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Table of Contents

Research Notices

Articles

Editorial

Welcome to volume five, issue two of the Journal of African Real Estate Research (JARER). As noted in the editorial of the first issue this year, JARER continues to be a significant medium through which research on African real estate markets is disseminated. We are witnessing an increasing trend in the rate of submissions and the review turnover timing is becoming more encouraging. Our appreciation goes to our reviewers and editorial board who have, despite the unforeseen challenges this year has brough, have dedicated their time and efforts to make this issue possible. We thank the board members of the African Real Estate Society, the Library services at the University of Cape Town, and Managing Editor, Luke Boyle from the Urban Real Estate Research, who has been working diligently in managing the publication process. In addition, we appreciate the support provided by IRES, ERES and Prof. Karl-Werner Schulte and his team from the IREBS at Regensburg University. The special issue focussing on showcasing real estate related research spearheaded by African women is progressing nicely. The special issue has attracted a number of submissions, mostly from new authors, and we are encouraged by the broadening support of the journal that this has demonstrated. Guest editors, Karen Gibler and Geci Karuri-Sebina, have worked tirelessly in coordinating the special issue and providing mentorship to the authors. Most of the articles are in their advanced stages and the issue is on track for publication before June 2021.

The current issue placed a strong emphasis on the Nigerian property market. The submissions focus on a wide range of topics from Nigeria's property data challenge; students' satisfaction in private hostels in Akure; land value capture and property tax; performance of commercial property in Lagos; and co-determinants of housing choice. It also contains, for the first time in recent period, an organizer's note on Future Leaders of African Real Estate Society (FLAfRES). The organiser's note, written by Akinsomi et al. announced the creation and activities of the Future Leaders of African Real Estate Society (FLAfRES), a youth wing of African Real Estate Society (AfRES). The notes highlights that FLAfRES, as a body, is created to promote active participation among early career academics, researchers and professionals; and promote volunteering and create a structural pathway to mentor the next crop of AfRES leaders. It examines the need for FLAfRES, its structure and fit within AfRES and strategies to explicitly involve younger members in the succession plans of the society.

The first research paper by Ndubisi Onwuanyi contributes to the debate surrounding the property data inadequacy and inaccessibility In Nigeria. The paper, which reviews existing literature on the subject, found that poor accessibility to property data has led to Nigerian valuers to adopt coping mechanisms rather than evolving best practices. The paper also found that views converged with respect to the creation of a central data bank as offering opportunities to address the property data issues in Nigeria.

The second paper, written by Victoria Amietsenwu Bello and Nnaemeka Bethel Ezeokoli, examines the nexus between rental value and the satisfaction of students in private hostel facilities. The paper analyses the responses of 390 students living in private hostels surrounding the Federal University of Technology Akure (FUTA), Nigeria. Using the Weighted Mean Score (WMS), T-test Statistics, Spearman Rank Correlation and the Multiple Regression Analyses, the paper found that the students who were satisfied with their hostel facilities pay higher rents than the non-satisfied students for a single, self-contained apartments. It thus found a significant difference in the rental price paid by satisfied and dissatisfied students.

Third in this issue is a study which forecasts the total returns of two commercial property investment types (shops and offices) in five sub-markets of the Lagos property market. The paper, written by Chibuikem Adilieme and Obinna Umeh, made use of longitudinal data on the capital and rental values of commercial property investments for 12 years; from 2006 to 2018. The least-square method of time series data was employed in predicting investment returns for the years 2019 to 2021, among other analyses, the forecast showed a downward trend for the period.

The fourth paper is written by Funlola Famuyiwa and focuses on developing a land value capture property tax rates schedule for use in Lagos state. This is with a view to aiding sustainability in municipal infrastructure financing. Using a sample from Alimosho, the largest local government area in Lagos, a hedonic regression model is used to determine the financial contributions of municipal infrastructure in property values to show their varying influences. The study's use of Geographic Positioning System (GPS) represents an innovation in previous studies on infrastructure and property values in Nigeria.

Finally, our last paper is from Ayodele Olatunji who examined the impact of real estate value, household income, commuting cost, workplace distance and household activity patterns on housing choice optimality in Nigeria. Using a sample of 107 purposively selected middle-income households in Abuja and Minna, the paper's regression analysis showed that the housing optimality model has a fair predictive explanation of approximately 57–77% for the explanatory variables.

It is my hope that you will find the papers in this issue exciting and informative. I look forward to hearing the views of our readers and furthering discussion around important African real estate matters. I wish all of our readers a wonderful festive season and a happy new year.

Sincerely,

Prof. Abel Olaleye
Editor-in-Chief

Organisers' Announcement: Future Leaders of the African Real Estate Society

Omokolade Akinsomi[1], Emmanuel Kofi Gavu[2] and Tayo Odunsi[3]

[1] School of Construction Economics and Management, University of the Witwatersrand.

[2] Department of Land Economy, Kwame Nkrumah University of Science and Technology, Ghana.

[3] Chief Executive Officer, North-Court, Lagos, Nigeria.

Abstract

The African Real Estate Society (AfRES), founded in 1997 seeks to promote networking, research and education among property professionals across Africa. In recent years AfRES has witnessed a number of challenges to its objectives. One of the most critical of these challenges is the decline in new members and an aging membership. In this paper we highlight the creation of the Future Leaders of the African Real Estate Society (FLAfRES). The inauguration and creation of FLAfRES is to promote active participation among early career academics, researchers and professionals; and promote volunteering and create a structural pathway to mentor the next crop of AfRES leaders. We examine the need for FLAfRES, the structure, its fit within AfRES and strategies to explicitly involve younger members in the succession plans of the society.

Keywords: Future Leaders; African Real Estate Society; FLAfRES

1. History of AfRES

The African Real Estate Society (AfRES), founded in 1997, is a continent-wide organization that seeks to promote networking, research and education among property professionals across Africa. It is affiliated to the International Real Estate Society (IRES) which was established in 1993 to promote real estate research and education at the international level, along with sister

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[1] kola.akinsomi@wits.ac.za

[2] ekgavu1.cap@knust.edu.gh

[3] tayo.odunsi@northcourtrealestate.com

societies in North America (American Real Estate Society - ARES), Asia (Asian Real Estate Society - AsRES), Europe (European Real Estate Society - ERES), the Pacific (Pacific Rim Real Estate Society - PRRES) and Latin America (Latin American Real Estate Society - LaRES). There is no profit motive and no person is paid for his or her services. The warmth and mutual support amongst members and between sister societies is its characteristic, and anyone who wants to contribute is welcome.

AfRES membership is currently organized into three regions:

1. Southern Africa (Republic of South Africa, Botswana, Swaziland, Lesotho, Mozambique, Mauritius, Madagascar, Zambia, Angola and Namibia)

2. Eastern Africa ((Tanzania, Kenya, Uganda, Rwanda, Burundi, Republic of Congo, Seychelles, Eritrea, Djibouti, Comoros, Ethiopia, Sudan and Somalia).

3. Western Africa (Nigeria, Ghana, Mauritania, Senegal, Mali, Guinea, Burkina Faso, Ivory Coast, Liberia, Sierra Leone, Togo, Benin, Cameroon, Chad, Central Africa Republic, Congo Brazzaville, and Gabon).

(AfRES.org, 2020)

The Northern Africa countries of Egypt, Libya, Tunisia, Algeria and Morocco are members of the Middle East and North Africa Real Estate Society (MENARES) that was set up in June 2009. The current membership of AfRES includes academics employed in private and public sector entities, property owners, investors and related professionals. Through seminars, annual conferences and other activities, AfRES has played a critical role in developing a platform from which property markets across the continent can prosper. These activities include – disseminating cutting edge research, developing education curricular and providing opportunities for robust debates on issues that affect African real estate markets.

The future of the African real estate sector is indispensable to developing highly skilled professionals. There is therefore an urgent call to encourage younger colleagues to join the society in order to ensure its sustainability and growth. In response to encouraging early-career real estate researchers and practitioners to join the society, Future Leaders of the African Real Estate Society (FLAfRES) has been formed to promote volunteering and mentoring the next AfRES leaders. The relaunch of the Journal of African Real Estate Research (JARER) is a step in the right direction to offer quality peer review research to the world at large that is focused on African real estate markets. JARER has a strong developmental dimension that mentors emerging African researchers. JARER offers quality feedback and support from the peer review and publication process.

2. Challenges and Potential Solutions to AfRES' Growth

The inauguration and creation of FLAfRES is to promote active participation among early career academics, researchers and professionals. In recent years AfRES has witnessed a number of challenges to its objectives. One of the most critical of these challenges is the decline in new members and an aging membership. Real Estate, as a form of education and profession, has grown in leaps and bounds across Africa. There are more real estate programmes being established across Africa and herein lies an opportunity for AfRES to be more active in engaging with early career academics, researchers and professionals to strengthen the core values of AfRES; promoting networking, research and education.

FLAfRES intends to address this challenge by organising an annual seminar at the AfRES conferences which aims to encourage more participation by early career academics and professionals, to encourage them to be more involved in assuming more leadership roles within FLAfRES and AfRES. The appointment to the FLAfRES board and subsequently AfRES board is centred on interest, willingness to contribute and capability which would be measured by publications and service record. This is very critical in ensuring vibrancy, continuity and sustainability of the society.

Another critical challenge facing AfRES is the seeming lack of a succession plan. There have been several attempts to encourage younger members to be involved and take active roles within the society; however, this has not yielded desired results. There is therefore a need to whip up more interests in a youth-led committee within AfRES that will appeal more to younger members to offer more to the society in terms of volunteering. To address this problem, FLAfRES has instituted a mentorship programme, to pair early career academics, researchers and professionals (ECARPs) to senior AfRES members. Each year, applications are open to all ECARPs within AfRES to participate in the mentorship programme. Submitted applications are assessed by the FLAfRES leadership and selected mentees are paired with mentors based on shared interests. A pool of mentors are available to be assigned to mentees on a one-on-one pairing basis. The mentorship programme is typically for a one-year duration, although the relation can actually last for a lifetime. The FLAfRES leadership assesses the progress of mentors and mentees using questionnaires during half year reviews. The expectation of this programme is that in exchange for a senior AfRES member's time, the mentee will serve the society through a number of volunteering opportunities. These volunteering opportunities include serving on seminar and conference organising committees; seminars and conference supporting staff; editorial and logistics support during AfRES related programmes.

Subject to the board's approval, the doctoral session could be re-designed and strengthened to provide an added opportunity for emerging academics and professionals to remain involved with the society. The doctoral session brings together doctoral students during the AfRES annual conference, to share research outputs, receive feedback from their research and network among themselves. To do this, the annual conferences would include the doctoral

session as a permanent feature during the annual meeting. A reduced conference rate must apply to doctoral/ student participants and also financial support provided to support doctoral students as is the case in our sister societies (i.e. ARES and ERES).

By getting more members interested in the activities of FLAfRES, we provided a pathway to encourage involvement at AfRES membership, regional leadership and senior organisational leadership levels. This is a strategic way to explicitly involve younger members in the succession plans of the society.

3. The role of Students, Early Career Academics, Researchers and Professionals in Organisations

Early career academics, researchers and professionals (ECARPs) are defined here as postgraduate degree holders who have less than 10 years' experience in their chosen fields of specialisation after their degree is awarded and may still be searching to find a firm footing in their chosen career paths. ECARPs face a myriad of challenges. They may not find joining professional bodies as exciting and necessary for their own career development. There is therefore the need to educate and highlight importance of recruiting, supporting and mentoring them to stay focused on their chosen career paths (Yakushko, Wang, & Warrior, 2012). When AfRES recognises the importance of ECARPs within the organisation, it will fill the gap in terms of reinvigorating the society and provides a growing constituency of real estate professionals across SSA (Scholes, Stanton, & Supp, 2014).

Some ECARPs believe that leadership positions have been closed to new members within professional bodies; although some seek opportunities to get involved directly. "*Within smaller structures, more hands are needed for running and organization, and students as well as early career professionals can offer insights, interests, skills, and backgrounds needed to move organizations forward*" (Yakushko et al., 2012: p.725). In a smaller structure within the AfRES organisation, (new) members can directly get involved and gain leadership positions. Early career programmes and activities help to integrate recent graduates to fit into the future of organisations they see themselves (Scholes et al., 2014). These collaborations have a number of benefits, both to ECARPs or youth and senior colleagues within professional organisations. These include improving scientific expertise; direct contact with professionals; research publications; mentorship programmes to train the next set of leaders; funding opportunities; work-life balance; and networking opportunities (Scholes et al., 2014).

Networking benefits are critical and challenging for ECARPs in professional organisations. Mentoring has been the traditional way for ECARPs to seek opportunities and promote career development (which in many ways is limited to one-on-one interaction). However, globalisation has put pressure on organisations to create innovative ideas (including social media platforms) to ensure that no one is left behind in their chosen fields or career paths (Wolff & Moser, 2009). "*Networking can be a successful tool for career*

development… defined as building, maintaining, and using relationships to enhance career success" (Ansmann et al., 2014: p.1). FLAfRES provides a platform for facilitating this much needed networking.

Senior professional colleagues must be concerned about how to recruit, involve and assist students and ECARPs in connecting with the organisation. This must also be balanced with the aspirations and needs of ECARPs within the broader organisation.

4. FLAfRES Organisational Goals

The FLAfRES meetings would be held annually at the AfRES annual meetings and would serve as a platform to connect early-career academics and industry practitioners. FLAfRES is intended to act as a conduit to promote and build the careers of early career AfRES members. Therefore, we will endeavour to invite top real estate academics and leading practitioners to give an annual lecture to FLAfRES members on career advancement and publishing in leading global journals. This annual FLAfRES events would also provide a platform for ECARPs to network, share ideas and learn from each other. The first FLAfRES event was implemented in September 2019 at the AfRES conference in Arusha, Tanzania. The event was led by one of the founding members of FLAfRES, Omokolade Akinsomi who invited Jeremy Gabe of the University of San Diego to give a talk at the event.

FLAfRES believes that these cohorts of members need to be nurtured and the values of AfRES introduced at an early stage of their participation in AfRES. We hope that this would generate increased participation after the conference and when they return to the various chapters and fully participate over the subsequent year after the conferences. The FLAfRES aims to work together with senior members of the organisation both in academia and industry to act as mentors to early career academics and professionals. Therefore, we aim to inaugurate a mentorship program. We hope to encourage senior member of AfRES to act as mentors, prior literature has shown that individuals who serve as mentors to other report greater promotion rates, salary and career success than individuals without any experience as a mentor to others. (Allen et al., 2006).

The first mentorship program by FLAfRES commenced in May 2020 led by the Vice-Chair of FLAfRES, Emmanuel Kofi Gavu. The pairing of mentors and mentees involves a number of steps: the Vice-Chair sends the FLAfRES mentorship application forms to the entire FLAfRES membership; potential mentees fill out the application forms – which includes information on why they want a mentor, their research method of analysis and their primary area of research interest. Once the application forms are returned, the Vice-Chair collates and sends this information to potential mentors to select their preferred mentee, and the match between mentor and mentee is completed. The FLAfRES mentorship program is an initial one-year program, which is expected to develop into a life-long relationship; we have adopted a non-prescriptive mentorship relationship and proffered a developmental mentorship relationship between mentor and mentee.

The pairing of mentee and mentors has been successful. The initial mentors are Patrick Katabua– Past President of AfRES and Director of Cushman & Wakefield/Broll; Samuel Azasu– Associate Professor at the University of the Witwatersrand and Past Editor of the Journal of African Real Estate Research; Jonas Hahn– Vice Chairman of the IREBS Foundation for African Real Estate Research; Olusegun Olanrele– Senior Lecturer at the University of Malaya; Abdul-Rasheed Amidu– Senior Lecturer at the University of Auckland; Tunbosun Oyedokun– Lecturer at the University of Glasgow; and Olalekan Oshodi– Lecturer at the Anglia Ruskin University. FLAfRES believes that this relationship between mentor and mentee could be mutually beneficial and could generate co-authorship opportunities in leading international journals, this would also assist mentees in extending network opportunities. As highlighted by Gibler (2000) and Gibler and Ziobrowski (2002), the quality of journals was the most significant factor considered in tenure requirements and promotion and hence induces authors to publish in them. In addition, mentoring has been shown as critically important in the professional success of the mentees including influencing ethical and responsible research conduct (Bird, 2001).

FLAfRES have developed a leadership structure similar to the Future Leaders of the American Real Estate Society (FLARES). This organisation has been largely successful and we have borrowed some of our ideas from them. We have structured the FLAfRES leadership to encourage participation and exposure to the AfRES structure and organisational goals. The functions of FLAfRES officers can be seen in Appendix 1 which stipulates the operating principles and definitions of roles, responsibilities and procedures of elected FLAfRES officers including Chair, Vice-Chair and Program Chair.

5. A Brief History of FLAfRES

The first FLAfRES meeting was held on Thursday, September 11, 2019 at the Arusha International Conference Centre in Arusha Tanzania. The meeting was well attended with 20 AfRES attendees consisting mostly of early career members including one of the founding members of FLARES– Jeremy Gabe of the University of San Diego, United States. The founding directors– Omokolade Akinsomi, Emmanuel Kofi Gavu and Tayo Odunsi developed the working structure of FLAfRES specifically for early career academics within the African continent and globally. This would include an annual meeting during the AfRES conference, a mentoring program to partner FLAfRES members with leading academic and industry mentors for a period of one year. To encourage the participation of mentors, an award in honour of Mr. Akin Olawore would be initiated, where we intend to inaugurate the Akin Olawore Mentorship Award to the most impactful mentor – we hope that this would encourage transfer of knowledge from the senior members to the early career academics of AfRES.

FLAfRES mission statements and adoption was presented by Omokolade Akinsomi to the AfRES board of directors at the AfRES board of directors meeting at the AfRES Annual conference on Thursday the 11th September

2019 in Arusha Tanzania. The president of AfRES, Mrs. Catherine Kariuki, fully supported the idea of the creation of FLAfRES and this was unanimously approved by the board members of AfRES[4].

The idea to create FLAfRES was initiated by Omokolade Akinsomi. The idea was initially developed when he was elected as the program chair of FLARES in Florida, United States in April 2018 and the impact of FLARES to early career academics inspired the establishment of a similar initiative from an African perspective. In April 2019 at the ARES annual conference in Arizona, United States, more concrete plans to develop this idea took place with Emmanuel Kofi Gavu and subsequently Tayo Odunsi. We therefore formed a group with Omokolade Akinsomi as the Chair. Omokolade is an Associate Professor at the University of the Witwatersrand, Johannesburg, South Africa. Emmanuel Kofi Gavu as the Vice-Chair is a Lecturer at the Kwame Nkrumah University of Science and Technology, Kumasi, Ghana. As Vice-Chair, Emmanuel has successfully paired early career members with senior members of AfRES across the African continent and globally for a period of one year. Tayo Odunsi as the Program Chair. Tayo is the Chief Executive Officer of North-Court, Nigeria and a PhD student at the University of Reading, England. As program chair Tayo is responsible for organising the annual FLAfRES meeting.

Due to the Covid-19 pandemic in 2020, the second FLAfRES meeting was held on the 23rd October. 2020 online as a Zoom webinar meeting. The guest speakers on the day were Ms. Vivian Ombwayo, Director of Research and Valuation, Broll Kenya; Dr. Tunbuson Oyedokun of the University of Glasgow; and Associate Professor Anthony Owusu-Ansah of the Ghana Institute of Management and Public Administration (GIMPA). The speakers gave presentations and stimulated an interactive session with FLAfRES members on career advice, development and advancement. The FLAfRES Exco also discussed the ongoing FLAfRES paper submitted to the Journal of African Real Estate Research, the mentorship program and plans for the future. Due to the pandemic, officers are expected to remain in their positions and an election for Program chair is expected at the AfRES conference in September 2021 in Lusaka, Zambia.

6. Conclusion

FLAfRES intends to act as a complement to the AfRES organisation. To engage more actively with real estate students, early career academics and professionals across Africa. FLAfRES aims to be of value to the AfRES organisation through our mentorship program. It is envisaged that FLAfRES will provide the needed pathway to increase and sustain the membership of AfRES through more active youth involvement. This will ensure vibrancy, continuity and sustainability of the society. We also aim to expose FLAfRES members to world best practices in academia and the real estate industry. By

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[4] The board however raised a note about the AfRES Youth Wing which is the existing student arm within AfRES and the possibility of an overlap between the two groups - the expectation of the board is that the FLAfRES committee work towards the incorporation of the AfRES Youth wing into the FLAfRES group in the future.

the activities of FLAfRES, we do hope to balance and meet the aspirations of all stakeholders.

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Appendix: Operation Principles & Definitions of Roles, Responsibilities, and Procedures

Article I

Annual Meeting: Function of Members

Section 1: Executive Committee

Item 1: The Executive Committee shall determine issues to be brought before the AfRES Board and the general membership at the annual meetings of the Society.

Item 2: The Executive Committee shall review, and tentatively approve, the report which will be submitted to the AfRES Board of Director's meeting(s), as well as the annual general membership meeting minutes (within 60 days of the annual **FLAfRES** meeting). Revisions may be made as necessary to capture the essence of the meetings.

Item 3: The Executive Committee shall consist of the chairperson (voting), vice chairperson (voting), program chairperson (voting) and immediate past chairperson (voting).

Item 4: The chairperson, vice chairperson and program chairperson shall automatically serve as voting directors during their terms of office. The immediate past chairperson shall serve as an elected director for a two- year period following his or her term as chairperson.

Item 5: Setting the FLAfRES Annual Meeting format, subject to change based on room availability and layout, as well as time allotment. The FLAfRES Annual Meeting format will be as follows:

1. Thursday: FLAfRES session
2. Friday: PhD Student Members, Researchers and Executive Committee invited to participate in Doctoral Session Luncheon (if funding is available).
3. Friday: Pre-Dinner Social event (if funding is available).

Item 6: Approving ''Mentoring Program Acceptance Criteria'' to assure fair and equal treatment to all members, for guidance of program chairperson.

Item 7: Holding regular committee meetings to attend to the affairs of FLAfRES.

Section 2: Officers.

The officers of the Society shall be a chairperson, vice chairperson (mentoring program chairperson), program chairperson (annual meeting program chairperson).

Section 3: Chairperson.

The chairperson shall serve a one-year term and shall perform all duties incident to the office of president as chief executive officer and such other

duties as may be decided upon by the board of directors. No individual shall serve more than one term as president. Included in the many duties of the president are the following

Item 1: Sit on the AfRES Meeting Committee.

Item 2: Chair the meetings of the FLAfRES committee.

Item 3: Bring important issues to the attention of the FLAfRES officers, at least seven days prior to the annual meeting.

Item 4: Chair the general membership meeting at the AfRES annual meeting.

Item 5: The chairperson should reside as parliamentarian at the annual meeting and is responsible for maintaining order at the annual meeting, including monitoring the flow of actions coming before the board and the membership to ensure compliance the by-laws of FLAfRES.

Item 5: Arrange, as necessary and after consultation with the FLAfRES Committee, for personnel and / or other necessary means to keep annual meeting preparations on schedule, should conflicts / non-performance occur.

Section 4: Vice chairperson / Mentoring Program Chairperson.
The vice chairperson will serve for a one-year term. He or she has included in his or her duties such tasks as may be assigned by chairperson. In the absence of the chairperson or in the event of the chairperson's inability or refusal to act, the vice chairperson shall perform their duties. The vice chairperson shall automatically become president after serving one year in that capacity.

Item 1: The vice chairperson is responsible for coordinating the mentoring program, and carrying out other functions as requested and / or delegated by the chairperson.

Item 2: The vice chairperson shall serve as chairman of the Mentoring Program sub-committee of the FLAfRES Committee during the year in which he or she holds office. The vice chairperson has primary responsibility for coordinating the mentoring program, including the following:
1. Sit on the AfRES Meeting Committee.
2. Respond to all questions related to the mentorship program.
3. Conduct initial review of the mentorship program applications for compliance to the application guidelines.
4. Recruit Mentoring Application Review committee and coordinate the review process.
5. Recruit mentors to participate in the mentoring program.
6. Upon review of applications, identify best pairings of mentors and mentees.

7. Contact all applicants and inform them of acceptance or non-acceptance. All applicants should receive feedback on their application if not selected.
8. Contact all mentors and notify them of whether they have been paired, and if applicable with whom.
9. Coordinate initial meetings at AfRES Annual Meeting.

Item 3: The vice chairperson shall make a summary report about the program to the FLAfRES board to be included in the chairperson's report to the AfRES board of directors at the annual meeting, along with proposed schedule and recommended changes in meeting procedures for subsequent year.

Section 5: Program Chairperson.

The program chairperson shall act as the program chairperson as well as secretary to the FLAfRES committee. The individual members at the annual meeting shall elect the program chairperson for a one-year term. Members attending the meeting shall make nominations. A member must be present to be nominated (and elected) for program chairperson. The results of the election shall be announced at the meeting. The program chairperson shall automatically advance through the positions of vice chairperson and chairperson at one-year intervals.

Item 1: The program chairperson shall serve as chairman of the Program Committee for the annual meetings of the FLAfRES Committee during the year in which he or she holds office. The program chairperson has primary responsibility for planning the annual meeting, including the following:

1. Sit on the AfRES Meeting Committee.
2. Chair the FLAfRES Meeting Committee.
3. Conduct contract negotiations with hotels at selected sites (if applicable).
4. Establish rate structure for rooms (if applicable).
5. Coordinate menu selection for events and breaks with the meeting committee (if applicable).
6. Monitor room pickups and other meeting related activities.
7. Organize speaker(s) for FLAfRES sessions / panels and organize additional social functions.
8. Maintain contact with meeting coordinator relative to on- site physical facility arrangements for meeting rooms, audio-visual equipment, signage, rooms, and services for food functions during FLAfRES Annual Meeting itself.

Item 2: The program chairperson shall make a summary report about the program to the FLAfRES board to be included in the chairperson's report to the AfRES board of directors at the annual meeting, along with proposed schedule and recommended changes in meeting procedures for subsequent year.

Item 3: Solicitation of meeting event sponsors (e.g., receptions, beverage breaks, lunches). In this capacity, the program chairperson will coordinate with the AfRES Meeting Planning committee.

Item 4: Solicitation of meeting displays and sponsors. In this capacity, the program chairperson will coordinate with the AfRES Meeting Planning Committee.

Item 5: The program chairperson may be removed by a majority vote of the board of directors for non-performance as evidence by the chairperson and the vice chairperson having to personally take action to ensure that the annual meeting proceeds on schedule. In such event, an election to select a replacement president-elect for the following year will be held at the next general membership meeting of the Society.

Item 6: The secretary shall keep the minutes of the regular committee meetings; shall keep the minutes of annual membership meetings; shall see that all notices are duly given; shall be custodian of the records; shall maintain a record of members' names and addresses; and, in general, perform all the duties incident to the office of secretary.

Item 7: Any subcommittee chairperson is charged to maintain a record of all events and activities in which such sub- committee is involved, which record is to be retained for five years following such event for activity. A copy of such records is to be made available to the chairperson, vice chairperson, or secretary upon request from same. This task may be assigned to a committee member, though the responsibility remains with the chairperson.

Item 8: The duties of the secretary are primarily those of recordkeeping and include:

1. Being the custodian of the by-laws of FLAfRES.
2. Keep the minutes of the annual membership meeting.
3. Keep the minutes of all meetings of the FLAfRES Committee and obtaining the committee's approval of the minutes within 72 hours of the annual meeting.
4. Update the FLAfRES by-laws to reflect any changes approved by the membership within two weeks following the annual meeting.
5. Update the by-laws to reflect any changes approved by the membership within two weeks of the annual meeting.
6. Maintain the membership record, and in general, perform all the duties incident to the office of Secretary.

Section 8: Immediate Past-Chairperson.

The immediate past-chairperson will serve as a voting member on the Executive Committee for a one-year term and remain on the Executive Committee for an addition year in an advisory capacity.

Item 1: The immediate past-chairperson will represent FLAfRES at the annual meeting of one of the AfRES sister-societies, if possible.

Item 2: In the event of the development of any FLAfRES awards, the FLAfRES immediate past-chairperson shall chair the Prize Awards Committee, handle all details and tasks necessary to expeditiously carrying out its function, and make all award decisions based upon the opinions of at least two, but ideally three, of the Prize Committee judges.

Article II

Annual Meeting: Elections

Section 1: Prior to voting, the chairperson (or his / her appointed agent) will explain the Society's election procedures to the general membership. The importance of prior service to the Society by nominees, as evidenced by attendance and presentations at prior meetings, editorial board activity, and committee activity is to be stressed, particularly, for vice presidential nominees.

Section 2: A member must be present to make a nomination. A member must be present to be nominated (and elected).

Section 3: A member to be elected should have attended 3 years AfRES conferences and must be involved with Academic or Professional Research within AfRES.

Section 4: Speeches supporting nominees for elected offices shall be limited to one minute.

Section 5: The election process is to be monitored and evaluated on a continuing basis by the FLAfRES Executive Board and re-evaluated after each annual meeting.

Article III

FLARES Roles at AfRES Conferences

Section 1

At each AfRES annual conference, FLAfRES members under the direct supervision of the Program Chairperson shall serve as Rapporteurs for each plenary and breakout session. The rapporteurs for each session shall prepare a two page summary of each plenary and a one page summary of each breakout session.

Section 2

The summaries will be collated and made available to the AfRES Board as the annual conference report which may be utilized in whole or part or any manner at the discretion of the AfRES Board such as a post-conference communique to governments or any other body

Article IV

Amendments

These by-laws may be altered, amended or repealed and new provisions added by a majority vote of those present at annual meeting of FLAfRES. Such alterations shall be operative immediately upon adjournment of the FLAfRES Annual Meeting at which they are approved. All members of FLAfRES are to be provided written notice of motion of any proposed change or addition at least 21 days prior to the voting on same; this notice of motion requirement may only be waived by a unanimous vote of all Executive Board members. Notice may be posted online on the FLARES tab of the AfRES webpage, Social Media pages; and / or as part of the newsletter submission.

Endnotes:

1. The founding directors of FLAfRES are as follows: Kola Akinsomi, PhD (Chairperson); Emmanuel Kofi Gavu, *Dr.-Ing.* (Vice Chairperson) and Tayo Odunsi (Programme Chairperson).
2. The founding directors have agreed as a matter of principle to limit membership of FLAfRES to academic and professional researchers.
3. Benefits of FLAfRES to the mother organization, AfRES, are as follows: to encourage membership of early career academics, researchers and professionals to AfRES; encourage young people to take up leadership roles within AfRES through mentorship programmes; FLAfRES members serving as Rapporteurs during AfRES meetings.
4. In the near future the plan is to be able to annually sponsor at least one PhD student to the AfRES meeting.
5. The founding directors agreed to kick-start FLAfRES during the 19th Annual General Meeting and Conference in Arusha Tanzania in 2019 (in attendance was one of FLARES founding members – Jeremy Gabe).
6. The draft constitution is adapted and modified from the working document of FLARES.

A Review of the Property Data Challenge in Nigeria

Ndubisi Onwuanyi[1]

[1] Department of Estate Management, University of Benin, Benin.

Abstract

Data on Nigeria's property sector tends to be inadequate and inaccessible. While the government produces statistics for its own activities, such as GDP and inflation rates, other sectors function with insufficient information. This is particularly true for Nigeria's property sector and its data which have been given a lesser status despite an increasing economic importance for investment opportunity, GDP contribution and attraction of foreign investment funds. The gap in data creates a challenging situation for property valuers, but also, an opportunity for property researchers. This paper, which reviews existing literature on the subject, is a contribution to the debate as well as an effort towards a solution. The literature stipulates that poor accessibility to property data leads valuers to enact coping mechanisms rather than best practice and that property data is synonymous with market transactions which makes it invaluable to valuers. Also, there is a convergence of views in the reviewed literature that a central data bank offers opportunities for a solution. Conversely, it is here argued that focusing on market transactions is a narrow understanding of data as property data extends beyond such transactions. This school of thought believes that the users and uses of property transaction data extend beyond valuers and valuations and that the central data bank recommendation requires examination as to its feasibility. Accordingly, this paper broadens the definition of property data by recognising the existence of non-market data, by identifying its other users and uses as well as its role in socio-economic policies. The considerable doubts associated with the central data bank recommendation leads the study to make recommendations which are novel, but nevertheless, hold holistic methods for addressing Nigeria's property data challenge.

Keywords: Property Data; Market Transparency; Property Markets; Nigeria

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[1] ndubisi.onwuanyi@uniben.edu

1. Introduction

Access to reliable and valid data continues to be a challenge in Nigeria. Population censuses, for one, have been the centre of statistical controversy (Kazeem, 2019), and these recurrent disputes have engendered unfavorable perceptions of data produced in Nigeria. Adepoju and Olaomi's (2008: p.231) state that: "*the general attitude towards Nigerian statistical data is that they are unreliable and unusable*". This critical assertion is substantiated by Olubusoye et al. (2015: p.12) who observe "*a poor statistical culture, a lack of feel for numbers and generally a lack of appreciation of the important role which statistical data and information can play in society*". Consequently, the country relies upon data estimates and forecasts which have typically and consistently come from global institutions such as the International Monetary Fund and The World Bank (Kazeem, 2019). The consensus across academia and recent assessments of the challenges related to Nigerian data (Nwogu, 2006; Olubusoye et al. 2015; Beguy, 2016; Afeye, 2019; Kazeem, 2019; Uduu, 2020) is that data is not easily available due to systemic deficiencies mainly of governance (poor coordination, inadequate monitoring and evaluation) and funding (which is largely-donor driven).

This study is about property data, a variant of mainstream data, a universal need which has been described as "*the world's most valuable resource*" of the digital era (Economist, 2017: p.1). Across the economies of the world, property investments create, preserve and enlarge wealth as well as protect it against inflationary pressure. As a consequence, the greatest part of global wealth is held in the form of property (World Bank, 1989), and property is the world's largest asset class by value (Savills World Research, 2017). Furthermore, property data is important in the economy where it is the norm for value-creating production decisions to be made at various levels: the individual, household, producer and government. These decisions are indirectly dependent on property data because property is a basic production input (Jin et al., 2018). Fraser (1984) underscores the inter-reliance between property markets and the economy. Property data is also important because it is economic data which makes it a vital input to property investment decisions. At governmental level, property data is also essential to economic planning and management. All of these highlight the importance of property data in various decision making processes which have significant economic impact. This requires that property data be accessible and reliable. It is particularly important in the preparation of valuation advice for the guidance of property investors whose decisions should be optimal, and therefore, founded upon optimal valuation advice.

Like in other countries, property markets are a central component of Nigeria's economy. Correspondingly, property data is of significance to the functioning and efficiency of Nigeria's property market. Having reliable and accessible data will support optimal property investment decisions which, by producing successful outcomes, offers the potential to strengthen the economy. Hence, without accessible and reliable data to facilitate accurate valuations, optimal investment advice cannot be given by valuers (Ajibola, 2010; Adegoke, 2016). Many authors have highlighted the existent data inadequacy for

property valuations in Nigeria (Ogunba & Ajayi, 1998; Olaleye, 2004; Aluko, 2007; Effiong, 2015; Obayomi, 2018). The Jones Lang LaSalle (JLL) Global Real Estate Transparency Index (2018) also underscores this view by its finding that Nigeria has "a low transparency" which diminishes its global competitiveness. This low international perception of Nigeria's property market is due partly to a "data availability" challenge (JLL, 2018), and may slow down property sector growth (Gbonegun, 2018).

This study, therefore, examines the challenge of accessible and reliable data to Nigeria. It involves a review of extant research work on property data inadequacy in the country. The available body of work is limited and it is entirely the output of valuers, who collectively, are an important segment of regular users of property data. The paper finds it necessary to broaden the property data concept to accommodate the omissions observed in existing research. This is then used to elucidate the extent of the challenge by identifying the various groups who usually have a need for, or are involved in the production of, property data. Furthermore, this study collates the various recommendations as per the articles reviewed. Areas of commonality were critically appraised in the search for a holistic solution.

Following the introduction, there is a review of literature on mainstream data, its uses, challenges and their consequences in developed and developing countries. This is followed by the definition of property data and an elucidation of the concept in Nigeria's context. Thereafter, the nature of the property data challenge in Nigeria is defined from local and international perspectives as a foundation to the review of extant research. The specifics and recommendations of the reviewed works are then collated and the common recommendation discussed with the intention of proposing a holistic solution to the Nigerian property data challenge.

2. Literature Review

According to the RICS (2009), "*Data can be in the form of facts or statistics*" (RICS 2009: p.4). The meaning here is that "facts" are known to be real and experientially provable whilst "statistics" constitute numerical information which is obtained from a process involving collection, organization, analysis, and interpretation. Thus, data may be gathered either directly from observation (including surveys and measurements) or produced by statistical analysis. Irrespective of the origin, data consists of evidentiary details about people, assets, events, issues and phenomena. It is purposely sought because it is needed to produce understanding, and thereby, provide the basis for reference and analysis. Good quality data should have the features of reliability and validity. Reliability, as Burns (2000) states, calls for dependability, stability, consistency, predictability and accuracy. Validity would exist if data reflects accurately what it ought to reflect. This depends on methodology.

2.1. Data in a Universal Context

Data is a universal resource. Its significance can be appreciated from two distinct levels; the corporate level and at the level of economic management. For firms, businesses and other organisations which are guided by set targets, data is important because it "*is the basis of analysis. Data is used for benchmarking, business planning, decision-making, and internal and external reporting. Its target users will be just as varied. This makes it difficult to identify exactly why data is needed-specific decisions will require specific sets of data*" (RICS, 2019: p.7). As a business tool, data is powerful and possesses the potential to create value. It offers cost savings through improved efficiency and provides customer need insights. For these reasons, data is profitable to produce, to possess and to use. At the level of economic management, data constitute the input which are used to measure economic development (Ge & Harfield, 2006). Data is essential for governments and institutions to plan accurately, fund and evaluate their activities, and in monitoring progress towards specific goals of improving socio-economic conditions (Beguy, 2016).

2.2. Data Challenges and their Consequences

Where information is relevant, reliable, recent and valid, it improves the prospects of making the right decision (Burns, 2000). Thus, data inadequacy presents a challenge – one which requires persistent research for sources with greater detail as well as improved accuracy. The search for new, improved, data-gathering systems is necessitated by the growing expectations of data users and the complexity of decision-making (McAfee & Brynjolfson, 2012). Big data, a new source facilitated by the digital revolution, is one of these systems. It is data which is accumulated from diverse sources which practically cover all aspects of life and living (Mutuku, 2016). It consists of "*new data sources other than censuses and surveys which have been common in official circles*" (Beresewicz, 2015: p.2). In big data, developed and emerging countries can obtain diversified and detailed information with the potential to enable improvements in virtually all aspects of society and the economy. Although big data has gained wide recognition as a potential source of statistical information, Beresewicz (2015: p.8) cautions that "*there are several aspects that need to be considered in order to meet the criteria of a statistical data source*".

There are opportunities in big data for less developed countries and these consist of new opportunities for statistical tracking, measurement and delivery of more information for planning and management (Beresewicz, 2015). Some of these opportunities are in property or real estate. Big data applied to real estate furnishes information for more effective marketing and improved buyer decision-making; enables investor choice-making as to the best locations for projects where customer traffic maximisation is important; enables easier identification of trends and more accurate predictions. Also, there are advantages of user-convenience and quick information delivery due to big data's extensive volume, variety, veracity (accuracy), velocity (speed), and therefore value (Özköse et al., 2015). Furthermore, big data facilitates

automated valuation models and enables faster decisions by buyers and sellers (Kok et al., 2018). It also aids the provision of cost-efficient urban services by obtaining information on citizen preferences (Barkham, 2015). The benefits of big data extend to property owners, property investors and property practitioners. However, this digital resource requires facilitation by high levels of digital literacy and internet penetration because it is an interactive undertaking, necessitating public input. Africa's comparatively low levels of internet penetration (Statista, 2019a), low adult literacy (World Bank, 2018a) and a poor statistical culture (Beguy, 2016) are potential barriers to big data. Nigeria's population is given as 195 million (an estimate, incidentally, in the absence of a census), the adult literacy rate is 62% (World Bank, 2018a); the level of internet penetration is 68.82% (Statista, 2019); whilst the number of Nigerians on social media networks is 16.6% (Statista, 2019b). Much growth may not be achieved in the short and medium terms due to various estimates of rising poverty levels (African Development Bank, 2018; WorldBank, 2018b). Big data, as a resource of the future for Nigeria and other developing countries, may have limited impact unless these constraints are addressed.

2.3. Data in Developed and Developing Countries

Countries of varying levels of development need data. For developing countries, data is critical to development whilst developed countries are increasingly becoming data-centric as their technology-driven firms explore the benefits of digital capital (Singh, 2019). This has seen them become top producers of data in what is termed as the new data economy. Data is described as the fuel of this new economy (Chakravorti et al., 2019), because it is used to create new goods and services as well as solve problems (Aaronson, 2020). Developing countries need data in order to make realistic plans. They need to produce indices which define social and economic life. These include births and deaths, growth and poverty, taxes and trade, land and the environment, health, schooling and safety. But the quality of data is dependent upon national statistical systems which, in the case of Africa are ineffective, making it difficult to have accurate, timely and reliable data (Beguy, 2016). The inability of African countries to produce frequent and timeous data creates a challenge to data-driven decisions (Beguy, 2016). In developed countries, the availability of capacity for the operation of statistical systems has provided "*leadership, policy direction, forward planning…operational standards and methodological criteria*" which have created successful outcomes, although some systems are notably more successful than others (OECD 2015: p.6). The need for data is underscored by the fact that socio-economic development is planned with data, tracked by data and periodically measured by data. Thus, undertaking development without data is akin to going on a distant journey without a map.

2.4. The Concept of Property Data

Property data is data which is gathered or produced from landed property. It originates from landed property as it passes, at different times, through the processes of being initially delineated, bought and owned, leased out and sold

off. These processes involve administration which deals with rights, tenure, registration and transactions-monitoring (Wallace, 2009); and management, development and disposal (by sale or letting) which are value-adding, market and profit-oriented (Darlow, 1984; Fraser, 1984; Savills UK, 2020). Due to factors of heterogeneity and uniqueness of location, each property unit is distinct (Fraser, 1984). This necessitates its clear identification and collection and retention of pertinent details for reference and analysis as may become necessary. Using the RICS (2009) definition of property data as consisting of facts and statistics, it becomes evident that some statistical information will emanate from within the property market whilst other factual information regarding property will originate from outside it. Therefore, this study espouses a broad concept of property data which constitutes three categories: property ownership data, property market data and property industry data as displayed in Table 1. The various types of data in each category and their sources are listed. In the first category, property ownership data is not market-derived; rather it comes from the land administration system. In the second category, property market data emanates from the property market with the exchange of rights in property between buyers and sellers, and lessors and lessees in the letting, investment and development sectors. As Fraser (1984) explains, rents are determined in the rental sector; investments are bought and sold in the investment sector, whilst in the development sector site values are determined as well as the supply of new property for sale and lease. Between these three sectors, there are interactions which give character to the property market.

Table 1 shows that the property industry is a larger and wider concept than the property market; the latter being a part of the former. The RICS (2009) report recognises this fact by its focus, not directly on the UK property market, but on the UK property industry which "*concerns almost every aspect of the built environment: from how we use and interact with properties as individuals and businesses, through to how a building's energy consumption and construction details are being recorded and analysed to help surveyors, asset managers, building managers, developers and investors make informed decisions about real estate*" (RICS, 2009: p.3). Just as in the case of the three sectors of the property market, there is an interrelationship between the three data types described in Table 1. They jointly create a basis for optimal decision-making in the entire property industry. The true source of reliable and valid property data is the individual and unique property asset. That uniqueness can be captured under the three identified types and sources. Property data is mostly a cumulation of information gathered from heterogeneous property units spread across a particular jurisdiction.

Table 1: A Broader Conception of Property Data

Types of Property Data		
Data on Property ownership	Data from Property market	Data on Property industry
name of owner geographical location land size date of construction title/tenure	asking prices biding prices transaction/traded prices transaction rents (occupied) transaction rents (new) investment expectations	material costs labour costs building supervision costs professional fees input to decision-making
Sources of Property Data		
land registration system	the property market's letting, investment and development sectors, real estate agents/brokers, valuation advice/reports	the market for building materials, building industry regulations, construction industry professionals (architects, builders, quantity surveyors, civil engineers, from self-builders, estate developers

Source: Author's Research, 2020

Table 1 addresses the systematic accumulation of property data which is the main issue of this study. It also seeks to explain that property data is not synonymous with property market data. Thus, it is emphasised that property data extends beyond what is supplied by, or obtained from, the property market. That property data accumulation in the Nigerian context refers to three categories: data collected under the statutory system at Land Registries in Ministries of Lands and Survey, market data and industry data. This provides the background for elucidating the various users and uses of data. However, it is pertinent here to differentiate between formally accumulated property data (which is under consideration in this study) and valuation data, whose sources RICS (2017: p.17) identifies as: "*the client; inspections; property analysis; market analysis and the public*". This definition is rationalised by the fact that: "*the valuation process begins from the moment the client requests a valuation, up till the value is established and reported*" (RICS, 2017: p.17).

2.5. The Property Data Challenge in Nigeria

Since this paper discusses the property data challenge in Nigeria, it is appropriate to consider what evidence there is that such a challenge actually exists. The issue can best be addressed by looking at the present sources of data and the flow of information in Nigeria's property market in contrast to property markets in other countries.

Property data is obtainable in Nigeria in the three categories as shown in Table 1. Not all land is registered, nor are all land transactions recorded. Research by Butler (2009; 2012) and Akinbogun and Dunse (2014) respectively confirm widespread informality in, and the immaturity of, the Nigerian market. Informality is not associated with record-keeping whilst immaturity implies a lack of organisation. Under these subsisting conditions,

there is no systematic collation of transaction evidence from the property market and this affects data adequacy and accessibility (Olapade et al., 2019). The situation in Nigeria is worsened because most transactions do not pass through valuers mainly because they are not adequate for the volume of transactions and this creates an opportunity for intrusion by non-professionals (Oloyede, 2011). Regarding what this paper describes as property industry data, Nigeria is not completely in the dark as some records are independently held by individual practitioners, firms, professional and other organisations and government agencies, but since this is not systematic, the results are unlikely to be comprehensive. Therefore, the main property data source is the property market. This is the common origin of data held in valuation firms' own records, presented in research reports and published by the media. It is also the source of data which is purveyed by a growing number of online sources. These include Proshare, Estateintel, Nigerian Property Centre and Castlesweekly. Reports on market trends and opportunities have also been produced by firms such as PwC, Banwo and Ighodalo and Akin Olawore & Co.

The issue of market information flow is addressed by the JLL 2016 and 2018 global surveys of property markets. These are important assessments because globalisation has inevitably engendered comparisons between economies, property markets and systems. In JLL's (2016) survey, the dearth of data contributed to the low (opaque) rating given to Nigeria's property market mainly because of its inability to meet a global standard measure of market transparency. Nigeria's 96th position out of 97 countries indicates a very low perception of its property market by international investors. In the 2018 JLL Index of Global Real Estate Markets, "data availability" (a property market issue) is one of the criteria, others being institutional issues such as "governance, transaction processes, property rights and the regulatory/legal environment". Out of 100 countries and 168 city markets, Nigeria undergoes an improved rating as 67th out of 100. Its overall ranking improved to that of a "low transparency". It can be surmised that the limitations experienced locally in terms of data sources and the conclusions from the JLL surveys confirm the existence of a property data challenge in Nigeria.

In response to this historic deficit in statistics and data, Nigeria recently adopted counteractive measures which include the establishment of the Nigerian Bureau of Statistics (NBS) in 2007 and the Office of Statistician-General. These were done to meet the challenge of producing official statistics in Federal Ministries, Departments and Agencies (MDAs), State Statistical Agencies (SSAs) and Local Government Councils (LGCs). The NBS is part of the World Bank-funded Statistical Master Plan (2003). It has, despite a paucity of resources, improved the efficiency and timeliness of data production as well as the supply when compared with its predecessors, the Federal Office of Statistics and National Data Bank. The NBS as the main agency responsible for official statistics, coordinates the entire Nigerian National Statistical System and is required to produce adequate, quality and timely official statistics to meet the needs of government, universities, research institutes, the private sector and international agencies.

2.6. The Importance of Data in Property Markets

Property markets are made up of parties who engage mainly in buying, selling, leasing, mortgage and development of landed property. These activities tend to involve sizable monetary outlays since property investment is essentially a way of holding money. Again, market transactions present the basis for appropriately rewarding the factors of production (Harvey, 1994)– landed property is a factor input to all productive activities (Jin et al., 2018). For all these reasons, it is important that neither party to a property transaction spends more or receives less than he ought. Thus, where data is inadequate for quality advice on value, there is a likelihood that transactions will not be based on optimal prices. The outcome will be an unequal exchange of value, which is indicative of a market system which is inefficient and of low competitiveness (NASDAQ, 2020). Where factors of production are able to receive a commensurate return, such a market would be described as being allocatively, operationally and informationally efficient, and therefore, competitive (Keogh & D'Arcy, 1994).

The importance of data is reflected also by the fact that the modern economy is substantially driven by an effective and efficient property sector which, in turn, is driven by data. The property sector is vital for many reasons. First, shelter is a basic human need. Second, real estate (including land) accounts for a substantial portion of national wealth (World Bank, 1989). Such wealth is the outcome of investment decisions which are made and sustained by information. The financial importance of real estate leads Kok et al. (2018: p.202) to describe it as the "*largest asset class in the world*". Third, landed property is a factor input to production, meaning that goods produced by industries and services delivered by businesses are enabled by the property industry (Minguzzi, 2018). Fourth, the property industry (and its constituent construction sector) employs professionals, artisans and other workers who contribute to economic output and the GDP (Minguzzi, 2018). Fifth, real estate offers a stable base for revenue yield to the government through taxation (Youngman & Malme, 2005). Data contributes to the effectiveness and efficiency of the property sector by facilitating and optimising buyer and seller decisions (Kok et al., 2018), promoting transparency and a good market reputation, both at home and abroad (Kelly, 2018).

2.7. Data Challenges and Property Markets in Nigeria

The common manifestation of the data challenge in Nigeria's property market is the scarcity of reliable and valid data when and where it is needed. This is an inference drawn from existing research (see Ajibola, 2010; Ajibola & Ogungbemi, 2011; Adegoke, 2016; Olaleye & Olapade, 2018). A further challenge exists if the data needed is either not available or is available only in a limited quantity, a situation which gives rise to data sharing (Olapade & Olaleye, 2018). Another complication might be that available data is not recent. This scenario leads to the adoption of methods which do not require comprehensive market data (Ashaolu & Olaniran, 2016) Furthermore, the data challenge leads valuers to seek the assistance of colleagues who usually have privately garnered such information (Ashaolu & Olaniran, 2016;

Olapade & Olaleye, 2018).This course of action constitutes a challenge because it is not standard practice and data may be unreliable (Bamigbola, 2018). Furthermore, there may be a reluctance to share due to the undoubtedly competitive nature of practice. Thus, data becomes a trade secret of those who have privately gathered it. This situation has implications for the quality of valuation advice given by valuation firms. Thus, the shortage of data, by hampering property investment advice, would tend to delay new investments as valuers need to gather the information for investors privately. A failure to do this effectively may discourage investors. The data challenge impacts property markets because property investment is based upon expectations of the future in respect of which the present is used as the basis of analysis. Data represents reality, so its unavailability makes the future more risky.

Various deficiencies of Nigeria's property market have contributed to its categorisation as an immature sector by researchers such as Akinbogun and Dunse (2014) and Clement et al. (2016). One of these deficiencies is a dearth of data. At the core of this challenge is the absence of an efficient institutional framework and workable arrangement for the systematic collection and dissemination of property data (Bamigbola, 2018; Olapade et al., 2019). The suggestion is that the Nigerian system is comparatively inchoate and in need of organisation, re-organisation and standardisation. The current situation is unsatisfactory because it is reasonable to expect that Africa's largest economy would be supported by an efficient data management of its property sector which is vital to economic production. However, Nigeria falls behind the Republic of South Africa (second largest economy in Africa) in property data collation, dissemination and property market transparency (JLL, 2018). The latter has a well-established and effective system of capturing data on all property ownership and changes thereof (Luus, 2003). Under this system, house price indices are regularly produced and metropolitan authorities capture data on property within their jurisdictions. Unmistakably, this suggests a property data system which has taken shape and form. This is confirmed by JLL's (2018) categorisation of South Africa as Africa's most transparent market, ranking higher than eight European countries including Austria, the Czech Republic, Norway and Portugal. The disparity between Nigeria and South Africa cannot be explained simply by South Africa's relatively longer period of political and economic stability. Good planning, management and supporting legislation are also important factors. These should not continue to elude Nigeria.

The absolute necessity for change is further rationalised by the growing importance of Nigeria's property sector. Its contribution to GDP has been rising; with an increase in foreign real estate investment and real estate's national appeal as an investment opportunity. This is reflected by the listing of property development companies on the Nigerian Stock Exchange and various speculative residential and commercial development projects in major cities. As mentioned, data is pivotal to an efficient property industry given the industry's substantive role in economic development. The real benefits of a well-run property sector are more likely to materialise if property practitioners, property investors and policy makers (and managers) have access to adequate, timely and valid property data. Therefore, the resolution

of the property data challenge in Nigeria serves the mutual interests of all participating actors, as well as society, more broadly. In these many respects, it becomes undeniably necessary, important and apposite to examine the property data situation in Nigeria.

This paper, therefore, examines the challenge which property data poses to Nigeria by undertaking a critique of published literature on the subject to ascertain:

(i)   The specifics of property data inaccessibility;

(ii)   The recommendation(s) for overcoming property data inaccessibility; and consequently; and

(iii)   Evaluating the feasibility of the recommendation(s) with a view to proposing a holistic solution which addresses all issues pertinent to resolving the property data challenge in Nigeria.

3. Approach

The research approach of this study involves a review of extant literature on the accessibility of property data in Nigeria. A total of 23 publications on the topic were found through an exhaustive online search. In the absence of a property research repository, this was a reasonable method of assembling published work on the topic. Given that property data in Nigeria is limited, this paper surveys the work of valuers who are both producers and users of the data. Their perspectives, given this dual role, therefore adequately reflects the nature of the challenge and contributes towards its resolution. The papers reviewed are empirical studies undertaken between 1998 and 2019, a period spanning 21 years. Out of the 23 studies, 21 are Nigerian, the remaining two are Ghanaian. They have been included for their relevance which arises from the fact that both countries are facing the same challenge. The fact that a solution is yet to be found and property data inaccessibility continues to be a topic of debate underscores its importance in Nigeria. Thus, this approach elucidates the concept of property data; identifies its present sources in Nigeria; and addresses the nature of the property data challenge. Thereafter, extant research is reviewed with the main recommendation(s) collated for discussion. This aims to support the search of a holistic solution which aligns with this paper's working definition of property data, through which explorations of ways of overcoming the challenge are presented.

The research which is of relevance to the property data challenge is displayed in Table 2 which lists the year of publication, the researcher(s), the essentials of the studies and their shared recommendation.

Table 2: List of Published Property Data Research

S/N	Year	Author(s)	Specifics	Common Recommendation
1	1998	Ogunba, A.O.& Ajayi, C.A.	Residential valuation inaccuracies in Lagos result from the dearth of data, amongst other factors.	A central NIESV* databank.

2	2004	Olaleye, A.	An investigation of data sources of valuers and the effects of the lack of a data bank in Nigeria	A centralised databank.
3	2006	Mends, T.M. **	Conditions and contradictions, namely data and knowledge inadequacies, market informality, amongst others, often distort estimated property values.	A sound property data system is recommended, inter alia.
4	2007	Aluko, B.T.	Some factors, inclusive of a lack of a centralised databank, cause variations in valuers' interpretation of property characteristics which affect valuation output.	A centralised databank.
5	2008	Olaleye, A.	The dearth of transaction data limits choice and strategy in the portfolio approach to property investment	A centralised database
6	2010	Ajibola, M.O.	Inaccurate professional advice is greatly affected by lack of a databank.	A NIESV databank.
7	2010	Ajibola, M. O. & Oloyede, S. A.	Lack of data sharing is a major barrier to valuation consistency.	A central NIESV databank.
8	2011	Ajibola, M.O.& Oletubo, A.A.	Valuation inaccuracy in Lagos is due to inadequacy of data, outdated methods, inexperience and client influence.	A central NIESV database.
9	2011	Babawale, G.K.& Omirin, M.M.	High levels of inaccuracies in residential property valuations are due to factors such as experience and market knowledge.	Systematic data procurement and banking by NIESV.
10	2011	Ajibola, M.O.& Ogungbemi, A.O.	Valuation inconsistencies are linked with poor data.	An NIESV databank.
11	2015	Ayedun et al.	Variance and inaccuracy attributable to inexperience, training and a data dearth.	A central database.
12	2015	Bello, V.A. & Thomas, O.J.	Valuation opinion amongst valuers show close and insignificant differences; but databank is a necessity	A central NIESV databank.
13	2015	Effiong, J.B.	Valuation variances and inaccuracies in Nigeria are comparatively far higher than in the UK.	A central property database.
14	2016	Adegoke, O.J.	Variance and inaccuracy cause fluctuation in the price of property, sending wrong signals.	A data bank system.
15	2016	Ashaolu, T.A.& Olaniran, M.O.	Data difficulties drive valuers to seek assistance from colleagues or adopt less than ideal methods.	A central NIESV databank.
16	2016	Clement et al.	Lagos' property market is comparatively more mature than Ibadan and Oshogbo; but all are challenged by market data.	An NIESV databank for each state.
17	2017	Adebayo, A.A.	The availability of data determines valuers' adopted method of valuation.	None, but recognises pivotal role of data.
18	2017	Awuah, K.G.B. et al. **	Identifies and assesses reliability of seven valuation data sources in Ghana.	Systematic data collection needed.
19	2018	Olapade, D. & Olaleye, A.	Identifies and explains 19 factors affecting valuers' data access in the Lagos market.	A data bank can address challenge.
20	2018	Aliyu et al.	Identifies data inadequacy amongst others as causative factors of mortgage valuation inaccuracy in Kaduna.	A databank.
21	2018	Olapade, T.O. & Olaleye, A.	Most Lagos valuers are willing to share data and support a data bank as a means of improving accessibility.	A central database.
22	2018	Bamigbola, D.	Deployment of technology by valuers is associated with absence of a data bank.	A database system involving individuals/groups/institutions
23	2019	Olapade et al.	Valuers, as potential users of centralised property database, would prefer its management by NIESV.	An NIESV central databank.

4. Overview of Property Data Research in Nigeria

For three basic reasons, these collated studies all deal with valuation. First, the authors are all trained valuers and real estate practitioners. Secondly, "data *plays a central role in the real estate sector and the valuation process*" (RICS, 2017: p.17) and finally, research relating to property data in Nigeria is held by valuers.

4.1. Valuation Accuracy and Valuation Variance

Valuation accuracy and variance are key areas of investigation. Valuation inaccuracy is seen to emerge if there is a wide difference between the assessed market value of a property and its eventual sale price; where no market or material changes have taken place to warrant any difference (Ibiyemi, 2013). On the other hand, valuation variance occurs where valuations of the same property, for the same purpose, and at the same time, differ significantly amongst different valuers (Ibiyemi, 2013). Variance differs from inaccuracy because it assesses the degree of divergence in opinion of value amongst different valuers whilst the latter reflects divergence from actual market value. The recommendations of researchers (see for example Ogunba & Ajayi, 1998; Olaleye, 2004; Aluko, 2007; Effiong, 2015) on these two issues indicate a commonality of opinions in support of a centralised property data bank managed by the Nigerian Institution of Estate Surveyors and Valuers. This common recommendation points at data input as a factor in inaccuracies and variances.

Despite the distinction made between inaccuracy and variance, the commonality of opinions on data banking suggests that they are two sides of the same coin. Given the call for valuation standards by Effiong (2015), data banks alone cannot guarantee that valuations will be more accurate, but they may bring about a reduction in these occurrences (Ajibola, 2010). If a valuation was analogous to a manufactured product such as a medical device which must be safe and effective in use, its successful making would require a combination of *quality control* and *quality assurance* in accordance with good manufacturing practice (ISPE, 2020). In this instance, the undoubted determinants of quality control are input (in the form of valid data) and processing (in the form of methodology) whilst quality assurance comes in the shape of adherence to prescribed valuation standards, including the valuer's interpretation of market facts, an exercise which requires skill and experience. *Ceteris paribus*, the inference can be made that all *accurate* and *consistent* valuations have a common origin in good data. This position is supported by the RICS (2017: 17): "Data quality has a direct impact on valuation accuracy, and it must therefore be reliable, accurate and openly available, and lastly, secure as the corruption of data is increasingly becoming an issue". Therefore, data inadequacy is a challenge to accurate and consistent valuations.

4.2. Data Sharing Among Valuers

Data-sharing refers to data which was gathered privately by individual firms who willingly share with colleague firms (Olapade & Olaleye, 2018). Their research indicates a preponderance of firms which are willing to share data. However, this does not stop the firms from desiring a central databank, suggesting that sharing is only a means of coping. Sharing raises the issue of reliability as data gathered at the level of the individual firm will tend to be limited in scope and application. Bamigbola (2018) disapproves of valuers' reliance on "individual market surveys" because it is not standard practice. Such data may be unsuitable because every property market consists of many sub-markets where differences may exist, meaning that datasets from one sub-market may not apply to others.

4.3. Valuers' Accessibility to Data

Despite the inevitable resort to data sharing, valuers' access to this data option depends on certain factors, the most important being confidentiality (Olapade & Olaleye, 2019). Given that data is a sought after resource, firms may be unwilling to share it and potentially lose their competitive advantage. The next two most important factors which limit accessibility are the lack of cooperation (a reluctance to share), followed by the accuracy level of the data (Olapade & Olaleye, 2019). This suggests a further limitation to data sharing. In Ashaolu and Olaniran's (2016) study of Ibadan and Abeokuta, participants' responses to the data gap were either to share or use valuation methods which do not require comprehensive market data. This confirms that valuers face difficulties due to poor data accessibility which can change only if data becomes easily accessible.

Awuah et al.'s (2017) property market study in Ghana is relevant here because both Ghana and Nigeria were ranked as "opaque" markets in the 2016 JLL survey. JLL's classifications of the world's property markets are in five categories starting from "opaque" at the very lowest to "highly transparent" at the apex. In-between, in ascending order, are "low transparency", "semi-transparent" and "transparent". Classification of a particular market as opaque means that its processes are adjudged to be near the lowest level on the scale of transparency used in the assessment. This would be due to deficiencies in the main areas of regulatory control, ease of doing business, use of technology and the availability of industry information to guide investors. In 2018 Ghana remained "opaque" whilst Nigeria moved up to a "low transparency" status. Awuah et al. (2017: p.448) reflect on the data challenge by stating that, "*reliable property market information represents a major barrier to improving valuation practice in Ghana and it is regarded as a key challenge*". Data sources on Ghana's property market consist of: valuers' own database; public institutions; professional colleagues; property owners; estate developers; estate agents; and the media. This is akin to Nigeria where valuers' colleagues are the most sought-after data source. In Ghana, valuers' own datasets were considered to be the most reliable, with the media being the least reliable. Again, the distinction between data availability and data reliability is highlighted here because the RICS (2009) report emphasises that "*sharing data is still a major challenge for the*

industry…There is the ever-present challenge of seeking consistent and trusted data" (RICS, 2019: p.17).

4.4. Summary of Findings

The literature review reveals the following. Firstly, transaction information on Nigeria's property market is scarce. This leads to a reliance on individual or businesses' data collection systems and data sharing (Ashaolu & Olaniran, 2016; Olapade & Olaleye, 2018). Secondly, the focus of all the studies on property market transactions data appears to suggest that all property data originates from the property market. This does not align with the analysis in Table 1. Thirdly, all the studies focus on the impact of property data inaccessibility on valuers. Whilst this is understandable because the authors are valuers, it is, nevertheless, not all-embracing because such data is used by other publics such as government, corporate concerns, voluntary organisations, donor and aid organisations, foreign and local investors, media, research organisations and the public.

Fourthly and finally, all 23 property research works, except one, make the same recommendation for a central data bank. However, the feasibility and modality remain unaddressed. Thus, no attention has been given to the efficient accumulation of data in a market whose "low transparency" categorisation connotes inefficiency. Olapade et al. (2019) are the exception, but do not go into much detail. In addition to these identified gaps in literature, other issues which are important to an all-embracing property data collation system which need to be addressed are as follows:

(i)   Market size, sectors, segments and activities; spatial variations; trends in returns/prospects.

(ii)   The existence and activities of producers of property industry data.

(iii)   The data needs of non-valuers.

(iv)   The existence and role of non-market property data sources.

These are considered in Section 4.5.

4.5. Accumulating Data on Omitted Issues in Nigeria's Property Data Research

Table 3 lists the important property industry issues identified in Section 4.4 which have not received much research attention in Nigeria. The dearth of information on these areas effectively constitutes a data gap. They cover market specifics (Column 1), non-market data sources (Column 2), property industry data producers (Column 3) and the needs of data users who are non-valuers (Column 4). These issues need more research attention because the wide, consistent and regular availability of such data will reduce the considerable data gap in the Nigerian property industry. The table explains the scope of each data type and its relevance to justify inclusion in a holistic

collation system with the potential to contribute towards uplifting the reputation of Nigeria's property market.

Table 3: Data on Omitted Issues

Issue	Market Overview (1)	Non-Market Property Data (2)	Property Industry Data Producers (3)	Non-Valuers Who Need Property Data (4)
Scope	Comprises sizes of key sectors(letting, development & investment);vacancies; unsold/unlet property etc.	Comes from property owners, estate developers, self-builders & the wider property industry	Comes from individuals, analysts, media, researchers, organisations who present alternatives. e.g. the Ronald Igbinoba Real Foundation for Housing and Urban Development (2019) which provides housing market analytics	Include financiers & mortgagees, policy makers, international & donor agencies, researchers/analysts
Relevance	Provides highlights; indicates trends; promotes transparency; enhances market image indicates trends; creates investor confidence	May support/ complement other data with relevant information	Helps to broaden the horizon; an alternative data source for investors	These groups are interested in house prices, a better knowledge of real estate and credit market conditions, economic policy & financial stability monitoring. Real estate significantly affects the real economy

Source: Author's Research, 2020

Further comments about the table are as follows. The issues listed in columns 1 and 2 are within the province of the valuer. Whilst the valuer has little to do about the issues in column 3, it is important for him to be aware that there are producers of such data which could be useful to the valuer as the valuer's could be to such data producers. Regarding column 4, the valuer should be aware as a producer of analytical data, that processed information from the market and entire industry is used as input by non-valuers to whom such data should be available.

4.6. Feasibility, Modality and Achievability of a Central Data Bank

Other research identifies conditions in, and characteristics of, Nigeria's property market which constitute hindrances to data collection (Butler, 2009; 2012; Akinbogun et al., 2014). It is natural to imagine either the federal government or the valuers' professional body as potential handlers of a property data bank, however, there are reasons which suggest their unsuitability. Government involvement may lead to availability at best, but may not deliver validity, timeliness and reliability. Available data that is untrustworthy, is of very little worth or use. There are reasons to believe that the administrative and fiscal centralism which Nigeria started operating post-1966 has not served it well as a way of organising society and economic

activity. Some researchers find this federalism to be excessively bureaucratic, wasteful and inefficient. For example, Asobie (1995: p.158), describes the system as a "*centralised federalism*" which, being a negation of true federalism, "*has not aided the process of national development*" (Asobie, 1995: p.158). In the assessment of Nwosu (2016), there is too much waste at the centre where government has too much money at its disposal, having saddled itself with too many responsibilities, few of which it is able to perform well. Perhaps the most telling description of the incapacity at the centre is Nigerian President Olusegun Obasanjo's 2000 justification of the privatisation of federal government enterprises on the grounds of excessive bureaucratic control, gross incompetence, mismanagement, corruption and complacency (5CCPress, 2007). These are reasons for caution as government has a history of not being business-minded. Furthermore, if property markets are indeed local in nature and Nigeria is a federal system, centralising locally collected data creates an unnecessary level of bureaucracy. Effectiveness and efficiency of the NBS data collection on the economy is threatened by inadequate funding but also poor institutional capacity (Kazeem, 2019). Other NBS challenges are the timeliness of output dissemination, cost inefficiencies arising from overlaps amongst the various public sector data producers, causing poor coordination (horizontal and vertical) as well as feedback from local and state governments (Olubusoye et al., 2015). Being a subclass of economic data, property data collection and dissemination by the government could be prone to similar challenges. Government incapacity is indicated at the sub-national level by its inability, since the 1978 Land Use Act, to discharge its exclusive responsibility of accumulating property ownership data.

The following reasons raise doubt regarding the capacity of the Nigerian property profession to handle the responsibility solely. Firstly, its involvement may be limited to property market transactions data for which it would have to rely totally upon the participation of registered members of the NIESV. Secondly, in a country of an estimated 195 million people, the property profession is only 16,000-strong with 1,000 registered firms (NIESV, 2020). This suggests that it would be unrealistic for the NIESV professional membership to deliver the volume of transactional data required to make a significant difference, given the prevalence of unregistered transactions and brokers.

4.7. Recommendations Arising from the Review

The main finding from the review is that a central data bank is the preferred solution to data inaccessibility in Nigeria. The other findings are inferences drawn from the review. These include the notion that property data is assumed to be a need of valuers only, so data inaccessibility is a challenge to valuers only; and that property data is synonymous with market data. The last three points are issues which have been explained in the process of defining the property data challenge. The issues to which they give rise are explained in Table 3 in section 4.5. Thus, the main finding and recommendation in the review is the establishment of a data bank.

4.7.1. Considerations for a data banking system for Nigeria

Since the Nigerian system has not been successful at accumulating property data, it is prudent to learn from arrangements in successful countries, particularly in the Western world which tend to have more advanced data infrastructure. The countries selected are the UK, USA, Finland and France. The UK and USA are good examples because they are respectively the first and third most transparent property markets in the world; for which data accessibility is a main classifying factor (JLL, 2018). France and Finland are additional representatives of continental Europe. Table 4 compares the ways in which the three property data types are accumulated and disseminated in these western countries.

Table 4: Basis of Accumulation and Dissemination in Some Western Countries

Types of Data					
Land & Property Registration		Property Value		Property Industry	
Basis of Accumulation and Dissemination					
Central	*Non-Central*	*Private*	*Public*	*Private*	*Public*
France	UK	UK	UK	UK	UK
Finland	Northern Ireland	Northern Ireland	Northern Ireland	Northern Ireland	Northern Ireland
	USA	USA	USA	USA	USA

Source: Author's Research, 2020

Table 4 shows that the UK, USA and Northern Ireland have non-centralised registration unlike France and Finland. Property value data is available from private and public sources in all the countries. In the UK, the RICS is a private source of data whilst "*in terms of public sources of property value data…the Inland Revenue offers online tabulations of property transactions* (Calhoun (2001: p.18). The UK provides an example to Nigeria because its overall effectiveness is illustrated by the relative accuracy and consistency of its valuations, as revealed by Effiong's (2015) UK-Nigeria comparative study on variances and inaccuracies.

4.7.2. A contextual solution

In learning from established systems, evolving systems should be circumspect and avoid making the assumption that one-size-fits-all. This suggests that they should take into consideration their socio-political environment and lived experience. Thus, a feasible data bank system for Nigeria should truly reflect the requirements of the environment. As such, the design should comprise the necessary elements which would work to create the best possible chances for successful operation in the existent circumstances. This would require that existing deficiencies be overcome and known pitfalls avoided. In this regard, the two important considerations are as follows. Centralisation should be avoided because of its predisposition towards becoming a bureaucracy. Additionally, Nigeria's sub-national governments' very limited success at discharging their statutory responsibility for formal land registration advises that other options be

explored. The fact that 42 years have elapsed since that responsibility was given to them under the 1978 Land Use Act is sufficient evidence of their limitations. This leaves for consideration the third tier of government: the local government system.

It is espoused that a great potential for success lies in organising property data collection and dissemination on a local government basis across the entire country. Many reasons can be adduced in support of this proposition. First, every landed property belongs to a locale. Second, property markets are local in nature. Third, property is locally developed and put to use in the locality where it stands. Fourth, local governments have a grassroots presence which places them in a position to monitor their environment more closely than the state and federal governments. Fifth, the local government system, as a creation of the constitution, can be legally and financially empowered for property registration and associated activities. Understanding the potential in local governments requires looking beyond the past and present failures of the system which is a creation of military fiat just like the under-performing state government system. The modality by which the local government system can accomplish property data management is beyond the scope of this paper. However, the promise which the system holds is evident from the capacity of colonial era city councils to perform effectively some functions which are now the responsibility of state governments.

5. Conclusion

This paper evaluated the challenge of property data inaccessibility and inadequacy in Nigeria. The approach involved a critique of existing literature, which incidentally, all concentrate on property market data and on valuers as users of data. This further involved identifying the studies' specifics and evaluating their recommendations with the ultimate objective of making a holistic submission. The conclusion suggests that the property data challenge in Nigeria extends beyond property market data which is but one of three categories of property data identified in this study. Furthermore, it indicates that besides valuer-users, the challenge extends to other users and uses of data which need to be addressed by the data banking solution unanimously recommended in the literature.

The findings suggest that existing research is not all-embracing in the following ways. First, its focus on property market transactions data is conceptually narrow because property data extends beyond market transactions. Furthermore, the challenge is examined only from the viewpoint of valuers and valuations whereas the users and the uses of property data extend beyond valuers and valuations. Finally, the studies do not examine the feasibility and modality of the common recommendation for a central data bank. Also the findings reveal the extent of the property data gap in Nigeria.

The findings of the study contribute to an improved knowledge of property data in Nigeria by expatiating the concept and the extent of the challenge. This raises the expectation that efforts will be intensified towards a holistic solution. In addition, the findings highlight the value of property data as an

input to economic policy and its potential to impact the entire property industry and macro economy. Reliable and valid data are therefore essential for accurate valuations, optimal property investment advice and the sector's success at large. An investment in a consistent data system will likely improve the performance and reputation of Nigeria's property industry, which in turn serves the mutual interests of property practitioners, property investors and policy makers. Finally, the research suggests that a sustainable solution to the property data challenge in Nigeria should be contextual. Knowledge of practices elsewhere is important and may be helpful, but whatever is proposed as a Nigerian solution must fit the Nigerian situation.

The study recommends the establishment of data banks, not one data bank but rather many to reflect the country's federal nature. Local government should manage the data for its region given that property is a fixed resource and belongs to a locale. Since local presence can compel a wider compliance, local governments should take over responsibility for property registration from states, and become the custodians of property ownership data, property market data and property industry data. Furthermore, a statistical culture should be promoted by legally requiring all who buy, sell or lease property (individuals, households and other economic actors) in a locality to supply relevant property market data to the local government registry. In addition, online access to these records should be available so that valuers can gain direct access whilst analysts may collate the figures to produce overviews and statistics on regional and sectoral trends, rent indices and market analyses. Beyond these recommendations, ultimately overcoming the property data challenge would depend principally on reforms targeted at the inefficiencies of Nigeria's property industry, particularly widespread property market informality and bureaucratic capacity.

Undeniably, Nigeria's 36 sub-national units have failed to accumulate property ownership data significantly in the 42 years since the 1978 Land Use Act. The necessity of a workable arrangement for property industry data makes it pertinent that further research be made as to whether advantage lies more in maintaining the *status quo ante* or in embracing change by evaluating the feasibility of entrusting that responsibility (including property transactions and property ownership data) to a rejuvenated and empowered local government system.

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Rental Values and Students' Satisfaction in Private Hostels Proximate to the Federal University of Technology, Akure, Nigeria

Victoria Amietsenwu Bello[1] and Nnaemeka Bethel Ezeokoli[2]

[1-2] Department of Estate Management, Federal University of Technology, Nigeria.

Abstract

Property rental values are readily influenced by a multitude of interrelated factors such as the state of the economy, neighbourhood amenities and property characteristics. However, there is always an expectation that rental value reflects the occupier's satisfaction from the neighbourhood and property. As such, this study examines the satisfaction of students with private hostel facilities surrounding the Federal University of Technology Akure (FUTA), and the effect these facilities have on the rental values of the off-campus students' hostels. There are 17,307 students who reside in the private hostels off-campus, of which 392 students were randomly selected from the total population of residents living around FUTA South Gate and given questionnaires. Of the 392 questionnaires administered, 390 were retrieved for analysis, thus representing a 99.5% response rate. The data collected was then analyzed using the Weighted Mean Score (WMS), T-test Statistics, Spearman Rank Correlation and the Multiple Regression Analyses. The findings reveal that there is a significant difference in the rental price paid by satisfied and unsatisfied students. Thus, the satisfied students pay higher rents than the non-satisfied students for a single, self-contained apartment. These occupiers are found to be satisfied with facilities such as the toilet, bathroom, fencing and water supply system in the building. There is a positive relationship between students' rent satisfaction and their satisfaction with hostel facilities provided. The regression analysis further reveals that rental value is a function of neighbourhood amenities and property characteristics. The study recommends that private hostel developers make adequate provision for functional facilities as these can increase students' satisfaction as well as enhance residential property rental values.

Keywords: Student Housing Facilities; Private Hostels**;** Rental Values; Satisfaction, Nigeria

1. Introduction

Access Housing is both a consumable and investment good and so this type of investment is capital intensive (Henderson & Loannides, 1987; Ezinuo, Onyejiaka & Emoh, 2014). According to Thorncroft (1978), the aim of real estate investment, especially housing, could be for pecuniary or non-pecuniary benefits. Investment could be in the commercial, residential and industrial sectors among others. However, the residential sector includes investment in dwelling houses of which student housing accommodation is a part. Students are a section of the population that forms a specific key demand group for housing because of the niche market they create and bring about material difference in their demand from other tenants (Rugg, Rhodes & Jones, 2000). In many developed and developing countries the world over, the provision of accommodation for student populations continues to be a challenge to most governments. This may be because of the annual increase in the enrolment of students in the tertiary institutions worldwide and weak or no policy directed at housing them (Rugg, Rhodes & Jones, 2000). Sharma (2012) observes that student-enrolment in institutions of higher education has increased to about 160% globally. Furthermore, Horn, Peter and Rooney (2002) reveal that out of the estimated 16 million students attending colleges and universities in the United Kingdom, approximately 16% of them live on campus, while the remaining population resides off-campus.

In Nigeria, little or no attention has been given to the provision of adequate accommodations in these universities to take care of the rising student population. Nigeria University Commission's (NUC) statistics show that the government's provision for student housing is less than 30% of the demand (NUC, 2004). Also, Adebisi et al. (2015) observed that the rate of hostel provision by government is decreasing with increasing population of students. Therefore, the national government has adopted policies that encourage private participation in the provision of student accommodation to solve the under-supply of student housing as well as support the inadequate residential infrastructure provided by the government (Asare-Kyrie et al., 2012). Despite this laudable objective, student housing on campus and off campus remain grossly inadequate in Nigeria.

The Federal University of Technology Akure, which was established in 1982, operates the dual-residential accommodation system where some students (especially the first year and the final year students) are accommodated on-campus, while others are made to seek accommodation outside the institution. The reason for this duality is the inability of the institution to accommodate its growing student numbers coupled with little or no subvention from government. For instance, during the University's inaugural academic year (1982/1983), 147 students were enrolled. This number grew to 19,230 in the 2017/2018 academic session (FUTA Academic Planning unit, 2018). Out of the 19,230 students in the 2017/2018 academic session, only 790 females and 1,133 male students (a total of 1,923 students) were accommodated in the university's student hostels on-campus. Thus, private property investors cater for the large percentage of students who are not in the university's residential facilities (school hostels) as to complement government's efforts. The rent

charged by private developers is typically exorbitant, with lackluster facilities (Olatubara, 2008). It is frequently observed that these properties are in poor state of repair, overcrowded, having inadequate facilities, dirty and unpleasant conditions (Ubong, 2007; Aluko, 2011; Idakwo, Igbokwo & Ndom, 2012). The question, therefore, is whether students are satisfied with the facilities provided in their privately rented off-campus hostels as well as the rent they pay for these accommodations. Does any relationship exist between students' satisfaction with the facilities provided and rent satisfaction? And, what effect does the provision of facilities have on rental values of hostel accommodation? These are the questions this paper aims to address.

The paper is organised as follows. The following section (Section 2) takes the form of a literature review. The review is followed by a discussion of the research methodology in Section 3 with the results presented and analyzed in Section 4. The paper concludes with a summary of findings, recommendations and a conclusion in Section 5.

2. Literature Review

According Housing is not only a basic human need, but it constitutes a vital component of welfare, life sustenance and survival (Bello & Bello, 2006). According to MacLaren (1996), one of the characteristics of sustainable development is satisfying basic human needs. These needs may include safety and satisfaction of users or consumers. They are elements that improve the well-being of humans and their surrounding ecosystem (Hodge, 1997). Therefore, understanding the need for sustainable housing development vis-à-vis its role in ensuring human safety, health and satisfaction will go a long way in shaping the face of housing developments in the society. More especially that of students. Given the foundational role housing plays in human wellbeing, many researchers have studies in the field (Egunjobi, 1999; Ajanlekoko, 2001; Olujimi, 2010). However, tertiary student accommodation has had little interest for Nigerian researchers. Internationally student accommodation has gained academic interest. In developed countries, studies have focused on students' housing satisfaction (Thomsen & Eikemo, 2010) and the factors predicting student's satisfaction with university hostels (Khozaei, et al., 2010). Contrastingly, the few studies on student housing in developing countries (including Nigeria), have focused on the modes of transportation taken by non-resident university students (Nkegbe, Kuunibe and Abdul – Mumin, 2012); student access to housing and management (Joachim and Olachi, 2010; Yusuff, 2011; Mohammad, Gambo and Omirin 2012); student's accommodation quality and the economics of private hostels (Asare-Kyire, Appienti, Forkwoh and Osei, 2012; Nimako and Bondinuba, 2013) risk in student hostel investment (Attakora-Amaniampong, Salakpi and Quansah, 2014) and student hostel accommodation alongside academic performance (Oyetunji, 2014).

For instance, Yusuf's (2011) study on student access to housing in Lagos State University made use of a Percentage Frequency Table. The study revealed that most students suffer from an incessant increase in housing rent,

domestic violence and neighbourly disturbances. However, the study did not look at the factors affecting the increase in rental value of the student housing. On the other hand, Aluko (2011) assessed the condition of students' housing at the University of Lagos as well as the level of satisfaction students felt with the state of the facilities. The study, which focused on on-campus housing facilities used a structured questionnaire and interviewed over 400 students. This data was then analyzed using Frequency Distribution Tables and graphs which suggest that the demand places immense pressure on the undersupply housing facilities within the institution. This imbalance, coupled with the deplorable condition and maintenance of these properties, caused greater dissatisfaction among the student-users. Akhihiero (2011) argues that the poor state of student accommodation facilities in tertiary education in Nigeria could result in high levels of stress among students and consequently poor academic performance. Furthermore, the overcrowding of student-on-campus housing facilities erodes the privacy that most students seek (Aluko, 2011). This has forced many students to search for private, safe and convenient accommodation outside the campus despite the higher associated costs (Khozaei, Hassan & Razak, 2011). Olaniyan, et al. (2018) similarly argues that the supply of electricity, which typically between 4-8 hours per day across the country, has implications on students' social and academic performance as well as overall sustainable development (Akhihiero, 2011). The cost of private accommodation is also unsustainable for students. The rate at which the rent of off-campus student hostels is increasing is exponential. This increase is a cause for concern as it suggests that the factors that should normally be assessed before fixing rents are often neglected (Mudau, 2017). Such factors as good housing conditions, functional facilities, access road and good water supply that are necessary for good living are often not available in some of the students' housing notwithstanding the high rent the housing commands.

Looking more globally, Khozaei, Hassan and Khozaei (2010) assess undergraduate students' satisfaction with hostel and their sense of attachment to place in University Sains, Malaysia. The study uses a dataset of 267 undergraduate student respondents, and correlation analysis was employed to measure the association of students' satisfaction with the attachment to the place. It was found that increased satisfaction level is associated with higher sense of attachment, which was found to be significant. Additionally, a study by Sawyerr and Yusof (2013) examined the levels of student-satisfaction with the facilities provided within their on-campus hostels in Malaysia using a sample of 250 students. Descriptive statistics were analyzed, and the results suggest that the majority of the students are not satisfied with the facilities in their hostels, and not all were equipped with the facilities necessary for convenient or conducive living by the homeowners for. This highlights the deplorable state of the housing provided outside the university campuses as the developers are more profit-driven rather than human-centred as little or no income is plowed back into the building for maintenance (Ogeah & Ajalaye, 2011; Mudau, 2017). Contrastingly, Danso and Hammond's (2017) study of Ghana, reveals that students were satisfied with the quality of the facilities provided in off-campus hostels. However, the service delivery of the hostel managers was called into question for adequate improvement.

Attakora-Amaniampong, Ameyaw and Akortsu (2017) also found the hostels and facilities in Wa Town, Ghana, tend to be adequate in meeting the requirements of the students for academic purposes.

Returning to Nigeria, Mbee and Akpoghomeh (2017) examine the trend in off-campus student accommodation rents in federal public universities in Southern Nigeria using both descriptive and inferential statistics. The result shows a significant variation in the rental pattern of student's accommodation across the universities and geographical locations. There is no denying that each student carves out a niche in the housing market, which is different from others (Adebisi et al., 2015), and one which landlords may seize as an opportunity to increase rents arbitrarily without providing the required facilities to command such rents. Furthermore, Azeez, Taiwo, Mogaji-Allison and Bello (2016) comparatively assess students' satisfaction with private hostels in selected private Universities in Ogun State, Nigeria. Their study employs a relative satisfaction index to determine the degree of student's satisfaction with varying housing components. They conclude that student's satisfaction with hostel accommodation can be significantly influenced by the standard of housing components. However, the study was unable to show if there is any relationship between students' satisfaction with hostel accommodation and satisfaction with rent paid for the use of such accommodation. Adebisi et al. (2017) also examine the perspective of students on private hostel facilities in proximity to the Federal University of Technology in Akure using a relative importance index and weighted mean score. The results reveal that students need internet connectivity and electricity facilities, both of which but are largely unavailable for them. Privacy and the length of lease were the major points of attraction for students. Finally, Attakora-Amaniampong et al. (2017) observe the risks associated with private student housing investment, especially when the investment environment is unstable. These risks include management risks, which raked highest, environmental risks, inflation, legislative, liquidity to the lowest ranked financial risk.

Under normal circumstances, and according to the literature, there should be a positive correlation between satisfaction with the facilities in the student housing and rent paid for using such facilities. However, in some cases in Nigeria, these facilities that should enhance student-satisfaction are either inadequately provided, maintained or altogether unavailable (Adebisi, et al., 2017). The literature above highlights this, however it also highlights a gap in the existing research. The authors have not been able to prove whether students' rent satisfaction is a function of student's satisfaction with housing facilities. Thus, the present study deviates from previous studies and investigates the students' satisfaction with rental paid on off-campus housing in relation to on-campus facilities in the study area. The intent of this is to fill the present knowledge gap and to add to available literature.

3. Research Methodology

This study focuses on the rental values and satisfaction of students with off-campus hostel facilities around FUTA South Gate. The term 'private hostel',

as used in this study, refers to any student housing or residential property occupied by the students in the study area that is not provided by the university of by government. The target population for the study comprises the student population living in off-campus hostels around FUTA South Gate. According to the record of FUTA Academic Planning Unit (2018), the population of the students is 19,230 out of which 1,923 live on the campus. Therefore, 17,307 FUTA students live in private hostels located outside the university campus and it is from this group that the target population is drawn. Using Kothari's (2004) formula, 392 students were determined as the sample size for the study. This is the minimum sample size according to Kothari. In order to achieve a good response rate, more than 392 questionnaires were administered, randomly, to students living in private hostels off-campus around FUTA South Gate. A total of 390 of the questionnaires retrieved were found good for analysis giving a response rate of 99.5% of the sample size. The data gathered was analyzed using the Weighted Mean Score, Spearman's Rank Correlation and Multiple Regression Analysis.

The Weighted Mean Score was used to examine the level of students' satisfaction with the facilities in the off-campus accommodation they occupy. The response was ranked on a 5-point Likert scale ranging from 'highly satisfied' with a weight of 5 points to 'highly dissatisfied' with a weight of 1. The formula for determining the weighted mean score or average is as shown in equation (1).

$$\ddot{x}_w = \frac{\sum_i^N x_i w_i}{\sum_i^N w_i} \qquad (1)$$

Where: $\ddot{x}_w$ is the weighted item; x_i is the value of the ith item x; w_i is the weight of the ith item x.

The satisfaction of students with the rent they pay, and facilities provided in their off-campus hostels were ranked on 2-point and 5-point Likert scales respectively. Thereafter, Spearman's Rank Correlation, which measures the strength of association between two variables, was employed in measuring the association between the rent satisfaction of the students and their satisfaction with facilities provided in the off-campus hostels. This statistical method uses ranks and is appropriate for both continuous and discrete ordinal variables. The formula is shown in equation (2).

$$r_s = 1 - \frac{6 \sum d_i^2}{n(n^2 - 1)} \qquad (2)$$

Where: r_s is the correlation coefficient; d_i is the difference between the two ranks of each observation; 'n' is the number of observations.

A Multiple Regression Model was used to analyze the effect of facilities on the rental values of the properties occupied by the students. The regression analysis deals with the contribution of the independent variables to changes or variations in the dependent variable. This is represented by equation (3).

$$RENT = \alpha + \beta_1 TOFAC + \beta_2 WATSUP + \beta_3 BATH + \beta_4 ELEC + \beta_5 FENCE + \beta_6 ACC + \beta_7 SECSYST + \mu \qquad (3)$$

Where: α is the constant; β_i is beta coefficient of variables, i, which measures the changes in rent that associated with a unit change in the independent variables; μ is the error term associated with the variables.

Table 1: Operationalisation of Variables for Regression Analysis

Variable Code	Description of Variable	Measurement
Rent	Rental Value	Actual (₦)
TOFAC	Toilet Facilities	1=Open Defecation; 2=Pit Toilet; 3=Squatting Toilet; 4=Water Closet
WATSUP	Water Supply System	1=No Water System; 2=Hand-Dug Well; 3=Water Running within
BATH	Bathroom	1=Open Bathroom; 2=Shared Bathroom; 3 = En-suite Bathroom
ELEC	Electricity Supply	1=1-3; 2=4-6; 3=7-9; 4=10-12; 5=Above 12 (Hours per Day)
SECSYST	Security System	1=No Security; 2=Community Security; 3=Independent Security
FENCE	Fencing	1=No Fence; 2=Fenced without Gate; 3=Fenced with Gate
ACC	Access Road to Property	1=Ungraded Road; 2=Graded Road; 3=Tarred Road

4. Data Analysis and Discussion of Results

This section presents the results of the data gathered from the occupiers of the various hostel accommodation types around FUTA South Gate. The results are detailed in Tables 2–10.

In order to have an understanding of the private student's housing around FUTA South Gate, Table 2 shows the type of students' housing that are predominant and their distances from the University's gate.

Table 2: Characteristics of Students' Hostels/Housing around FUTA South Gate

Property Characteristics	Description	Frequency	Percentage
Students Housing Type	Single room self-contained apartment	348	89.2
	2-Bedroom flat	28	7.2
	3-Bedroom flat	14	3.6
	Total	**390**	**100.0**
Distance of Property from FUTA South Gate	<201 metres	184	47.2
	201-400 metres	122	31.3
	401-600 metres	40	10.3
	601-800 metres	12	3.0
	>800 metres	32	8.2
	Total	**390**	**100.0**

Table 2 reveals that the type of students' hostels occupied most frequently by respondents are the single room self-contained apartments with a response

rate of 89.2%, while 28 (7.2%) and 14 (3.6%) of respondents live in 2-bedroom and 3-bedroom apartments respectively. This indicates that investors are more interested in developing single room self-contained apartments around FUTA South Gate because that is what is in high demand (Sawyerr & Yusof, 2013; Adebisi et al., 2017). A single room self-contained apartment is designed for a sole occupant with a toilet, bathroom and kitchen enclosed. This affords student occupiers convenience and privacy without having to share these facilities with other tenants within the same building. Furthermore, Table 2 indicates that most residential property types are near the school gate. About 78.5% of the sampled respondents live in apartments not further than 400m from the school's gate, while 21.5% live in properties that are more than 400m away from the school gate. Thus, the students have quick access to the university's facilities without having to go a long distance

Some basic facilities required for good housing such as toilet facilities, water, bathroom, electricity, security fencing and access road were examined. These facilities are basic to human health and for the enjoyment of any housing or neighborhood (Wang et al., 2019). To this end, the characteristics pf the housing facilities were categorised using the above as a guiding framework. Table 3 below identifies the characteristics of the housing facilities in the study area.

Table 3: Characteristics of Students' Housing Facilities at FUTA South Gate

Type of Facilities	Description	Frequency	Percentage
Toilet Facilities	No toilet facilities	4	1.0
	Latrine	10	2.6
	Squat Toilet	66	16.9
	Water Closet (Western Toilet)	310	79.5
	Total	**390**	**100.0**
Water Supply System	No Water in the Building	28	7.2
	Hand-Dug Well	98	25.1
	Running Water	264	67.7
	Total	**390**	**100.0**
Bathroom	Open-air Bathroom	10	2.5
	Shared Bathroom	72	18.5
	Bathroom en-suite	308	79.0
	Total	**390**	**100.0**
Electricity Supply	1-3 hours	68	17.4
	4-6 hours	230	59.0
	7-9 hours	78	20.0
	10-12 hours	4	1.0
	Above 12 hours	10	2.6
	Total	**390**	**100.0**
Fencing	No fence	92	23.6
	Fence without Gate	66	16.9
	Fence with Gate	232	59.5

	Total	390	100.0
Security System	No Security	142	36.4
	Community Security	124	31.8
	Independent Security	124	31.8
	Total	**390**	**100.0**
Access Road to Property	Ungraded Road	164	42.1
	Graded Road	146	37.4
	Tarred Road	80	20.5
	Total	**390**	**100.0**

Table 3 shows the characteristics of the facilities provided in off-campus student housing around FUTA South Gate. From Table 3, toilet facilities tend to be a water closet (79.5%) with bathroom en-suite. This is evident with a 79.5% and 79.0% response rates respectively. However, there are still some residential students' hostels with old traditional toilet facilities like the latrines or even no toilet facility. While 16.9% of the respondents have a squatting type water closet in their residences, 2.6% use pit latrine. Further, 1.0% of the respondents have no toilet facility in their hostels, therefore, and have to improvise using a bush or by digging holes and using them as toilets. Furthermore, 2.5% of the respondents make use of open-air bathroom, which are located outside the building, while 18.5% of the respondents live in apartments where the bathrooms, though located within the building, are shared by all those living in the compound. From these results, one can conclude that most off-campus accommodations have the modern type facilities which can bring satisfaction to the occupiers otherwise the students may have intentions to relocate (Wang et al., 2019).

Over two thirds (67.7%) of the respondents live in houses with running water in the building (toilets, bathrooms and kitchens). Water is highly essential for human survival, and any building that readily provides that conveniently without the occupiers having to go in search for it, attracts prospective tenants. However, 25.1% and 7.2% of the respondents respectively still live in apartments where they either fetch water from a well within the compound or go outside to other compounds in search of potable water. Table 3 further reveals the level of electricity supply (hours per day) and shows that most accommodation in the area enjoys no more than 6 hours of electricity per day (76.4%). Olaniyan, et al. (2018) judge this as problematic since electricity is essential for living and productivity, especially in the student environment. The implication of this is that many students who can afford the use of generators will spend more of their money, while others who cannot will stay without electricity for the greater part of the day.

In terms of other housing facilities, Table 3 reveals that 59.5% of the residential properties are fenced with a gate for adequate protection. However, 23.6% and 16.9% of the respondents live in apartments without a fence or with a fence without gates. This may leave the inhabitants of these accommodations, especially the female ones, who are particularly vulnerable to attacks from criminals and even dangerous animals. Similarly, 36.4% of the properties do not have any operating security system for the safety of its occupants. While FUTA is a relatively peaceful area with minimal cases of

theft and violence, good accommodation should provide all the essential facilities required for good living and safety, which will in turn bring added satisfaction to the occupants. After all, housing is expected to meet the sustainable development characteristics of basic human needs (MacLaren, 1996) such as safety and conducive living environment.

From the analysis, most of the facilities provided in off-campus accommodation are adequate. Furthermore, many have modern aspects due to recent developments and a surge in student's population as observed by Adebisi et al. (2015). However, some of the properties are still deficient in the provision of these essential facilities especially given the continued use of pit toilets, out-building bathrooms and some without running water. Some of these features persist given that old buildings are frequently repurposed as student housing/hostels to meet the demand. When demand is higher than supply, students make do with what they can get ahold of, even when the rent does not match utility offered by the accommodation. Sometimes, these students would have to live at an extra cost since they will have to provide some of these facilities that are not available in the properties by themselves. It could also lead to distractions from their studies and subsequently hamper the highly educated workforce needed for a growing economy like Nigeria. When satisfaction is tampered with, it can also bring about difficulties with tenants and subsequently rent defaults, which is not good for an investment.

A cross-tabulation was carried out to show the level of satisfaction or dissatisfaction of the students with the rents they pay for the different types of student housing around FUTA South Gate. This is presented in Table 4.

Table 4: Students' Level of Satisfaction with Rent Paid

Residential Property Type	Satisfied with Rent		Not Satisfied with Rent		Total	
	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage
Single room self-contained	200	51.3%	148	37.9%	348	89.2%
2-Bedroom	22	5.6%	6	1.6%	28	7.2%
3-Bedroom	10	2.6%	4	1.0%	14	3.6%
Total	**232**	**59.5%**	**158**	**40.5%**	**390**	**100%**

Table 4 shows the number of respondents who are satisfied and/or dissatisfied with the rent paid for the residential hostel occupied around FUTA South Gate. From the Table, 59.5% of students are satisfied with the rent they pay, while 40.5% are dissatisfied. Out of the 59.5% who are satisfied, 51.3% live in single room self-contained apartments, 5.6% in 2-bedroom flats, while 2.6% live in 3-bedroom flats. Also, 37.9% of the dissatisfied students reside in a single room self-contained apartment, while 1.6% and 1.0% live in 2-bedroom and 3-bedroom flats respectively. The results show that more students are satisfied with the rent they pay than those who are not satisfied.

In Tables 5 and 6, a T-test was employed to ascertain the level of difference in the rents paid by the students who are satisfied and dissatisfied, and how significant the difference is.

Table 5: Group Statistics of Students' Housing Mean Rental Values

Residential Property Type	Group	N	Mean Rent (₦)	Std. Deviation	Std. Error Mean
Single room self-contained	Satisfied	200	81,140.00	22,459.800	1,588.148
	Non-Satisfied	148	69,743.24	23,117.453	1,900.243
2-Bedroom	Satisfied	22	134,818.18	28,691.522	6117.053
	Non-Satisfied	6	128,333.33	42,972.860	17543.596
3-Bedroom	Satisfied	10	153,400.00	615,34.453	19458.903
	Non-Satisfied	4	206,000.00	.000	.000

Table 5 shows the group statistics of the number of residential properties occupied by students who are satisfied and unsatisfied with the rent paid for their apartments, as well as the mean rental values, the standard deviation and error mean. The result suggests that higher prices on similar spaces cause dissatisfaction. This can be seen in the relationship between the satisfied and unsatisfied students in a 3 Bedroom space as those who are not satisfied pay a higher mean rent than those who are satisfied. This dissatisfaction with rent paid is expected as the student occupiers would have used the excess rent for other personal provisions. However, for a single room self-contained apartment and 2 Bedroom apartments, the students that are satisfied with their rent pay even higher mean rent than that paid by the non-satisfied students. For these students to be satisfied with paying higher mean rental value, it implies that they must have been enjoying certain incentives in the property. Thus, their satisfaction with higher rental value must have been influenced by some factors which may be internal or external to the property being occupied by the students. The significant level of mean rental value difference is presented in Table 6.

Table 6: T-Test for Equality of Mean Rental Values of Satisfied and Unsatisfied Students

Residential Property Type		Levene's Test for Equality of Variances		t-test for Equality of Means						95% Confidence Interval of the Difference	
		F	Sig.	T	Df	Sig. (2-tailed)	Mean Difference	Std. Error Difference		Lower	Upper
Self-contained single room	Equal variances assumed	1.558	.213	4.622	346	.000	11396.757	2465.832		6546.850	16246.663
	Equal variances not assumed			4.602	311.729	.000	11396.757	2476.517		6523.954	16269.559
2 Bedroom	Equal variances assumed	2.024	.167	.441	26	.663	6484.848	14709.472		-23750.905	36720.602
	Equal variances not assumed			.349	6.268	.738	6484.848	18579.454		-38511.035	51480.732
3 Bedroom	Equal variances assumed	15.163	.002	-1.668	12	.121	-52600.000	31527.025		-121291.488	16091.488
	Equal variances not assumed			-2.703	9.000	.024	-52600.000	19458.903		-96619.096	-8580.904

In Table 6, the Levene's test for the equality of variance is not significant for the single room self-contained apartments (p= 0.213), as well as the 2-Bedroom flat (p= 0.167). The Levene's test is used to test whether the variance of the mean rent for the two groups (satisfied and unsatisfied) is the same (Pallant, 2011). The result demonstrated a significance in the equality of variance for a 3-Bedroom flat (p= 0.002). The equal variance assumed in Table 6 is used for a single room self-contained and a 2-bedroom flat, while the equal variance is not assumed for a 3-bedroom flat. From the Table, there is a statistically significant difference in the mean rental values paid by the satisfied and unsatisfied students for a single room self-contained apartment (p= 0.000) and a 3-Bedroom flat (p= 0.024).

For single room self-contained apartments, satisfied students pay significantly higher rents than those who are unsatisfied by their rental price. Contrastingly, for 3-bedroom flats, dissatisfied students pay higher rent than those who are satisfied with the price. Perhaps this is due to the greater provisions of facilities offered in the single room self-contained apartments compared to the 3 Bedroom flats. However, for 2-Bedroom flats, there is no statistically significant difference in the mean rental value of housing occupied by either satisfied or dissatisfied rent-paying students (p= 0.663). This result shows that a difference in rental values exist in single room self-contained apartments around FUTA, due to its provision of and privatisation of facilities in the neighbourhood. This finding aligns with that of Mbee and Akpoghomeh (2017), who observed significant variation in the rental patterns of student housing around institutions.

In Table 7, the students' responses were sought on their level of satisfaction with the various facilities provided in their accommodation. This was conducted on a 5-point Likert scale, with '5' being the highest level of satisfaction, and '1', the highest level of dissatisfaction. A mean score (MS) of 3.41–5.0 shows satisfaction, 2.61–3.40 indicates undecided while anything below 2.61 indicates dissatisfaction with facilities.

Table 7: Students' Level of Satisfaction with Facilities

Facilities	Satisfaction Rating					Mean	Rank
	5	4	3	2	1		
Toilet Facilities	124 (31.79%)	152 (38.97%)	88 (22.56%)	14 (3.59%)	12 (3.08%)	3.93	1
Bathroom	92 (23.59%)	186 (47.69%)	90 (23.08%)	20 (5.13%)	2 (0.51%)	3.89	2
Fencing	92 (23.59%)	148 (37.95%)	68 (17.44%)	50 (12.82%)	32 (8.21%)	3.56	3
Water Supply System	70 (17.95%)	160 (41.03%)	68 (17.44%)	64 (16.41%)	28 (7.18%)	3.46	4
Electricity Supply	38 (9.74%)	142 (36.41%)	134 (34.36%)	58 (14.87%)	18 (4.62%)	3.32	5
Security System	24 (6.15%)	156 (40.00%)	118 (30.26%)	58 (14.87%)	34 (8.72%)	3.20	6
Access Road to Property	44 (11.28%)	130 (33.33%)	86 (22.05%)	84 (21.54%)	46 (11.79%)	3.11	7

Table 7 illustrates the level of satisfaction students feel toward the facilities in their off-campus accommodation: toilet facilities (MS=3.93), bathroom (MS=3.89), fencing (MS=3.56) and water supply system (MS=3.46). Thus, students are largely satisfied with these features. It is important to note that these facilities are subjective and specific to each student's hostel, however

they must be adequately installed and functioning to warrant the students' satisfaction. The responses also suggest that students are undecided about the neighbourhood facilities such as electricity supply, security system and access roads to the property with mean scores of 3.32, 3.20 and 3.11 respectively. This implies that some of the facilities in these hostels are adequate, and this must have incentivised the occupiers to be satisfied with the rent that they are paying especially in a single room self-contained apartment. However, the access road to the property, the level of security and the electricity supply system is only encouraging to some extent as most student occupiers are not satisfied with their provisions. This study supports the notion that not all required facilities, needed for convenience and value enhancement, are adequately provided for by homeowners as revealed by Sawyerr and Yusof (2013).

Table 8 shows the cross-tabulation of students' rent satisfaction with the satisfaction derived from the facilities provided. The results revealed that students who are satisfied with the facilities provided such as toilet (4.18), water supply (3.76), type of bathroom (4.07), electricity supply (3.44) and fencing (3.78) in their apartments are satisfied with the rents they pay, while they are undecided on the impact of security systems and access roads on their rental choices. The students who showed dissatisfaction with rents they pay are undecided and/or are not satisfied with the facilities being provided in their accommodation except for the toilet facilities (3.56) and type of bathroom provided (3.62). Thus, when students are satisfied with the facilities available to them, they are willing to pay more than market rent for their apartments. However, when the rent is excessively higher than what is obtainable in the market, as is the case in 3 Bedroom flats, dissatisfaction will set in even when the facilities are adequate.

Table 8: Cross Tabulation of Students' Rent Satisfaction with Facilities Satisfaction

| Facilities | Rent Satisfaction | Level of Satisfaction with Facilities | | | | | | Chi-square | |
		1	2	3	4	5	Mean	Value	Sig
Toilet Facilities	Satisfied	4	4	32	98	94	4.18	21.877	0.000
	Not Satisfied	8	10	56	54	30	3.56		
	Total	**12**	**14**	**88**	**152**	**124**			
Water Supply System	Satisfied	10	18	38	118	48	3.76	24.478	0.000
	Not Satisfied	18	46	30	42	22	3.03		
	Total	**28**	**64**	**84**	**160**	**70**			
Type of Bathroom	Satisfied	0	8	30	132	62	4.07	22.095	0.000
	Not Satisfied	2	12	60	54	30	3.62		
	Total	**2**	**20**	**90**	**186**	**92**			
Electricity Supply System	Satisfied	10	32	60	106	24	3.44	13.176	0.010
	Not Satisfied	8	26	74	36	14	3.14		
	Total	**18**	**58**	**134**	**142**	**38**			
Security System	Satisfied	14	30	64	110	14	3.34	7.706	0.103
	Not Satisfied	20	28	54	46	10	2.99		
	Total	**34**	**58**	**118**	**156**	**24**			

Fencing	Satisfied	12	24	26	112	58	3.78	19.238	0.001
	Not Satisfied	20	26	42	36	34	3.24		
	Total	**32**	**50**	**68**	**148**	**92**			
Access Road to Property	Satisfied	22	32	52	100	26	3.33	17.491	0.002
	Not Satisfied	24	52	34	30	18	2.78		
	Total	**46**	**84**	**86**	**130**	**44**			

The Spearman Rank Correlation analysis in Table 9 emphasises the statistically and significantly positive relationship between the satisfaction with rent paid and the facilities provided. The correlation is only strong for toilet facilities (0.321). Furthermore, the results show that the more students are satisfied with the housing facilities being provided, the more they become satisfied with the rent they pay. In other words, they are paying not only for the accommodation, but for the enjoyment of the facilities in the accommodation. When rents are high and there is no satisfaction with facilities provided, the students become dissatisfied with the rent and vice versa. Thus, this proves that there is a positive correlation between satisfaction with facilities provided in students' housing and satisfaction with rent paid.

Table 9: Spearman Rank Correlations of Students' Rent Satisfaction and Facilities Provided

Facilities	**Satisfaction with Rent Paid**		**Total N**
	Correlation Coefficient	**Sig. (2-tailed)**	
Toilet Facilities	.321	.000*	390
Water Supply	.297	.000*	390
Bathroom	.262	.000*	390
Electricity Supply	.177	.000*	390
Security System	.172	.001*	390
Fencing	.211	.000*	390
Access Road	.227	.000*	390

Table 10 presents the Multiple Regression result of the effect of facilities within residential accommodations on the rental values of the properties. The coefficient of Determination (R^2) shows that 34.3% of the variation in rental values for a single room self-contained apartment around FUTA South Gate is attributed to the independent variables being considered, and the model is significant at 0.000 level of significance. This implies that the result of the model can be relied on in predicting what happens in the residential rental market in FUTA. Furthermore, the results also reveals that type of water supply system (p= 0.000), bathroom (p= 0.000), access road to property (p= 0.000) and type of security system (p= 0.005) significantly and positively affect rental values of a single room self-contained apartments around FUTA at a 99% confidence level. Contrastingly, the type of toilet facilities significantly affect rent passing on the property type at 95% level (0.077). The implication of this result is that improvement in the water supply system, bathroom system, access road, security system and toilet facility will significantly increase the rental values of the properties concerned. This

finding is in tandem with the work of Adebayo (2006) who suggests that infrastructural facilities enhance the value of residential accommodation. Thus, developers should be mindful of these housing facilities to enable their developments to command high and satisfying rental values.

Table 10: Effect of Facilities Provision on Residential Property Rental Values

Model	Unstandardised Coefficients		Standardised Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	-18698.273	8649.778		-2.162	.031
Toilet Facilities	3334.541	1878.329	.082	1.775	**.077***
Water Supply System	6820.764	1898.427	.183	3.593	**.000****
Bathroom	16800.308	2309.133	.348	7.276	**.000****
Electricity Supply	-263.389	1282.521	-.009	-.205	.837
Security System	3739.390	1335.265	.130	2.800	**.005****
Fencing	918.823	1380.742	.033	.665	.506
Access Road to Property	5467.541	1446.477	.177	3.780	**.000****
R²	**0.343**				
F-Statistics	**25.370**				
Sig	**0.000**				

* Significant at 0.10
** Significant at 0.05

5. Conclusion

This study has examined the level of students' satisfaction with private hostel facilities in FUTA South Gate. Further, we studied the relationship between students' satisfaction with private hostel facilities and rent satisfaction, and finally the effect of the hostel facilities on the rental values of the private hostels. The study employed both descriptive and inferential statistical analyses. It was found that not all the students are satisfied with the rent they pay because they are not satisfied with some of the facilities provided in the private hostels. The correlation analysis revealed a significant positive relationship between students' satisfaction with facilities and rent satisfaction. The satisfied student occupiers were seen to pay more for hostel accommodation (especially single room self-contained apartments) than those who were not satisfied. This study further revealed that students' rent satisfaction is driven by their satisfaction with adequate facilities and this has implications for the rental values of students' hostels. Thus, the rental value of private student's housing is not merely a function of student's satisfaction with the rent they are paying, but also a function of their satisfaction with the facilities provided in the building as well as the accessibility to the building. When these facilities are lacking or inadequate, it should be reflected in lower rent passing.

Since rental value is also dependent on the satisfaction of students with the adequate provision of facilities in off-campus hostels, developers and investors in student housing should provide more adequate housing facilities

or improve the facilities already in their properties. This will increase the satisfaction level of the occupiers with the facilities.

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Forecasting Performance of Commercial Property Investments in Lagos Metropolis

Obinna Umeh[1] and Chibuikem Adilieme[2]

[1-2] Department of Estate Management, University of Lagos, Nigeria.

Abstract

Investors rely on statistical forecasts to guide their investment decisions. Given the relative opportunity cost associated with these decisions, and the huge financial implication of commercial property investments, such insights are invaluable; because investors can choose investments from an informed position. Despite this recognised benefit of forecasting, there has been little focus on forecasting the performance (total returns) of commercial property investments in Lagos Metropolis. This paper, therefore, aims to forecast the total returns of two commercial property investment types (shops and offices) in five sub-markets (Yaba, Ikeja, Ikoyi, Victoria Island and Lagos Island) within the Lagos property market. In doing so, the study uses longitudinal data for the capital and rental values of commercial property investments in Lagos between 2006 to 2018 alongside a simple regression model for 2019-2021 predicted total returns. Autocorrelation was used in testing the predictive validity of this data set. Furthermore, multiple forecasts were evaluated simultaneously for accuracy and, together, they illustrate the difficulty of compiling a robust dataset in the absence of a central database. This paper suggests that the sampled total returns for the five sub-markets fluctuate and tend to decline as seen in the Ordinary Least Square Regression technique for 2019 to 2021. The results also suggest a low autocorrelation in most of the sub-markets, which indicates that the observed pattern of returns may not continue. This paper recommends that investors be wary of commercial property investment in Lagos Metropolis, due to the observed poor performance (low and fluctuating total returns). It is also recommended that a property database be constructed to improve property data reliability and allow for the application of complex quantitative forecasting techniques.

Keywords: Real Estate Investment; Forecasting; Investment Performance; Lagos Metropolis; Nigeria

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[1] umelobinna@gmail.com

[2] adiliememichael@gmail.com

1. Introduction

Real estate investment refers to the commitment of a capital sum in exchange for future benefits such as an income flow or capital gain, or a combination of both (Hargitay & Yu, 1993). The financial implications of real estate investment are substantial and, therefore, investors require data on possible trends to enable them to make sound investment decisions (Ogbuefi, 2002). The use of historic data to estimate possible future trends is commonly referred to as forecasting. According to DeLurgio (1998), forecasting forms an integral part of any decision-making process. It attempts to decrease the dependence on chance and provide some way to predict future events. Forecasting is an indispensable activity in property investment (Mitchell & McNamara, 1997). Umeh (2017) in reaffirmation and furtherance, opines that forecasting is the lifeblood of most successful investment decisions.

Lizieri (2009), as cited in Emele, Okpaleke and Umeh (2014), divides forecasting methodologies into two groups: formal and intuitive. Formal forecasting, which is the more commonly adopted approach, is further defined by two main approaches, namely: quantitative and qualitative approaches. The quantitative approach is analytical and has been recommended by many studies given its emphasis on historic data for estimated outcomes. Various international studies (*United Kingdom* (UK)- Gardiner and Henneberry, 1989; McGough and Tsolacos, 1995; Brooks and Tsolacos, 2001; Stevenson, 2007; Papastamos, Matysiak and Stevenson, 2014; *Hong Kong* - Tse, 1997; *Finland* - Karakozova, 2005; Kiehela and Falkenbach, 2014; *Australia* - Newell and MacFarlane, 2006; *Singapore* - Ng and Higgins, 2007) concentrate on the application of quantitative forecasting methods in real estate. These methods include the Box Jenkins, Auto Regressive Integrated Moving Average (ARIMA), ARIMA with a vector of an explanatory variable (ARIMAX), Vector Auto Regression (VAR), Ordinary Least Square Regression (OLS)/Simple Regression and Multiple Regression amongst others, in the real estate investment market. Jadevicius and Huston (2015) citing and expanding on Lizieri's (2009) work, further classify quantitative forecasting methods into two classes; simple and complex. They include Exponential Smoothing, Simple Regression, Multiple Regression and ARIMA models into the simple forecasting technique category. Econometric and VAR specifications are classified as complex forecasting techniques.

Despite the international emphasis on forecasting for real estate outcomes, empirical studies on real estate investment and forecasting in Lagos remain limited. The Nigerian literature (Oni, 2009; Oni, Bello & Oni, 2012; Oyewole, 2013; Iroham et al., 2013; Emele, Okpaleke & Umeh, 2014; Udoekanem, Ighalo & Sanusi, 2015) consider various perspectives on the performance and forecasting of real estate investment. However, few focus on the prediction of total returns. In response, this study attempts to forecast the future performance, in terms of total returns, of shop and office investments in five selected commercial centres in Lagos Metropolis. Total returns are the unit of analysis because it is one of the recognised main measures of investment performance; it shows the investor both capital appreciation and income return on the investment (Crosby & Devaney, 2019).

Therefore, the enquiry into this measure of performance gives a more comprehensive assessment of the performance of commercial property investments. The total returns were determined by applying the annual rent and capital values of the commercial property investments as inputs, before predicting the future total returns.

The choice of Lagos Metropolis is predicated on its position as the largest property market in Nigeria where property investment take place (Olapade & Olaleye, 2018; 2019). The study areas considered are; Yaba, Ikeja, Lagos Island, Ikoyi and Victoria Island. They were selected in line with Umeh, Otegbulu and Anule's (2016) rationale, who similarly observed that these areas reasonably cover the core commercial areas in Lagos Metropolis and the results can be generalised to every commercial area in Lagos Metropolis. The next section presents a literature review of forecasting, investment performance studies in Nigeria as well as the issues within Nigerian real estate investment analysis. The third section presents the research methodology used and highlights the issues encountered in data collection. The fourth section presents the results and findings. The final section concludes the study and offers recommendations based on the results, findings and challenges.

2. Literature Review

2.1. Forecasting techniques in commercial property performance analysis

Studies on the forecasting of commercial property investments are predominantly foreign based, focusing on study areas in the UK, Australia, among others. These studies have focused on the application of different quantitative techniques for forecasting real estate investments. The techniques have either been time-series models (incorporating time), econometric models (incorporating time, macroeconomic variables and other variables), or models that test the accuracy of forecasts. For example, in a study based in Finland (using the Helsinki property market), Karakozova (2005) examined alternative econometric methods for modelling and forecasting property rent and returns. The study recommends that if the investment analysis aims to forecast rent and returns, a simple time-series technique should be used. The findings of Karakozova (2005) was validated by Kiehela and Falkenbach (2014) which was also based on data from the Helsinki property market. While a study by Ng and Higgins (2007), based on the Singapore office market, constructed a regression model to determine rent in Singapore for the period 1992 to 2005. They found that their model could reasonably capture the trend of the actual gross rent for those periods. The implication from Karakozova (2005), Kiehela and Falkenbach (2014) and Ng and Higgins' (2007) is that single equation regression models can predict movements of rental values. The use of regression method to predict rental values has also been adopted by Nigerian based studies – for example by Iroham et al. (2013) and Udoekanem, Ighalo and Sanusi (2015).

The findings of Brooks and Tsolacos (2001), based in the UK slightly differs from Karakozova (2005) and Ng and Higgins (2007). Brooks and Tsolacos

(2001) compared the performance of three forecasting techniques to determine the predictability of real estate investment returns in the UK. Two of the techniques adopted in the study utilise the time-series properties of real estate investment return series; while the third one uses a Vector Auto Regression (VAR) method which incorporates financial spreads. The study found that a VAR model improves on predictions of real estate investment returns made using other simpler, univariate and naïve forecasting methods for short-term forecasts. While Jadevicus and Huston (2015), also based in the UK, compared the forecast accuracy of five methods namely, ARIMA, ARIMAX, simple regression, multiple regression, and VAR, concluding that the simple and complex methods do not outperform each other in forecasting. The takeaway from the study is in its comparison of simple and complex methods of forecasting. This is unlike the general assumption that complex techniques will outperform or produce more accurate forecasts than simple techniques.

Apart from the numerous quantitative techniques applied to forecasting property investment performance, it is established that macroeconomic conditions influence forecasts. Papastamos, Matysiak and Stevenson (2014) observed that property forecast is affected by macroeconomic factors – GDP, consumer spending, inflation rate and unemployment rate. They argue that the greater the uncertainty (cross-sectional variance) of the forecasts, the greater the mean absolute errors of the property forecasts and in turn the smaller their accuracy. Their study reveals the influencing power macroeconomic factors place on forecasts which is important here given that the Nigerian macroeconomic space has been reported to experience fluctuations and volatility since 2014. This has affected rental values and prices (Nairametrics, 2020). This may introduce greater uncertainties in forecasts of investments based in Lagos Metropolis, Nigeria.

Having identified several forecasting techniques and the impact of macroeconomic factors on forecasts, it is important to establish a forecasting technique that applies to this study.

2.2. Preferred forecasting technique: The case for a simple regression method

As indicated above, there are a plethora of quantitative forecasting methods applied in the domain of property investments. Therefore, the choice of an appropriate technique is a fundamental determinant in the forecasting of the total returns of investments. Academics continue to debate 'best practice' for quantitative real estate forecasting. Jadevicius and Huston (2015) investigate whether complex forecasting techniques outperform simple techniques. Their study compares the forecasting accuracy of five different techniques in forecasting the UK commercial property market rents (ARIMA, ARIMAX, simple regression, multiple regression, and VAR) as well as the forecasting accuracy of 169 specifications in a five-year out-of-sample period with 845 forecasts generated in total. The study notes that more complex VAR specifications did not produce accurate out-of-sample forecasts when compared to simple models– the simple regression and ARIMA techniques

produced greater modelling results. The study confirms that increased model complexity does not necessarily yield greater forecasting accuracy. Furthermore, it recommends that analysts should make forecasts user friendly; that researchers should simplify forecasting techniques and use human judgement to aid forecasts; or employ a combination forecasting approach. Hence, this study promotes the need for approaching forecasting in a simple manner irrespective of the method applied, to encourage understanding.

Apart from Jadevicius and Huston (2015), the adoption of simple methods of forecasting is supported by other relevant literature. Armstrong (2001) opined that the naïve or simple forecasting method was as accurate as any other forecasting technique. Hence, the study argues in favour of simple methods of forecasting. Similarly, Newell et al. (2002) noted that despite the increased complexity in property market modelling methodologies, simple methods often perform as well as complex econometric structures. What's more, is that Newell and MacFarlane (2006) observed that many studies have found simple forecasting methods to be more accurate than complex econometric models. Karakozova (2005) and Umeh (2017) advocate the use of Ordinary Least Squares Regression Method– a simple technique– especially in situations where one is not analysing causal factors of performance.

From the foregoing, it is observed that there is no preferred one can conclude that both simple and complex techniques are appropriate depending on the scenario of application and provided that the forecast are tested for accuracy.

2.3. Studies on performance of direct real estate investment in Lagos metropolis

Analysing the performance of real estate investments is not new to Nigeria. Udoekanem, Ighalo and Nuhu (2014), Udoekanem, et al. (2015), Oyewole (2013), Odu (2011), Dabara (2014), Umeh and Oluwasore (2015), Umeh, Anule and Otegbulu (2016), among other studies, have assessed, analysed and compared the performance of different types and classes of real estate investment using different objectives and assessment metrics. S and Udoekanem et al. (2015), analyse the performance of commercial real estate investments in Minna and Wuse respectively for their association with macroeconomic factors. Oyewole (2013) compares residential and commercial real estate investments in Ilorin to determine which of the investments present a better investment option in terms of performance. Odu (2011), Umeh and Adilieme (2019a), Dabara (2014) and Umeh and Oluwasore (2015) analyse the performance of real estate investments in Lagos, Akure and Ibadan in terms of their inflation hedging abilities. Additionally, Umeh, Otegbulu and Anule (2016), Umeh and Adilieme (2019b) assessed the potential benefits due to diversification of commercial real estate investments in selected locations in Lagos.

It is noteworthy that the literature on the performance measurement of investments in Lagos as well as other parts of Nigeria, presents an academic bias towards diversification benefits, relationship with macroeconomic

indicators, comparing investments that present the best opportunities and inflation-hedging capabilities. There has been little focus on predicting the performance of investments based on their total returns.

Oni (2009), for one, using a polynomial regression model, focuses on the forecasting of rental values of properties located along arterial roads in Ikeja; while Iroham et al. (2013) investigate forecasting of property rental values in Akure using a simple linear regression method. Oni, Bello and Oni (2012), using the moving average method, concentrate on forecasting the demand for office spaces in Ikeja; while Udoekanem, Ighalo and Sanusi (2015) adopt a regression method in predicting the rent of offices in Abuja. Emele, Okpaleke and Umeh (2014) study the overarching limitations to the practice of real estate forecasting in Nigeria. However, these studies have not considered the total return on investment concept. Total returns capture capital appreciation and income return on the investment, it shows an investor the capital appreciation and income return measure of investment performance and is one of the recognized primary measures of investment performance (Crosby & Devaney, 2019).

From the foregoing, it is necessary to briefly identify issues plaguing property investment analysis in Lagos Metropolis. This may reveal reasons for the absence of enquiry into the prediction of total returns of property investments in the study area.

2.4. Some issues plaguing investment analysis in Lagos metropolis

Real estate investment analysis in Lagos Metropolis, and by extension Nigeria, is plagued by several issues that have, in turn, limited forecasting of investment performance. Firstly, the real estate market in Nigeria is opaque and data on property transactions is rarely found in the public domain. The 2020 Global Real Estate Transparency Index report by Jones Lang LaSalle (JLL) categorised the Nigerian real estate market as having low transparency (68 out of 99 markets under review). Other prevalent issues include; averseness to data sharing and assemblage by real estate practitioners, data retention capacity of estate firms and period of data retention (Olapade & Olaleye, 2018; Olapade & Olaleye, 2019). The combination of these factors has also limited investment funding opportunities from European and American investors, who have rated the market a high-risk market (Lim, McGreal & Webb, 2006).

Of the issues identified, the unavailability of publicly accessible quality data is particularly significant. This is emphasized by the absence of a central property database and a property index which in turn affects real investment analysis. Property investment analysis and forecasting, in particular, will be better served by independent and publicly verifiable data sources. Furthermore, it is observed that in developed nations (United States of America, UK, Australia, etc.), property investment performance indices are constructed monthly or quarterly to produce a robust data set (Higgins, 2015; MSCI, 2020). This allows for the capture of the real estate market cycle or an outlier occurrence within a year; annual averages may not properly capture

the real estate market cycle. However, the practice in Lagos metropolis is that rental values used in investment performance measurements are recorded annually, preventing the development of a robust data set for analysing and forecasting investment performance in Lagos Metropolis. Besides, the issue of the absence of a data bank has also prompted the sourcing of rental values and capital values directly from real estate practitioners.

In addition, little consideration has been given to the measure of the total return on investment performance. Nevertheless, this research focuses solely on forecasting the total returns of commercial property investments. The next section is dedicated to the research methods applied in this paper.

3. Research Methods

The study aimed to forecast the performance (total returns) of commercial property investments in Lagos Metropolis, due to the few numbers of studies focused on that area. The study was presented with the already acknowledged issue of the absence of a central property database. Hence, the primary data originates from the archives of estate firms registered with the Estate Surveyors Registration Board of Nigeria (ESVARBON) in Lagos metropolis. 192 estate firms are considered out of the 382 firms in the area by using an online sample size calculator (www.surveysystem.com/sscalc.htm). The sample size has a 95% confidence level and a 5% confidence interval. From this sample, two types of properties (shops and offices) and thus their relevant data are studied in 200 properties in total. Shops and offices were considered due to their popularity in the commercial property market of Lagos Metropolis. Out of the 200 properties, 125 were offices and 75 were shops. The choice of only 200 commercial properties was because they were the number of properties whose data were reliable for the 12 years considered. The rationale behind this choice is validated by a recent relevant study in the area by Ekemode and Olaleye (2016) which covered only 226 properties due to data retention challenges faced by real estate firms in Lagos metropolis which limited the scope of data collected.

The data on the average annual capital and rental values on these properties serves as the input for determining the total returns of various commercial real estate investments. The total returns formula for the real estate investment asset is given as:

$$TR_t = \left(\frac{(CV_t - CV_{(t-1)} - CExpt_t + CRpt_{(t)} + NI_{(t)})}{CV_{(t-1)} + CExpt_t}\right) \times 100 \qquad (1)$$

Where: TR_t = the total return in for the period under review (t)
CV_t = the capital value at the end of the period under review (t)
$CExpt_t$ = the capital expenditure (includes developments) in period (t)
$CRpt_t$ = the capital receipts (includes sales) in period (t)
NI_t = the rent receivable during period (t), net of property management costs, ground rent and other irrecoverable expenditures

The use of average annual capital and rental values sourced directly from real estate practitioners is due to the absence of a national property database and

information on commercial real estate transactions. Furthermore, rental transactions occur annually in Nigeria. The absence of a property index limits the dataset to annual values as opposed to monthly and quarterly values. These observations present a limitation, as the in-sample data obtained was for 12 years (2007 to 2018); 12 observations, as opposed to 144 or 48 observations if there was a monthly or quarterly property index.

Time is an important factor in forecasting property performance. As such, a Simple Regression methodology for time-series is adopted to make a forecast on total returns. This method allows for a simple time-series which achieves the same results as complex methods of forecasting (Armstrong, 2001; Karakozova, 2005; Umeh 2017). Furthermore, the absence of a robust dataset precluded the use of complex time-series models such as the ARIMA method. The forecast is followed by a test of predictive validity for the dataset using the Autocorrelation method. Autocorrelation is applied in technical analysis to measure how much impact a past pattern will influence or have on future patterns in a time-series analysis. Umeh (2017) observes that autocorrelation is used in an econometric analysis to determine if a past pattern is likely to continue in the future, provided that all external conditions remain constant. An investment possessing a high probability of pattern continuity suggests that trends can be forecasted with a relatively high level of confidence. The autocorrelation method is given as:

$$r_k = \frac{\sum_{t=k+1}^{n} (x_t - \bar{x})(x_{t-k} - \bar{x})}{\sum_{t=1}^{n} (x_t - \bar{x})^2} \quad\quad (2)$$

Where: r_k = the autocorrelation coefficient with k period lag
$\bar{x}$ = the mean of x variables
x_t = the observation of the period t
x_{t-k} = the observation of x with k period lag
n = the number of observations of x

The results are given on a scale of -1 to +1, with +1 indicating a perfect positive correlation and -1 indicating a perfect negative correlation. Higher autocorrelation values indicate high predictive validity (the past pattern will continue) (Umeh, 2017). The time-lag used for the autocorrelation analysis in this study is a 3-year time-lag.

In forecasting, it is essential to evaluate the accuracy of forecasts (Newell & MacFarlane, 2006; Jadevicius & Huston, 2015). Forecast evaluation compares the forecast values and actual values and inference from the result can be made concerning the accuracy of the forecast. Hence, the forecasts were evaluated using the Root Mean Squared Error, Mean Absolute Error, Mean Absolute Percentage Error, and Theil Inequality Coefficient methods on EViews software. The methodology adopted by the study commences with sourcing rental and capital values, determination of the total returns. These total returns are used to predict the total returns for 2019 to 2021. The total returns are tested for their predictive validity, then, the predicted values are evaluated for accuracy, by applying forecast evaluation techniques.

4. Results and Findings

This section presents the results and findings from the analysis conducted on relevant data obtained for this paper. Table 1 presents the average annual total returns for shops and offices in the selected study areas for 2007 to 2018 while the predicted total returns for 2019 to 2021 is presented in Table 2. Table 3 presents the results of the autocorrelation test, and the forecast evaluation is shown in table 4.

Table 1: Average Annual Total returns for Shops and Offices in Selected Areas of Lagos Metropolis

	Shops					Offices				
Year	Yaba	Ikeja	L/Island	Ikoyi	V/Island	Yaba	Ikeja	L/Island	Ikoyi	V/Island
2007	11.97%	4.52%	0.13%	14.71%	17.25%	17.87%	2.96%	7.15%	3.59%	17.25%
2008	8.09%	11.43%	13.60%	4.48%	1.95%	3.41%	7.23%	8.82%	9.52%	1.95%
2009	9.96%	3.90%	0.13%	3.53%	14.11%	10.62%	7.33%	1.56%	9.85%	14.11%
2010	2.43%	11.12%	18.31%	11.17%	17.32%	14.02%	4.72%	10.78%	3.10%	17.32%
2011	15.43%	6.71%	0.13%	12.39%	13.12%	5.85%	15.95%	1.38%	13.32%	13.12%
2012	3.99%	7.85%	13.98%	12.52%	14.90%	10.41%	5.56%	10.95%	8.28%	14.90%
2013	3.86%	2.49%	0.14%	5.88%	10.23%	7.78%	0.02%	0.03%	2.45%	10.23%
2014	5.14%	25.76%	5.29%	2.68%	22.31%	1.07%	14.40%	1.34%	0.77%	22.31%
2015	4.91%	1.95%	2.73%	2.86%	0.45%	1.07%	0.27%	1.05%	2.34%	5.18%
2016	6.62%	1.18%	7.23%	7.77%	-0.29%	11.28%	-0.99%	2.04%	2.10%	-0.27%
2017	5.02%	1.82%	4.65%	5.22%	2.44%	5.31%	-1.30%	-4.19%	-2.31%	-0.38%
2018	0.79%	0.11%	0.03%	-0.077%	-0.41%	1.77%	0.40%	-3.18%	-1.49%	-0.52%
Mean	6.52%	6.57%	5.53%	6.93%	9.45%	7.54%	4.71%	3.14%	4.29%	9.60%
Std. Dev	4.19%	7.12%	6.45%	4.72%	8.16%	5.41%	5.77%	5.09%	4.85%	8.08%

Source: Field Survey (2019)

Table 1 presents the total returns determined for the property investment options in the five study-areas over 12 years. Real estate investments in these locations fluctuate significantly. This observation, therefore, indicates high market volatility and aligns with the findings of Lu and Mei (1999) who argue that property investment returns in emerging markets are unpredictable. Such high levels of volatility are expected to reduce predictive validity and limit forecasting (Emele, Okpaleke & Umeh, 2014).

Forecasts
The time-series regression for the total returns from each of the locations is determined using the Ordinary Least Squares Regression method. The characteristic regression lines are given as:

Shops in Yaba:	$y = \mathbf{10.22 - 0.673(x)}$; $r^2 = 0.3357$
Shops in Ikeja:	$y = \mathbf{9.42 - 0.518(x)}$; $r^2 = 0.069$
Shops in Lagos Island:	$y = \mathbf{7.61 - 0.378(x)}$; $r^2 = 0.0447$
Shops in Ikoyi:	$y = \mathbf{10.84 - 0.712(x)}$; $r^2 = 0.2952$
Shops in Victoria Island:	$y = \mathbf{16.22 - 1.231(x)}$; $r^2 = 0.296$
Offices in Yaba:	$y = \mathbf{12.10 - 0.829(x)}$; $r^2 = 0.3048$
Offices in Ikeja:	$y = \mathbf{8.47 - 0.684(x)}$; $r^2 = 0.1827$
Offices in Lagos Island:	$y = \mathbf{8.66 - 1.003(x)}$; $r^2 = 0.5046$

Offices in Ikoyi: $y = 9.37 - 0.923(x); r^2 = 0.4701$
Offices in Victoria Island: $y = 16.42 - 1.241(x); r^2 = 0.3065$

The fitted regression line for the investment property options shows a low coefficient of determination (<0.70). This coefficient is an indication that the dataset did not fit and is due to the fluctuations observed in the in-sample total returns. This result suggests that the predictions (Table 2), made using this data, may not be reliable, as the total returns show that they are subject to other factors other than the variable of time. Other factors might be GDP and vacancy rates. Udoekanem, Ighalo & Nuhu (2014) found that in certain commercial property markets of Nigeria, changes in return inputs such as rent is influenced by the GDP and vacancy rate of Nigeria.

Table 2: Predicted Total Returns for 2019-2021

	Shops					Offices				
	Yaba Shops	Ikeja Shops	L/Island Shops	Ikoyi Shops	V.I. Shops	Yaba Office	Ikeja Office	L/Island Office	Ikoyi Office	V.I. Office
2019	1.46%	2.68%	2.69%	1.59%	0.22%	1.32%	-0.42%	-4.38%	-2.63%	0.29%
2020	0.79%	2.17%	2.31%	0.88%	-1.02%	0.49%	-1.10%	-5.39%	-3.55%	-0.95%
2021	0.12%	1.65%	1.93%	0.16%	-2.25%	-0.34%	-1.79%	-6.39%	-4.47%	-2.19%
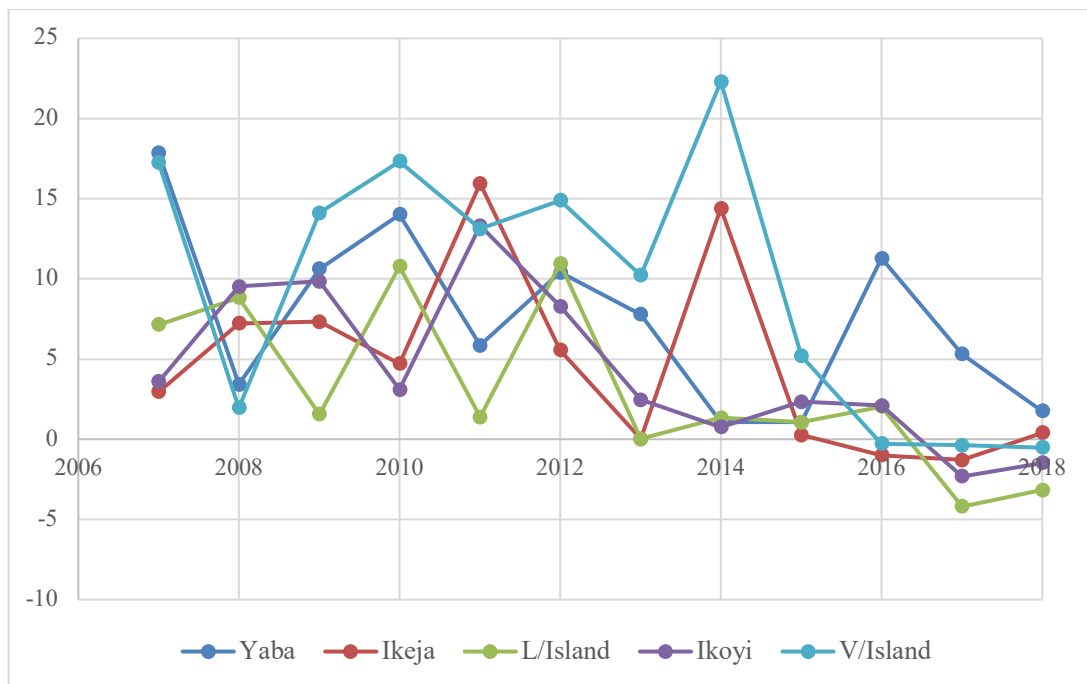
Figure 1: Trendline Of Total Returns On Shop Investments

The total returns on shop investments, illustrated in Figure 1, fluctuated between 2007 and 2016 with sharp rises and falls in the total returns particularly between 2009 and 2014. The total returns experienced a downward trend from 2016 to 2018. These fluctuations may be the result of the low growth observed in the rental values as well as the decline in capital values. Oxford Business Group (2019), in a study on the performance of the Nigerian real estate sector, reports that the real estate sector was impacted negatively by an economic downturn which was marked by a drop in the price

of crude oil. According to them, this decline was noticeable from 2013 to 2018, with the situation worsened by political instability brought about by a change in regime in 2015.

Figure 2: Trendline of Total Returns on Office Investments

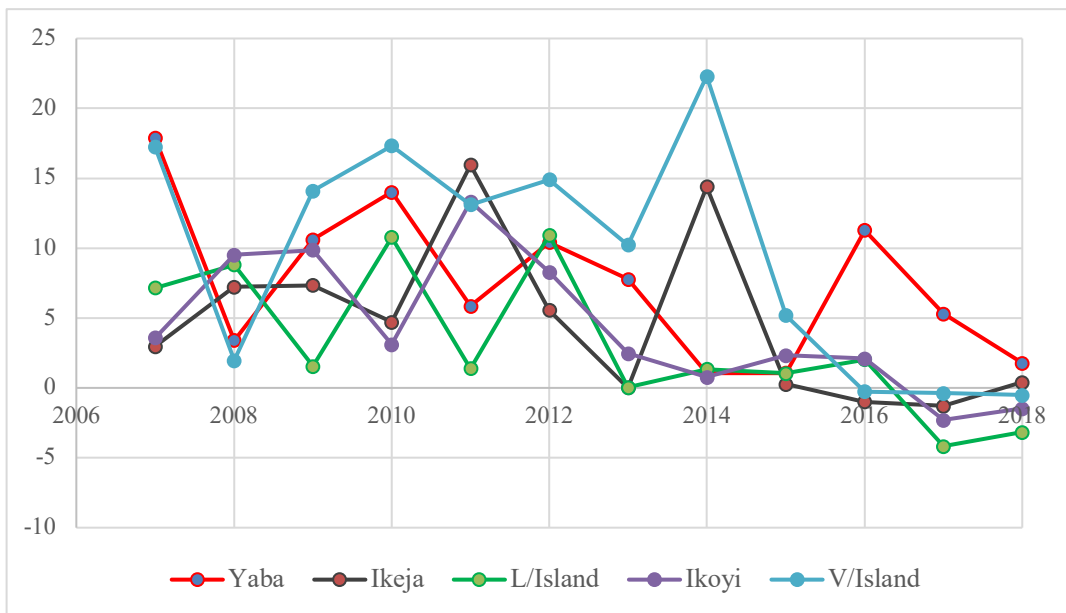As seen in Figure 2, the trend of total returns on office investments, like the shop investments in the study areas, fluctuated between 2007 and 2018 with sharp rises and falls in the total returns particularly between 2009 and 2014. These fluctuations may be the result of similar factors identified for the shop investments as reported by Oxford Business Group (2019). With these trends in mind, one can investigate the predictive validity of commercial investment opportunities across the five study areas (Table 3).

Table 3: Predictive Validity for the Commercial Investment Options

Investment option	1-time lag	2-time lag	3-time lag
Yaba Shops	-0.197	+0.202	-0.017
Ikeja Shops	-0.225	+0.053	+0.131
L/Island Shops	-0.689	+0.664	-0.530
Ikoyi Shops	+0.210	-0.242	-0.061
V.I. Shops	+0.158	+0.187	+0.075
Yaba Office	-0.093	-0.104	+0.401
Ikeja Office	+0.013	-0.008	+0.337
L/Island Office	+0.057	+0.426	+0.004
Ikoyi Office	+0.413	+0.160	+0.276
V.I. Office	+0.259	+0.164	-0.008

Table 3 presents the result of the autocorrelation analysis. The predictive validity of the total returns in the submarkets of Lagos metropolis varied from submarket to submarket as well as from time lag to time lag. In the case of the one-time lag; the predictive validity is higher for Ikoyi shops, Victoria Island shops, Ikoyi offices, and Victoria Island offices. In the case of the two-

time lag, the predictive validity is higher for Lagos Island shops, Lagos Island offices, and Yaba shops and very low for Ikoyi shops. In the case of the three time-lag, predictive validity is substantially higher for Yaba offices, Ikeja offices, and Ikoyi offices. As such, the investment options that show promise of pattern-continuation into the near future, based on its autocorrelation, are shops in Victoria Island, offices in Lagos Island, and offices in Ikoyi. This implies that the predictions made for these investments for 2019 to 2021, using the Ordinary Least Square regression method have a strong likelihood of occurring.

In general, the autocorrelation results suggest that the total returns observed in-sample will not follow the same pattern in the future. This holds as the Nigerian property market experienced volatility, marked by fluctuations in real estate values (capital and rental prices) in the period under review (2014 to 2019) (Oxford Business Group, 2019; Nairametrics, 2020).

Evaluation of the accuracy of the forecast
Forecast accuracy refers to the closeness of the predicted values to the true values obtained for the study. The accuracy of the forecasts was evaluated for accuracy using four techniques Root Mean Squared Error, Mean Absolute Error, Mean Absolute Percentage Error, and Theil Inequality Coefficient, with the aid of the EViews software (a statistical software used for forecasting, modelling, etc). The results are presented in Table 4 below.

Table 4: Forecast Evaluation

Forecast	RMSE	MAE	MAPE	SMAPE	Theil U1	Theil U2
YABA Shops	1.382474	1.376667	67.28138	108.3539	0.436385	2.853196
IKEJA Shops	0	0	0	0	0	0
L/ISLAND Shops	0.180831	0.143333	7.931481	7.421633	0.03985	0.454919
IKOY Shops	1.300295	1.29	63.47389	100.095	0.398819	2.740338
V/ISLAND Shops	3.237164	3.183333	158.3864	189.8851	0.889568	7.04461
YABA Offices	1.69628	1.676667	82.92389	131.4386	0.557368	3.630149
IKEJA Offices	3.272945	3.27	158.2826	200	0.950307	6.537388
L/ISLAND Offices	7.563923	7.553333	366.3642	200	0.987986	15.21796
IKOYI Offices	5.726223	5.716667	277.546	200	0.98124	11.55829
V/ISLAND Offices	3.172386	3.116667	155.2284	186.9809	0.88233	6.922176
Simple mean	2.715407	2.704	132.1555	187.3059	0.885865	5.60382
Simple median	2.355621	2.33	115.0357	169.2013	0.788039	5.028141
Least Squares	1.41E-15	1.41E-15	6.66E-14	6.84E-14	3.19E-16	2.85E-15
Mean square error	NA	NA	NA	NA	NA	NA
MSE ranks	2.566944	2.555152	124.9836	181.6657	0.86187	5.311498

* Trimmed mean could not be calculated due to insufficient data

Finally, this study evaluated the accuracy of the forecasts using four measures: Root Mean Squared Error, Mean Absolute Error, Mean Absolute Percentage Error, and Theil Inequality Coefficient with EViews v.10 software. The accuracy test returned poor results for all investment options excluding shops in Lagos Island, indicating that the predicted total returns do

not follow the observed total returns. Hence, the forecasts made using the ordinary least square regression method may not be relied upon.

5. Conclusion and Recommendations

The importance of forecasting possible investment outcomes cannot be overemphasized. It gives investors a probable snapshot into future outcomes of different investments thus guiding the investors to better alternatives. Hence, this study attempted to forecast the performance, in terms of total returns, of commercial property investments in Lagos Metropolis for 2019 to 2021 using annual total return data for 2017 to 2018. The forecast made use of the Ordinary Least Square Regression method for time-series data and illustrated a decline in total returns for the 2019 to 2021 period. The regression line for the investment options (shops or offices) showed a low coefficient of determination which suggests that the in-set sample data did not fit properly. The autocorrelation results also indicated low predictive validity. While the results from the forecast evaluation suggest inaccuracy in the 3-year forecast made using the Ordinary Least Square Regression method for time-series data.

Summarily, these results suggest that the total returns on commercial property investments in Lagos Metropolis are influenced by other causal factors (not considered in this study) and do not increase or decrease solely, due to the passage of time. This is evidenced by the poor correlation coefficient and coefficient of determination observed from the regression line. There is a possibility that these total returns are influenced by other factors highlighted by related studies; such as macroeconomic conditions (GDP, inflation rate, vacancy, unemployment etc), market cycles, etc.

To achieve more reliable forecasts, in terms of total returns for commercial property investments in Lagos, this study recommends that studies consider the factors that influence the performance such as macroeconomic factors (GDP, inflation rate, unemployment rate, vacancy rates etc.), and market cycles. Furthermore, the absence of data remains a challenge for property professionals. As such, institutions and organisations guiding real estate in Nigeria should work toward a reliable and established database. This will enable retention and centralise property investment data and, in turn, promote fidelity of the data and allow ease of performance analysis.

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A Land Value Capture Property Tax Schedule for Municipal Infrastructure Financing in Lagos State, Nigeria

Funlola Famuyiwa[1]

[1] Department of Estate Management, University of Lagos, Nigeria.

Abstract

This study develops a land value capture property tax rates schedule for use in Lagos state, Nigeria, in order to aid sustainability in municipal infrastructure financing. With the poor state of infrastructure in Lagos, the LVC property tax is advanced as a sustainable means of infrastructure reform through equitable rates. Using a sample from Alimosho - the largest local government area in Lagos - a hedonic regression model is used to determine the financial contributions of municipal infrastructure in property values to show their varying influences. From the regression analysis, the schedule is then derived, which is broadly premised on a quid pro quo basis. This stems from the fair notion that the pecuniary influences of municipal infrastructure should be recovered in the form of property taxes for public gains. Not previously done in the region, the schedule determines rates payable on property taxes and are reflective of the monetary influences that municipal infrastructure confer on property values. The proposed rates schedule also take into account varying distances of locational infrastructure and their impacts on property values. The use of Geographic Positioning System (GPS) in the study represents an advancement of previous Nigerian studies on infrastructure and property values where fewer infrastructure types have been considered or less precise measurement indices have been used. The study concludes that this LVC property tax approach will engender a sustainable, equitable, and efficient source of local financing for infrastructure delivery and operations. This is because it builds a veritable rates base and it enables ratepayers to face the actual costs of benefits received from infrastructure services.

Keywords: Land Value Capture; Property Taxes; Hedonic Pricing; Infrastructure Finance; Lagos State

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[1] funlolafam@yahoo.com

1. Introduction

Whilst increased urbanisation provides economic opportunities such as jobs and increased livelihoods, it also comes with planning and development challenges such as traffic congestion and poor access to public facilities. The rapid and uncontrolled population growth characteristic of cities in developing countries triggers a growing need for infrastructure, such as road developments, public amenities and transportation services. In Lagos state, Nigeria the rising infrastructure demand occasioned by the astronomical growth in population, has resulted in very visible infrastructure investment deficits (Soyeju, 2013). Governments at various tiers are in a constant battle to resolve this infrastructure challenge. Because public sector sources alone are inadequate to close the deficits, scholars such as Babawale (2013) and Famuyiwa (2019) prescribe and provide deeper insight into the innovative use of property taxes in supporting urban infrastructure and development.

The Property tax is a periodic levy on real estate, usually based on property values, just as income tax is based on income. According to Abbott (2008), it is levied against the deemed value or income arising from property. This tax is traditionally imposed by local governments, for expenditure on municipal infrastructure such as fire services, street lighting, waste disposal and cleaning services. Collier et al. (2018) thus explain that property taxes are seen as the price paid for public investment in services and infrastructure. Real estate is taxed because it represents most of the demand for municipal infrastructure. According to Bahl (2009), people shop for a community that provides the services they demand, and then pay for these services with the property tax. Walters, Sietchiping, and Haile (2011) similarly submit that if there were no real estate developments, there would be little need for the services that must be funded through taxes, as property users, carrying out activities that use sanitation, roads etc., create the demand for these public services. Essentially, the property tax is rooted largely in the 'benefits principle' of taxation and functions as a 'user-charge' on local residents for the benefits they receive (Institute of Taxation and Economic Policy, 2011). Tax rates in most jurisdictions, however, do not reflect this nexus. Ahmad, Brosio and Pöschl (2014) aver that there is little linkage of the property tax with service delivery. In Lagos state, Nigeria for example, policy only shows the rates derivation formula; and bills show tax liabilities. Suzuki et al. (2015) point out that taxpayers thus often contest the coverage and amount of taxes or fees because the definition of benefits created by public intervention is often vague. Further, the accuracy of the estimated incremental value is often challenged, and the calculation methods are not well defined. This causes low resource mobilisation (Babawale & Nubi, 2011), where appreciable returns are not yielded when compared to potentials. McGaffin et al. (2016) point out that the viability and success of this income generating mechanism, depends to a large degree on the ability to directly link the tax to the benefits received. This is of particular relevance in Nigeria where there is no evidence found that the revenue raised from the Lagos state Land use Charge was used to finance infrastructure (UKAid, 2015).

Economic theory provides the means to measure the influence of municipal infrastructure benefits in property values – as can be traced to the works of Rosen (1974). As such, a more equitable approach of rates determination which creates a definitive link between taxes paid and benefits received from municipal infrastructures can be achieved. This has the potential to increase accountability of government officials whilst making the tax more endearing to ratepayers. Parsons and Noially (2004) describe this as 'Land Value Capture' (LVC) taxing which can be applied in any case where a public facility leads to increases in nearby property values. Generally, infrastructure have distinct and significant values to building users, and their proximate availability have substantive impacts on real estate pricing and value (Johnson-Gardner, 2007). This emanates from functionality, service advantages, utility and convenience expressed in savings in time and costs (Famuyiwa & Babawale, 2014). LVC taxing is essentially a land-based financing (LBF) strategy which recovers in taxes, some or all of the gains in property values, realised from nearby public investments like infrastructure - for reinvestments or debt servicing. In Germán and Bernstein's (2018) study, property taxes were shown to be an important form of LVC, because well-functioning property tax systems base obligations on the market value of real estate. Property taxes that capture the rising value of real estate, have been hailed by economists as fairer and more efficient than other taxes (Haas, 2017). The concept of 'land value capture' has thus become a standard argument for implementing or reforming taxes based on real estate (Walters, 2013). When implemented well, it is highly transparent, citizens can clearly see how taxes are spent, and are able to hold local governments accountable (Smolka, 2019). As challenges mount from rapid urbanisation, deteriorating infrastructure, and more, the LVC as a funding source has never been more important to the future of municipalities (German & Bernstein, 2018).

The concept of LVC has been demonstrated in a number of ways in existing literature with the use of the 'hedonic regression pricing', by several scholars such as Parsons and Noially (2004); Medda and Modelewska (2010); and Suzuki, Murakami, Hong and Tamayose (2015). Using hedonic regression, this study aims to demonstrate how the LVC property tax can be applied in Lagos state, Nigeria using Alimosho local government area. The second section of this paper discusses narratives on the LVC in terms of previous studies on it, its use potentials and guidance on an equitable rates schedule in Lagos, Nigeria. The hedonic regression pricing, which reveals the influence of available infrastructure on residential property values is used as a basis towards deriving an equitable LVC rates schedule in the third section. In the fourth section of the paper, a schedule is derived. The schedule is broadly built on the notion that the pecuniary contributions of infrastructure should be captured back in the form of property taxes, which in turn will financially sustain municipal infrastructure investments. This is based on fairness. This schedule determines rates payable on properties and are reflective of the monetary influence that municipal infrastructure confer on property values. Conclusions and recommendations arising from the study can be found in the fifth section.

2. Land Value Capture and Municipal Infrastructure

"The tax upon land values is the most just and equal of all taxes. It falls only upon those who receive from society a peculiar and valuable benefit, and upon them in proportion to the benefit they receive. It is the taking by the community, for the use of the community, of that value which is the creation of the community."

(Henry George, 1879)

McGaffin et al. (2016) describe LVC as the process of extracting the additional value that accrues to a property following different types of public investments. Common LVC tools include public land leasing, linkage or impact fees, business improvement districts, and certain applications of property tax (Lincoln Institute of Land Policy, 2019). Figure 1 (adapted from Siba & Sow, 2017) shows the LVC process, which generates a cycle in which value is created, realised, and invested/re-invested in municipal infrastructure. The cycle shows that infrastructure investments are made with institutional support, enabling policies, efficient local government correspondence, administration etc. Taxes are then extracted on the basis of value contributions (implicit prices) of municipal infrastructure in property values. These value contributions also provide indicators of demand for various types of infrastructure. This is because hedonic regression pricing models are depicted in the demonstration of effective demand as opposed to projected perceptions of demand (Famuyiwa & Babawale, 2014). Ultimately, these realised gains are then invested or re-invested into infrastructure projects, and or used for debt servicing.
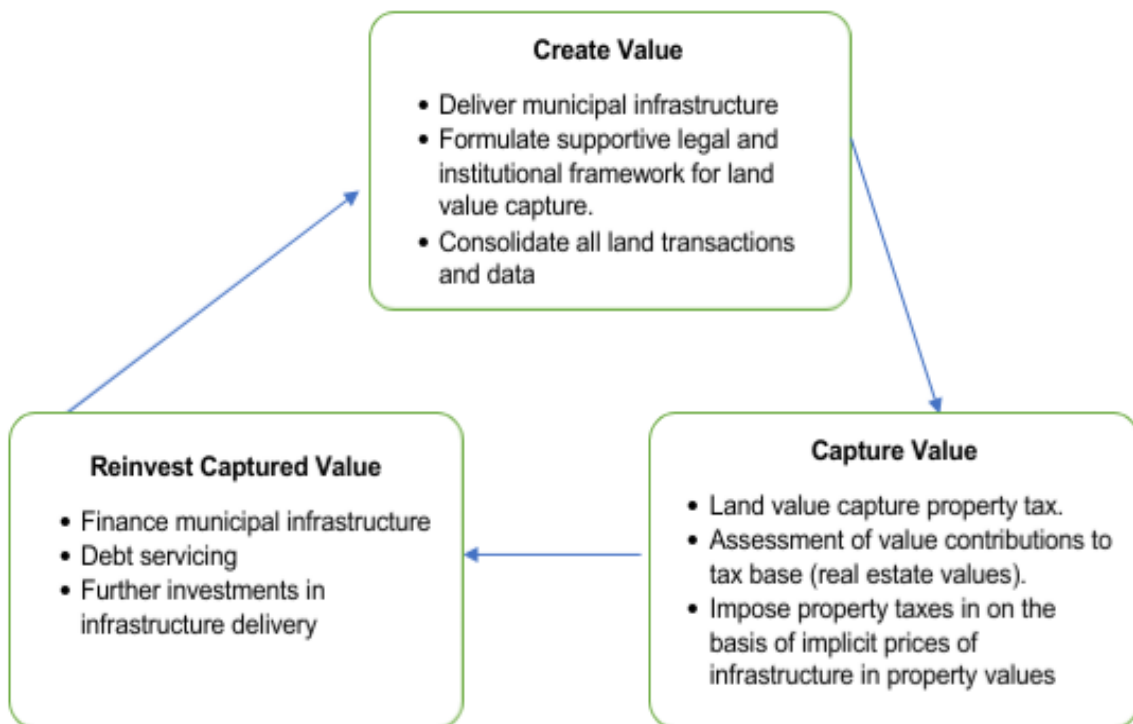

Figure 1: The Land Value Capture Process
(Adapted from Siba & Sow, 2017)

2.1. The benefits of a land value capture tax

As to why property tax rates should be linked with benefits received from municipal infrastructure, a few justifications particularly for Lagos state, Nigeria as collated by Famuyiwa (2019) and adapted here, are seen below.

i) Credibility in government and compliance with the tax system

LVC taxes are built on the notion that pecuniary contributions of public investments in real estate values, should be commensurately captured back in form of property taxes, creating a fair exchange between rates paid and service benefits received. In this way, policy makers are made more accountable. Prichard (2017) explains that where taxpayers do not believe that tax revenues correspond with public service provision, they are less likely to comply with taxes, and may hold more broadly negative views of government. Further, effective connections between revenue and services enhances trust in government, contributing to tax compliance and broader government credibility. Similarly, Smolka (2019) points out that with the LVC, citizens are able to hold local governments accountable as it is highly transparent. The UN-Habitat (2020) similarly states that if the connection between taxes paid and infrastructure and services is obscure, tax compliance will suffer.

ii) Revenue enhancement and infrastructure development

When taxes are seen as equitable, and representing a fair exchange for public services, revenues are positively impacted. 'Compliance' (mentioned above) aids revenue collection. Nzioki and Osebe (2014) note that compliance levels influence revenue generation in property taxation. With the LVC aiding compliance, revenues are boosted and so is spending on infrastructure and development. Pritchard (2017) notes that connection between revenue and spending are linked. This is because the connection will generate popular support for promised spending, leading to the creation of specific structures for delivering on that spending.

iii) Eliminating the 'freerider' problem

In addition to the highlighted points above, the LVC helps eliminate the 'free-rider' problem. The 'free-rider' problem arises where the usage of certain types of infrastructure is not controlled or regulated because there is no market or price mechanism to regulate their use. Simply put, such infrastructure types, have no price tags attached to them. Municipal infrastructure, such as streetlights or sidewalks (non-exclusionary and non-rivalrous goods) fall into this category, where usage is uncontrolled, 'unexcludable', and available to all at no specific cost to users (Otegbulu, 2010). Such services are therefore best funded through the LVC. This is because the LVC creates implicit prices and thus helps deal with the effects of such pricing failures.

As seen in the benefits of the LVC tax presented above and considering the pressing need for infrastructure reform in Lagos, this study helps set the stage for infrastructure reform in Lagos, through a sustainable means by developing

an equitable tax rates schedule. The benefits listed above contribute to the justification of this means (i.e. LVC) to help close the municipal infrastructure deficit in Lagos state, sustainably. The rates schedule proposed will will help address fiscal challenges of budget and inequitable rates. Huston and Lahbash (2018) submit that the arguments for LVC expansion on economic, strategic, fiscal and equity grounds are impelling.

2.2. Financing sustainability of municipal infrastructure in Lagos: The land value capture in perspective

Sub-Saharan African (SSA) cities are generally burdened by high urban infrastructure deficits and associated limitations to accessing services (UKAid, 2015). In Nigeria, municipal infrastructure development has been unsustainable. Soyeju (2013) writes that analysing the state of infrastructure in Nigeria presents a spectacle of the crushing lack of infrastructure assets across the nation. Unfortunately, infrastructure investments are characteristically capital intensive. According to Famuyiwa (2019) the delivery of infrastructure clearly requires significant investment in financing as well as related funding on operation, maintenance, and where applicable, debt servicing. In modern times, government spending alone in this regard is fast becoming inadequate. Ikpefan, Ailemen and Akande (2010) assert that public sector resources alone will be grossly inadequate to finance the necessary infrastructural development needed to drive the economy. Public-Private Partnership (PPP) arrangements, or other debt financing mechanisms are sustainable possibilities (Famuyiwa, 2019). Private sector participation is now well-recognised to help bridge the deficit, while complementing government efforts (Adeyemi et al., 2015). However, in such instances, there must be viable plans for repayment of loans sourced from the private sector. Such viable plans identified in literature include well-structured property tax systems (Walters, 2013; Suzuki et al., 2015). Similarly, Istrate and Puentes (2011) point out that any PPP project, requires a revenue source for repayment such as tolls, or fees from land value capture. Babawale (2013) elucidates that agencies (in particular the World Bank) have at various times under the aegis of the Infrastructure Development Fund (IDF) prescribed efficient property taxation as prerequisites for financial support for urban infrastructure and development. Walters (2013) reports that the LVC concept has become a standard argument for reforming property taxes, as substituting land-based taxes for other taxes to pay for infrastructure investments is economically efficient. Chapman (2016) similarly identifies LVC as a significant means of solving infrastructure funding problems.

In Lagos, Nigeria, the LVC holds a lot of potential for use. Firstly, is the prospect associated with the rapidly growing and large population of the city. Haas (2019) explains that the LVC is a powerful instrument for rapidly growing cities. Oualalou (2012) writes that by producing immediate substantial revenues, which reduces dependence on debt, the use of LVC is well adapted to cities witnessing particularly fast urban growth. Essentially, the population growth and the public investments leading to increased land values should not accrue to private investors - but channelled back to the public. Secondly, is the benefit inherent in utilising land to generate wealth

which the LVC is characterised by. Experts such as Tomori (2003) have explained that the wealth in Nigeria from land is more than enough to develop and sustain local governments, states, and the Federal Capital Territory (FCT) if it is well managed and administered.

2.2.1. Institutional and legal prerequisites in implementing Land Value Capture in Sub-Saharan Africa

In spite of this ever-growing consensus on LVC regarding the opportunities on issues such as infrastructure funding gaps, equity, sustainability, regional growth and development, there are constraints it faces in use and implementation. These constraints primarily relate to institutional and policy demands of LVC. Huston and Lahbash (2018) note that despite the widespread conviction that a proportion of 'unearned increments' should somehow be harvested for the wider public good, pragmatic and legal challenges remain. These pragmatic challenges are concerned with institutional' expediencies. Studies point to the role and capacity of local governments in this regard (Walters, 2013; UKAid; 2015). The UKAid (2015 p. iv) asserts that the directives from national institutions and particularly the capacity of local governments for the management of infrastructure - being a public good - is key to success. Local governments should hold authority over service management of municipal infrastructure, otherwise there will be inefficiencies and 'skewing of access to infrastructure'. Also is that poorer households would be neglected in favour of servicing non-residential and higher income residential property owners. Walters (2013) similarly advocates for decentralised authorities to implement LVC systems. In addition, because LVC systems include legal and spatial designation of schemes for ease of administration, Famuyiwa (2020) points out that local governments being in closest proximity to municipalities, must be included in administration. Unfortunately, in SSA, the role and influence of local governments, 'tipped over' by national governments in the region, act to constrain the opportunity for LVC (UKAid, 2015). In Lagos, Agwu (2019) explains that the federal government's tacit withdrawal of autonomy has become the bane of local government administration in Nigeria leaving local governments overwhelmed and incapacitated. Adegbenjo (2003), for example, states that there is very little known by local governments in terms of property inventory and information, making it virtually impossible to exercise proper authority over the land under their administration. Thus, institutional expediencies must take place in the areas of an effective and controlled framework for revenue collection, land geographic information systems, urban planning and tenure & registration systems. (Committee on Local Finance for Development, 2014). Furthermore, institutional challenges must be tackled by establishing local government fiscal autonomy. LVC systems can help support this.

Where legal issues are concerned, there should be clear policy intent on local government autonomy in both the raising of LVC taxes, and the managing of LVC arrangements. The UKAid (2015) submits that that it is essential to have a policy in LVC to provide a framework on issues like the functions of various players in the system such as administrators, and the state. Further, the policy

should provide for the financing method from the private partner and repayment approach. Essentially, such laws spell out the obligations of infrastructure service providers, and the financing arrangements for repayment. In Lagos, there are no laws specifically targeted at LVC financing mechanisms – to the author's best knowledge. In Famuyiwa (2020) land value capture is not expressly provided for in existing municipal legislations for infrastructure delivery. This presents various uncertainties with respect to legal questions around billing systems, debt collection, the designation of the LVC districts and requirements for public participation. Also, is relating this within the existing property tax law. The closest policy to LVC in terms of providing a framework for infrastructure financing arrangements is the Lagos state 'Public Private Partnership (PPP) Law of 2011' which, as the name implies, is a PPP policy[2]. In Lagos, key features of the PPP law centre around the establishment of the office of Public Private Partnership, procurement of private sector partners for infrastructure development, amongst others. However, the law is not strategic in terms of utilizing the land value uplifts attributable to infrastructure developments. According to Soyeju (2013), legal frameworks should necessarily include industry specifics (such as technical inputs needed). Also, the terms and the templates through which financial capital will move, must be defined. This remains a challenge for the use of LVC in Lagos state. Thus, the lack of clear and strategic policies on infrastructure finance act to constrain LVC. (UKAid, 2015).

PPP policy can however be enhanced to include the determination of value increases in property from infrastructure investments, as well as the inclusion of key elements necessary for effectively implementing LVC. The Ministry of Urban Development (2017) notes that the LVC encourages and facilitates the intervention of PPPs, resulting in a legal basis for introducing financial benefits from investment due to increased land values. In attaining robust policy formulation or reforms, the UKAid (2015) submits that in advocating for LVC with national governments, international development agencies can provide support in preparing policies - through the Department for International Development (DfID). Despite the legal and institutional challenges that need to be navigated in order for the effective implementation of LVC, it is argued that the benefits in terms of providing a more equitable and efficient tax system to better fund infrastructure, outweigh the challenges.

2.3. *The use of land value capture in Sub-Saharan Africa*

In SSA countries like Nigeria, its use is relatively limited– as are discussions on the topic. Bahl et al. (2018) explain that the use of LVC to finance infrastructure has been commonly used in developed economies, for example for Hong-Kong's mass transit railway network, as reported by Verougstraete and Zeng (2014). Similarly, McGaffin, Viruly and Boyle (2019) note that research on the use of LBF in financing infrastructure has tended to focus on

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[2] Essentially, PPPs are financial contractual agreements between a public entity and a private sector party, for providing infrastructure for the public, through greater financial participation and risk burden placed on the private party. Any PPP project requires a revenue source for funding repayments which may take the form of tolls, local or federal funding, or fees from land value capture (Istrate & Puentes, 2011)

Europe, the USA, South America and Asia. In the SSA region, some narratives also provide insight on LVC and advocate for their use. These narratives– such as Brown-Luthango (2010); McGaffin, Viruly and Boyle (2019) – however, stem from South Africa. In Nigeria the LVC remains loosely featured in literature as seen below (limited to Famuyiwa, 2017; Ibrahim & Fosudo, 2017).

Brown-Luthango (2010) reviewed case studies on the use of taxing land value increments from infrastructure provision, and how the concept holds possibilities for South Africa. It was found that more research was needed to model the effect of public infrastructure on land values. In addition, the study found that the instruments suitable in the South African context, such as betterment taxes, needed to be further explored. Finally, the study recommended a supportive legislative framework with clarity of purpose. Similarly, McGaffin et al. (2016), highlighted how value-capture could address the infrastructure challenges in South Africa. The study concluded that legislations should be reviewed, streamlined and have clarity– especially on issues relating to value assessments, and district delineation. Lombard, Behrens and Viruly (2017) conducted a case study to evaluate the effect of a newly constructed rail infrastructure project (Gautrain rail network) on adjacent residential property values. The study concluded that given a direct correlation between increased property values and infrastructure additions in some contexts in the study area, there was potential for the use of value capture. McGaffin, Napier and Gavera (2014), looked at two elements of the LVC process, namely the 'capturing of value', and 'the use of funds resulting from the captured value'. The focus was on the legal framework for use in the South African context. The conclusion was that legislation was vague and inconsistent. Further, it was asserted that the LVC would be most successful with clear policy objectives. McGraffin, Viruly and Boyle (2019) looked into issues surrounding how land-based financing (LBF) mechanisms could be used to overcome public infrastructure funding constraints in South Africa. Using a literature review the study found that other land financing mechanisms, such as tax-increment financing (TIF), that were currently not used would be better suited due to the reason of borrowing capacity of municipalities in South Africa. Suzuki et al. (2015) observed that majority of cities in developing countries had not yet fully explored the benefits of LVC, due to lack of a consistent vision, strategy, policy and institutional framework. The study also found that LVC exposed limitations relating to technical expertise, capacity, and experience. Other studies emanating from Africa, such as Biitir (2009), found that in Ghana the lack of enforcement of land use regulations, and knowledge gaps among key stakeholders was a major issue with the use of LVC. Ibrahim and Fosudo (2017) encouraged the use of LVC in infrastructure delivery for cities like Lagos state, Nigeria. They further highlighted the challenges of its implementation in Nigeria were insecure land ownership arrangements and insufficient property market data. Famuyiwa (2017) advocated for the use of value capture instruments and LBF strategies for infrastructure finance in Nigeria. A major observation of the study was the policy gap in Lagos.

The LVC studies reviewed above however, focus on issues of policy, administration, market systems, workability, operational issues and or modern high-tech mass transit systems. Little or no research has been done on the taxation of windfall gains from public infrastructure for LVC application in Nigeria. Particularly, the foci of these studies were not on developing LVC tax rates schedules. Thus, these gaps in literature reveal the need for this present study. Also shown, is the need for more studies in Nigeria.

2.4. Land value capture property tax rates

Where rates based on benefits received from infrastructure services are concerned, Slack (2006) writes that authorities may levy rates, according to services received on the basis of fairness. Essentially, rates should be commensurate with benefits received. This is because benefits derived from local public services are capitalised differently into property values. Evidence from literature generally shows little guidance on the use of circumstantial approaches in the setting of tax rates. According to Berniaz (2009), there are very limited studies on the subject of property tax rates. While Kennedy and McAllister (2005) hold a similar view that research on the principles of property tax rate setting continues to be negligible, it is noted that setting tax rates, the principles that formed the foundation of a tax policy (such as LVC) must be considered. This means that the guiding philosophy upon which the tax system is premised, such as fairness in terms of 'benefits received', should be reflected in rates. As advanced by Parsons and Noially (2004), LVC tax rates cover budgetary requirements and are also proportionate to benefits derived from municipal infrastructure. The LVC property tax rate should thus take into consideration the budgetary requirements (revenue expected by the public authorities from the property tax revenues) and benefits received from the tax. Baker and Dyson (2008) similarly state that the rates schedule used, must correspond to a market analysis for the specific characteristics of the property. McGaffin, Napier and Gavera (2014) explain that one key element in value capture taxation is the 'capturing of value' which corresponds to establishing a tax schedule or tax rate. This 'represents' the very essence of this study.

In addition to these highlighted considerations, the researcher recommends the consideration of a 'rateable' or 'taxable' value, as the value capture proposition in this study is not a one-time tax, rather, a recurring one where ratepayers in residential properties, as well as other property classes, are faced with this burden periodically (usually annually). The rateable value is derived when a percentage (e.g. 60%) is applied to the rental (property) value before the tax rate is then applied. It is a percentage of rental value, upon which the percentage of benefits from municipal infrastructure is then applied. In Lagos, the 'rateable value' corresponds to a 'general relief rate' well espoused by lawmakers, in section 10 of the long-standing property tax law (The Land Use Charge Law-LUCL). This 'general relief rate' reduces tax liabilities, thereby generating lower tax bills and reducing liabilities on ratepayers. In Lagos state, bills are reduced by 40% by this general relief rate. Melnick et al. (2009) point out that relief essentially attempts to produce a smaller tax bill for at

least some taxpayers. The altruism currently upheld in the LUCL will therefore be preserved in this proposed land value capture property tax. The UNHabitat (2020) states that revenue policies in land-based financing systems should be consistent with local values. Further, tax reliefs are usually granted to induce economic development and are thus appealing to taxpayers. The general relief rate essentially makes the tax more endearing, amenable to ratepayers thereby encouraging compliance.

The three considerations outlined above, namely: (a) budgetary requirements of the municipality or local authorities; (b) financial influence (implicit prices) of municipal infrastructure in property values; and (c) rateable value of properties; are to be considered in setting a tax schedule. The idea is to replicate these guiding considerations on LVC property tax rates in the study area.

The discussions above have provided insight on situating the LVC in Lagos state. The benefits, the operational challenges and the policy issues are highlighted in this section. The issue of a rates schedule– being a major gap in previous studies in addition to little or no guidance on its derivation– is also discussed in this chapter. The use of the LVC has at best, been demonstrated in a number of ways in existing literature with the use of the 'hedonic regression pricing'. Upon the hedonic regression pricing, which creates a definitive link between infrastructure and property values, a rates schedule can then be derived.

3. Research Methods

This study addresses two research questions. Firstly, what are the pricing effects–if any– of various municipal infrastructure on property values in the study area? The second research question seeks to understand how these pricing effects can be captured as a basis for property taxation. The following sub-sections explain in detail how the first research question is answered. The second research question is tackled in section 4.

3.1. Hedonic Regression Technique

The provision of infrastructural facilities has been established to have a direct relevance to the changes that may occur in residential property values (Ajayi et al., 2015). This has been demonstrated with the use of hedonic pricing in several studies such as Weinberger (2001); Larsen and Blair (2010); and Liman et al. (2015). Furthermore, several studies such as Medda and Modelewska (2011), Wang, Potoglou, Orford, and Gong (2015), Neville (2016), McIntosh,Trubka, Newman and Kenworthy (2017), used hedonic pricing to demonstrate the pricing effects of public amenities in property values for equitable tax schedules. Babawale and Johnson (2012), submit that the basic premise of the hedonic function is that a property represents a bundle of attributes which all contribute to its value. Tse and Love (2000) explain these property attributes to broadly include structural, neighbourhood and locational attributes (these attributes are discussed in sub-section 3.1.1 below). Babawale and Johnson (2012) further explain that the price of

property is the sum of the implicit prices (value contributions) for each of its attributes. A specific functional form (relationship) is therefore assumed to exist between these attributes and the value of the property. The functional form (hedonic price function) simply refers to the algebraic expression stating the relationship between the dependent variable (in this case property rental values) and the independent variables (property attributes). Malpezzi (2002) explains that the hedonic pricing analysis is a functional relationship between the price of a property and its characteristics in algebraic form. Functional forms quite often considered, include the 'linear', 'log-log' and 'log-linear' expressions (Babawale & Johnson, 2012). With the 'log-log', both dependent and independent variables are expressed in logarithmic forms. With the linear form, the exponential power of the dependent and independent variables is '1'. The log-linear's dependent variable is expressed in a logarithmic form, while the independent variables are not. It is vital to choose the right functional form. Dunse and Jones (1998) write that the choice of the functional form used will influence the results generated. From previous studies such as Babawale and Johnson (2012); Famuyiwa and Babawale, 2014; and Famuyiwa, 2019; a log-linear form (as shown below) is best considered. Further, Selim (2009) advocates for the use of the log-linear form in hedonic studies because it fits the data particularly well and its coefficient estimates can be interpreted as being the proportion of a good's price that is directly attributable to the respective characteristics of that good.

Hedonic analysis is used in this study to determine the impact of municipal investments/facilities on property values. Thus, the independent values are those that impact the property value (in this case rental value). The independent variables broadly consist of structural, neighourhood and locational attributes, as the functional form above depicts. Of key interest in this study, are 'locational' and 'neighbourhood' characteristics jointly referred to as 'municipal infrastructure' which will be featured in the LVC rates schedule. As mentioned in section 2.5, the rates schedule will include the financial influence (implicit prices) of municipal infrastructure in property values (among others). Famuyiwa (2019) describes municipal infrastructure as those publicly provided facilities serving local neighbourhoods and are designed to aid and ease of domestic, economic, and other productive activities within the are they cover. Examples include streetlights, fire services and pedestrian walkways. Here, municipal infrastructure represents both neighbourhood municipal infrastructure ('neighbourhhod characteristics' in the hedonic functional form) and locational municipal infrastructure (locational attributes in the hedonic functional form)- as seen in the equation (1) below.

$$\mathbf{P_n} = \beta_0 + \beta_s S_{ij} + \beta_l L_{ij} + \beta_n N_{ij} + z_{ij} \qquad (1)$$

Where: P_n = *Annual rental value of property (dependent variable).*
   β_0 = *The constant (The 'Constant' or the 'Y-intercept'. It represents the average value of the dependent variable in the absence of all predictors. It's the point at which the fitted line/ line of best fit crosses the Y-axis).*
   β_s, β_l, β_n = *Vector of the natural log of structural,locational and neighbourhhod characteristics respectively.*

Sij= Explanatory structural characteristics of a property.
Lij= Explanatory locational charateruistics of a property.
Nij= Explanatory neighbourhood characteristics of a property.
z_{ij}= is a random error and stochastic disturbance term (or unobserved characteristics) that is expected to take the form of a normal distribution with a mean of zero and a variance of α^2_e.

Section 3.1.1 discusses these characteristics in greater detail.

3.1.1 Structural, neighbourhood and locational attributes in hedonic pricing

Structural attributes according to Lombard, Behrens and Viruly (2017) are physical attributes of a building which speak to the quantitative and qualitative features associated with a certain property. Examples include its size, structural quality, and number of rooms. Neighbourhood attributes (neighbourhood municipal infrastructure) include publicly provided amenities or facilities in the environment in which the property is situated - such as road developments, streetlights, and waste-disposal services. Locational characteristics (locational municipal infrastructure), according to Babawale and Johnson (2012) refers to the spatial/distance relationships to local services or landmarks in a neighbourhood. For example, proximity to a bus stop, or intercity train station. In studies like Parsons and Noially (2014) focus was in fact only on locational infrastructure – a mass transit system. Distances were measured in actual amounts as opposed to use of (distance intervals) found in studies like Babawale and Johnson (2012) and Famuyiwa amd Babawale (2014).

Further, the price of property is the sum of the implicit prices for each of its attributes. The estimation of these various attributes through the hedonic pricing necessitates their measurement (variable measurement). According to Belniak and Wieczorek (2017), information concerning significant attributes connected with the property such as number of rooms, etc, is important in order to make the estimation (hedonic) possible. These attributes could be measured in numerical terms and or binary terms as can be seen in Table 1. Johnson-Gardner (2007) describes such attributes as either 'value' variables or 'dummy' variables. The former is expressed in numerical quantities, or order of magnitude, and the latter (dummy variables) in binary (dichotomous) form. The dummy variable (on a binary/dichotomous scale) is commonly used when dealing with categorical variables in hedonic studies (Famuyiwa, 2019) - as categorical variables take on very limited spectra of values. Value variables on the other hand, take on actual quantities in numerical terms. So, in Table 1, variables 4 and 19 for example, are 'value' variables as they are measured in actual quantities. Variables 6 and 16 on the other hand are binary as they are categorised. Studies such as Weinberger (2001); Selim (2009), Johnson-Gardner (2007); Medda and Modelewska (2010); and Babawale and Johnson (2012) all followed this path. The binary scale is used to measure the availability of an attribute. For example, '1' if the municipal infrastructure available and '0' if unavailable to the property. Structural details such as number of rooms are measured in numerical or quantitative terms. Locational characteristics of property relating to geographic distance are measured in order of magnitude (in kilometres).

The appropriateness of hedonic models is depicted in the demonstration of effective demand as opposed to projected perceptions of demand– which is illustrated through other environmental valuation techniques, such as contingent valuations surveys (Famuyiwa & Babawale, 2014). Since the hedonic analysis reveals the financial impact of municipal infrastructure in property values, the unearned windfall gains (financial impact) can thus be taxed in accordance with the value contribution to property values. This thus reinforces the objectivity, equity and transparency of the LVC property tax system.

3.2. Study area

The basic purpose of this study is to demonstrate that a property tax rates schedule will anchor a fair monetary exchange for benefits-received from municipal infrastructure through property taxes. This is demonstrated by using a sample of properties in one of the 20 local government areas in Lagos state, Nigeria. The properties provide a basis or demonstrating the use of the tax rates schedule advanced. The local government picked for this purpose is Alimosho Local Government area, which is the most populous local government area in terms of both human population and amount of rateable properties. According to the Lagos Bureau of Statistics (2016) the area has a total number of 144,570 chargeable (rateable) properties and a land mass of approximately 183km2.

3.3. Study data

The use and application of hedonic pricing requires some comparability of the population or sampling units in terms of property sub-markets. Straszheim (1974) submits that the property market is a series of single markets (property classes/types) which requires different hedonic functions. Bello and Bello (2007) add that in hedonic analyses, the skill of the valuer rests in the selection of comparable properties. According to So et al. (1997), a feasible approach to using the hedonic regression is to choose a sample with similar locational characteristics and income groups that are supposed to have homogeneous tastes so that the effects of various internal attributes and environmental characteristics of the neighbourhood are locationally insensitive. Therefore, this study used a sample of flats (apartments). Famuyiwa (2019) explains these to be residential accommodation with two or more bedrooms and its own conveniences within a building block. The reason for the use of flats was due to the relative accessibility to information and data on them in the study area. In any case the main idea behind the study is to demonstrate the potentials of the LVC property tax in Lagos State, Nigeria using a property sub-market, which in this case is residential apartments.

Data required for analyses of this nature are mainly primary in nature consisting of (i) annual rental values of properties under study, and (ii) characteristics or attributes that influence the value of properties significantly, namely 'Structural' attributes, 'Neighbourhood' attributes and 'Locational'

attributes. The choice of these various attributes was elicited partly through the use of structured questionnaires in a pilot study designed based on guidance from previous similar studies. Such studies include Babawale, Koleoso, and Otegbulu (2012); Famuyiwa and Babawale (2014); Jimoh and Ige (2017). Physical observation was also used to determine municipal infrastructure available in the local government area. The researcher's experience in the area and the pilot study (which entailed physical observation) informed the choice of these attributes for inclusion in analyses. According to Field (2013), variable selection should be based on theoretical rationale and past research. Bello and Bello (2007) similarly submit that the skill of the valuer rests in the recognition of key variables. A field survey helped identify infrastructure available in the study area, as this information was not derivable through other means. This was used to identify the infrastructure variables used in the study. Additionally, these types of infrastructure feature significantly in other studies such as Babawale and Johnson (2012), Jimoh and Ige (2017).

In terms of the measurement of market property values, some studies adopt the use of capital/sales value, while others use annual rental values. Weinberger (2001) is specific with the use of rental rates owing to the fact that rental rates are more abundant and dynamic, thus more sensitive to changes in the market, allowing for more robust models. Famuyiwa (2018) explains that in the Lagos property market, this is particularly true, as Lagos is known to have a more active property rental market than its sales market. The rental values were provided by Estate surveyors and valuers operating in the locality, with the researcher in liaison.

Table 1 below shows the variables used for the study, their measurement indices, and their code. The variables comprise of a comprehensive set of attributes for the properties in question. As mentioned earlier, these variables for this class of properties (flats) were selected based on past research and theory.

Table 1: Definition of Regression Variables

	Variables	**Variable Code**	**Variable Specification/ Measurement**	**Expected Correlation Coefficient Sign**
1.	Annual Rental Value (PV)	RENT	In Nigerian currency (Naira)	
2.	Structural Quality of Property	STRQUAL	Binary ('1' if good and '0' if otherwise)	+
3.	State of Repair/ Condition of Property	BCOND	Binary ('1' if good and '0' if otherwise)	+
4.	Number of Rooms	NROOM	Numerically specified	+
5.	Number of Bathrooms	BTHRM	Numerically specified	+
6.	Storage Space	STORE	Binary ('1' if adequately available, '0' if otherwise)	+
7.	Finishes	FNSHS	Binary ('1' if good, and '0' if otherwise)	+
8.	Balcony	BALC	Binary ('1' if available, and '0' otherwise)	
9.	Natural Ventilation	NVENT	Binary ('1' if good, and '0' if poor)	+

10.	Car Parking Space Capacity	CARP	Numerically specified	+
11.	Neighbourhood Security (Lagos neighbourhood safety corps security agency)	NSEC	Binary ('1' if post is easily accessible and '0' if otherwise). 'Easily accessible' in terms of Neighbourhood security as a variable is when the agency (i.e. the Lagos neighbourhood safety corps security agency) has at least a representative available daily patrol on the street.	+
12.	Nature of Roads	ROAD	Binary ('1' if motorable and tarred and '0' if not motorable and tarred)	+
13.	Pedestrian sidewalk	WALK	Binary ('1' if available and '0' if not available)	+
14.	Government waste disposal service	WASTE	Binary ('1' if regular and available '0' if not)	+
15.	Streetlights	SLIGHT	Binary ('1' if available and functional and '0' if otherwise)	+
16.	Drainage	DRAIN	Binary ('1' if good and '0' if poor)	+
17.	Street Cleaning	CLEAN	Binary ('1' if available and '0' if otherwise	
18.	Distance to main bus stop (Transportation terminus)	BUSSTOP	In actual/geographic distance (km)	−
19.	Distance to Local Retail Market	DMRKT	In actual/geographic distance (km)	−
20.	Distance to Primary Health Care centre	DHOSP	In actual/geographic distance (km)	−
21.	Distance to State Fire Services	FIRE	In actual/geographic distance (km)	
22.	Distance to Public Primary School.	DSCHL	In actual/geographic distance (km)	−
23.	Distance to Local Police Post/ Station	DPOLICE	In actual/geographic distance (km)	−

In Table 1, the first row shows the dependent variable, upon which the independent variables are regressed. Variables 2-23 are the independent variables of interest. Variables 2-10 are 'structural characteristics', while variables in rows 11-17 are 'neighbourhood characteristics' (neighbourhood infrastructure), and variables in rows 18-23 are 'locational characteristics' (locational infrastructure) of property. 'Neighbourhood' and 'locational' characteristics jointly represent municipal infrastructure. The 4th and 5th columns show their specification, measurement and expected coefficient signs.

A sample of 227 observations was considered appropriate based on Tabchnick and Fidell's (2001) formula. The formula takes into account the number of independent variables to be used as follows: $N>50+8m$ (where m is the number of independent variables, and N is the minimum number of observations required). However, this minimum required size of 227 was increased by 40% due to the expected problem of getting a low response rate. A total of 318 questionnaires were administered using the systematic random sampling as guided by Kothari (2004). This way, properties of interest (flats) were selected after some interval, whilst commencing from a randomly generated starting point. The intervals were at the discretion of the field

assistants and the researcher. This was due to the fact that official information pertaining to the number of properties of interest, or even their geographic spread, was unavailable. Altogether, a total of 288 filled questionnaires were found useful, and whose data were then analysed with the aid of the Statistical Package for Social Sciences (SPSS) Version 22.0. Locational infrastructure with distance variables (variables in rows 18-23 in Table 1) were measured, using a handheld GPS device. Distances were determined in relation to locational infrastructure as used in Weinberger (2001). The use of Geographic Positioning Systems (GPS) in this study represents an advancement of previous studies on municipal infrastructure and property values in Lagos state, Nigeria. This innovation enabled much more infrastructure types to be considered, with much greater accuracy in terms of their measurement indices.

4. Results and Findings

Table 2 shows the descriptive statistics (mean values) of the property characteristics under study. The mean values are based on the measurement scales specified in Table 1. The variable 'RENT' is the dependent variable, while all other items listed in the first column are the independent variables. The mean values can be seen in the fourth column with standard deviation values in column 5.

Table 2: Descriptive Statistics of Regression Variables

Variable Code	Minimum	Maximum	Mean	Standard Deviation
RENT	₦ 200,000	₦ 650,000	418,007.261	45.238.835
STRQUAL	0.000	1.000	0.890	0.449
BCOND	0.000	1.000	0.693	0.161
NROOM	2.000	4.000	2.885	1.520
BTHRM	2.000	3.000	2.126	0.982
STORE	0.000	1.000	0.502	0.114
FNSHS	0.000	1.000	0.691	0.275
BALC	0.000	1.000	0.453	0.096
NVENT	0.000	1.000	0.928	0.377
CARP	0.000	3.000	1.641	0.582
NSEC	0.000	1.000	0.283	0.005
ROAD	0.000	1.000	0.384	0.056
WALK	0.000	1.000	0.257	0.072
WASTE	0.000	1.000	0.397	0.158
SLIGHT	0.000	1.000	0.225	0.529
DRAIN	0.000	1.000	0.280	0.167
CLEAN	0.000	1.000	0.138	0.049
BUSSTOP	0.057	3.481	0.987	0.123
DMRKT	0.219	4.700	1.211	0.475
DHOSP	0.183	3.583	1.530	0.946
FIRE	0.534	7.162	3.659	0.821
DSCHL	0.226	4.095	4.764	0.558

DPOLICE	0.298	2.291	3.005	0.610

From Table 2, it is seen that the average distances to the main bus stop, local retail market, primary health care centre, fire station, public primary school and police station (collectively termed 'locational infrastructure') are 0.987, 1.211, 1.530, 3.659, 4.764 and 3.005 kilometres (km) respectively. For neighbourhood municipal infrastructure, average (mean) values are 0.283, 0.384, 0.257, 0.397, 0.225, 0.280, 0.138 km for security, motorable roads, pedestrian sidewalk, waste disposal services, streetlights, drainage and street cleaning respectively. This shows that 28.3% of properties are easily accessible to the Lagos neighbourhood safety corps (LNSC) security services. This agency (LNSC) is a motorized patrol agency that moves around neighbourhoods and ensure safety of communities. This creates a sense of security amongst residents. Their daily presence on various streets serve to deter and prevent the incidence of crime. What is meant by 'easily accessible' are properties that have at least a representative available daily on duty on the street where it is located. Of the surveyed properties, 38.4% have tarred and motorable roads leading up to them and 25.7% have proper sidewalks leading up to them. In terms of services, 39.7% dispose of their domestic waste through the Lagos state waste management authority. In terms of services, 39.7% dispose of their domestic waste through the Lagos state waste management authority. Functioning streetlights are available to only 22.5% of properties in the study area. While 28% of the properties have good public drainage outlets, and 13.8% enjoy public street cleaning. This shows that a lesser amount of properties enjoys services optimally or have access to them at all. Regarding the 'standard deviation', the values are low, showing that the spread of the individual values around the 'mean' is low. The standard deviation is the most widely used tool to determine how close or far away the individual values in a data set are, from a central representative value (such as the mean). In this instance the low standard deviation value shows that the individual values are clustered around the mean. All these descriptive values feed into the regression analyses and outcome.

In Table 3, the hedonic regression results show the implicit prices (coefficients) of the various property characteristics, as estimated in the annual rental values. These are the influences of property characteristics including municipal infrastructure, in property rental values.

Table 3: Hedonic Regression Results

Model		Unstandardised Coefficients		Standardised Coefficients	t.	Sig.
		B	Std. Error	Beta		
1	(Constant)	11.592	4.904		2.3638	.0089
	STRQUAL	.2114	.0984	.2347	2.1484	.0000
	BCOND	.1395	.0452	.1310	3.0863	.0000
	NROOM	.1979	.0300	.1528	6.5967	.0230
	BTHRM	.0748	.0137	.0803	5.4599	.0256
	STORE	.0462	.0517	.0572	.8936	.0337

FNSHS	.0923	.0076	.0719	12.1447	.0028
BALC	.0691	.0050	.0654	13.8200	.0195
NVENT	.0837	.0100	.0755	8.3700	.0072
CARP	.0885	.0051	.0918	17.3529	.0003
NSEC	.0332	.0093	.0204	3.5698	.0695
ROAD	.0494	.0196	.0386	2.5204	.0086
WALK	.0396	.0968	.0507	.4091	.0000
WASTE	.0099	.0034	.0040	2.9118	.0016
SLIGHT	.0188	.0050	.0116	3.7600	.0450
DRAIN	.0272	.0028	.0039	9.7143	.0028
CLEAN	.0056	.0128	.0051	.4375	.0414
BUSSTOP	-.0221	.0005	-.0262	-44.2000	.0366
DMRKT	-.0089	.0072	-.0027	-1.2361	.0276
DHOSP	-.0130	.0370	-.0230	-.3514	.0118
FIRE	-.0009	.0156	-.0045	-.0577	.0132
DSCHL	-.0009	.0052	-.0010	-.1731	.0000
DPOLICE	-.0034	.0325	-.0016	-.1046	.0001

ᵃ Dependent Variable: Annual Rental Value in Naira (₦)

In Table 3, the column tagged 'unstandardised coefficients' are only used to build the regression equation – as seen below. However, for making inferences about implicit prices, the 'standardised coefficients' are used (Pallant, 2005). The estimated equation for a hedonic regression model, in a semi-logarithmic form, is expressed as follows:

PN= 11.592 + 0.2114STRQUAL + 0.1395BCOND + 0.1979NROOM + 0.0748BTHRM + 0.0462STORE + 0.0923FNSHS + .0691BALC + .0837NVENT + .0885CARP + 0.0332NSEC + 0.0494ROAD + 0.0396WALK + 0.0099WASTE + 0.0188SLIGHT + 0.0272DRAIN + 0.0056CLEAN - 0.0221BUSSTOP - 0.0089 DMRKT - 0.0130DHOSP - 0.0009FIRE – 0.0009DSCHL – 0.0034DPOLICE

From Table 3, above it can be inferred that if neighbourhood security of Lagos state is easily accessible to a property in the study area, its rental value will increase by 2.04%. If the road surface is motorable and tarred, the annual rental value of a property will increase by 3.86%. The availability of pedestrian sidewalks will increase property value by 5.07%. The reason for this value may be due to the desirability of residents to taking walks or going jogging. Available and regular government waste disposal services will increase property value by 0.4%. Available and functioning streetlights will increase property value by 1.16%. Good drainage will increase the value of a property by 0.39%.

For locational municipal infrastructure, with every 1km decrease in distance to the bus stop, property value will increase by 2.62%. And with every 1km increase in distance to the fire service station, property rental value will decrease value by 0.45%. For primary health care centres, property values will increase by 2.30% for every decrease in distance by 1km. This means that proximity and closeness to various locational municipal infrastructure

influence property values positively. The influence of structural characteristics on property values can also be interpreted in similar fashion from the standardised coefficient column. However, analysing the structural components is not within the scope of this study. The T-statistics (column tagged 't') and their probability values ('sig.' column) show the significance of each independent variable. Essentially, the values in the column tagged 'Sig' help determine whether the influences observed are significant. All these are significant at 0.05 (5%) with the exception of 'neighbourhood security' whose significance is '0.0695'. This is perhaps due to private security measures taken by residents locally, such as private security personnel. Usually, when the significance is less than the threshold (in this case, 0.05), the hypotheses that each individual influence of the attributes is significant in the property values, is accepted. While 'T-statistics' are produced for the individual variable (Pallant, 2005) and their respective levels of significance as seen in Table 3, the 'F-statistic' is produced from an Analysis of Variance (ANOVA) test. The T-statistics show the significance of each independent variable, while the F-statistic, is for the overall significance of the model.

Generally, these results support similar studies like Sirmans, Macpherson and Zietz (2005) where a careful consideration of variables suggests that structural variables of property are more dominant, with some of the highest coefficient values such as 0.2347, 0.1528, 0.131 for structural quality, number of rooms, and state of repair respectively. Municipal infrastructure (both neighbourhood and locational characteristics of property) generally represents a lesser proportion of property values than structural attributes do, for obvious reasons. From Table 3, municipal infrastructure (coefficients of both neighbourhood and locational attributes aggregated) are generally lower in value– about 0.1933 than the aggregated value of the coefficients of structural attributes . Though the coefficient values are essentially interpreted as the individual percentage change in rental values for a given variable), these individual percentage changes in rental values can be aggregated, in order to have an insight as to the weight of their joint influences in rental values. In this case, 0.1933, and it is upon this joint influence that the LVC property tax will thus be largely based. The results (coefficient values) support similar studies like Babawale and Johnson (2012); and Babawale, Koleoso and Otegbulu (2012).

The results in Table 3 will later be used to help guide a tax schedule based on the impact of municipal infrastructure. The application of this tax schedule expectedly, covers only the coefficients related to municipal infrastructure i.e. 'neighbourhood characteristics' (neighbourhood municipal infrastructure), and 'locational characteristics' (locational municipal infrastructure) – variables listed in rows 11-17 and 18 -23 respectively. The tax burden would therefore be based on results so derived from the coefficients in rows 11-17 and 18-23, tagged 'standardised coefficients' as 'capturing back value' because these are the implicit prices of municipal infrastructure, in property values (the financial contributions that various municipal infrastructure have on property values). Each coefficient value (in the Standardised coefficients column) is interpreted as the average change in the property price, relative to

a per unit change in the corresponding independent variable while holding other variables in the model constant.

Table 4: Model Summary[b]

Model	R	R-Square	Adjusted R Square	Std. Error of the Estimate
1	.953[a]	.909	.902	89301.882

[a] *Predictors: (Constant), DPOLICE, DSCHL, FIRE, DHOSP, DMRKT, BUSSTOP, CLEAN, DRAIN, SLIGHT, WASTE, WALK, ROAD, NSEC, CARP, NVENT, BALC, FNSHS, STORE, BTHRM, NROOM, BCOND, STRQUAL*
[b] *Dependent Variable: Annual Rental Value in Naira*

Table 4 shows the performance of the hedonic regression (model summary). It can be seen that the model (hedonic) explains 90.9% of variance in the rental values which is desirable as this statistic is high. This can be read from the 'R-square' column, suggesting that 90.9% of the variation in rental values in the study area is explained by the twenty-two explanatory variables employed in the model. In hedonic analyses, models with good fits are at least higher than the 60% R^2 threshold value (Pallant, 2005). The predictive performance of the model is also good as indicated by adjusted R^2 value of 90.1%. These statistics indicate that the model is reasonably fit for making inferences. Table 5 shows the ANOVA results. These results assess the overall statistical significance of the results, as indicated by the significance of the F-statistic (.000). It determines if the joint influence of the independent variables in the model is statistically significant in the dependent variable (rental value) (Famuyiwa, 2019). From the column tagged 'Sig.' it can be seen that it is statistically significant, as $P < 0.005$ (P=0.000). This is as recommended by Pallant (2005).

Table 5: ANOVA[b]

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	21096546975364.045	22	958933953425.638	120.245	.000[a]
	Residual	2113328958782.681	265	7974826259.557		
	Total	23209875934146.726	287			

The regression results show that a significant portion of the value of flats in the study are attributable to municipal infrastructure. This lays the foundation of evidence to develop a tax schedule that can be used by local governments to reclaim some of the value created by their efforts.

5. Rates Schedule

This section answers the second research question regarding how the pricing effects of municipal infrastructure can be captured as a basis for property taxation. In capturing value in this study, deference is made to the coefficients in Table 3 (calculation of value/financial contributions of municipal infrastructure to property values) - as discussed in subsection 2.5 of this paper. The assumption here is that the value capture tax rate would altogether

be largely a percentage of the property value, formed of the contributory influences of various municipal infrastructure on property values.

5.1. Rates schedule for locational characteristics (municipal infrastructure)

It can be expected that property characteristics measured in distance (locational characteristics) would have varying influences on property prices as a result of proximity. Parsons and Noially (2004) explain that those who benefit most from a distance-based infrastructure project are those who reside closest to it. Though disamenity (negative) effects of infrastructure have been recorded in studies, these have been in relation to high scale infrastructure such as railway termini, or airports (Kilpatrick et al,, 2007; Seo, 2016). In Nigeria, municipal infrastructure and real estate pricing studies significantly show positive relationships between infrastructure and property values at the neighbourhood level. (Babawale et al., 2012; Famuyiwa & Babawale, 2014; Liman et al., 2015). Effects are thus expectedly positive, based on a priori expectations. According to Korngold (2017) due to the capitalised proximity value, these benefits arise depending on proximity of a property to the infrastructure. Thus, tax systems of this nature impose proportionately higher rates on properties closer to the specific infrastructure. From this, the researcher recommends the use of 'banding' of properties - in terms of proximity to specific locational characteristics (locational municipal infrastructure). Properties are classified according to their distance intervals, into 'bands' from various locational infrastructure. As such, they are grouped accordingly, where distances are fragmented into not more than 4 bands (or stretches) of 1 km each as seen in Table 6. Based on the studies of Parsons and Noially (2004) it is argued that implicit prices of locational infrastructure in property values would decline steadily and proportionately with increase in distance to specific locational infrastructure and vice versa. This banding schedule makes the LVC tax even more equitable in the sense that the tax liability and locational municipal infrastructure benefits are even further aligned. 'Banding' addresses the imbalance that arises from the proximity edge to locational infrastructure that properties have over each other. Properties closer to the locational infrastructure in question tend to have higher proximity value, which this banding schedule takes into account, in LVC tax rates.

Table 6: Definition of Bands

Description of Bands	Distance to Locational Characteristic (Municipal Infrastructure)
Band 1 (B1)	Up to a 1-kilometer distance to a specific locational characteristic
Band 2 (B2)	More than 1, and less 2 km to specific locational characteristic
Band 3 (B3)	More than 2 and less than 3 km to specific locational characteristic
Band 4 (B4)	More than 3 and up to 4 km to specific locational characteristic

Every property is located in a Band, (B1, B2, B3, or B4). If more than 4 km, the logical progression will terminate at zero. Thus, the influence of a locational infrastructure located more than 4 km from a property is regarded as 'zero' for that property. For properties in B1 to B4, the multiplier of a

regression coefficient in a particular zone will decrease proportionately. The rationale for using 1-km 'intervals' in Table 5 is that from the average results in Table 3 most distances are not more than 4 km and, in any case, the value of the implicit price would have declined significantly after 4 kms.

Therefore: B1 > B2 > B3 >B4 > 0.

Where: 'B1' as a multiplier, applied to locational infrastructure coefficients
would be equal to '1'
B2= B1/2 (i.e.½)
B3= B1/3 (i.e. 1/3)
B4= B1/4 (i.e. 1/4)
Any distance after B4, would be regarded as zero.

The influence of Locational infrastructure is represented as 'L1, L2, L3, L4,…LN, where L is derived from the regression coefficients for locational infrastructure. Each infrastructure is treated individually, and on the basis of how much it influences property values accordingly. For example, being within 1km (Band 1) of the local fire station means a property will increase in value by 0.09% (-.0009) as seen in Table 3. The further away (every 1km) the property is from a specific locational infrastructure, the lesser the value influence of that infrastructure will be on a property's value proportionately. Hence this is also reflected in rates. In this instance (using the guidance on bands above) the value influence of the fire station for a property in Band 2, will be ½ of 0.09% (i.e. 0.045%). N represents the amount of locational infrastructure identified for LVC tax purposes in any local government area. In this case, N= 6 (variables in rows 18-23 in Table 1). 'L1' for instance, would be the regression coefficient (implicit price) for locational infrastructure for 'Bus stop'. For any property in Band 1 for example, the tax burden for locational infrastructure would therefore be represented as follows:

$$\sum LB = (L1B1 + L2B1 + L3B1…+ LNB1)$$

The implicit price of each locational infrastructure coefficient would be estimated on the basis of its the proximity to the property in question (i.e. based on the Band the property falls into. Either B1, B2, B3 or B4). So, for a property which falls into different bands by virtue of its proximity to locational infrastructure:

$$\sum LB \text{ becomes } \sum(LNBX)$$

Where X is the denominator of the band a property might fall in, in relation to the specific locational infrastructure– ranging from 1-4. The value of 'BX' could therefore be 1, ½, 1/3 or 1/4.

5.2. Schedule for neighbourhood characteristics (municipal infrastructure)

The derivation of rates on the basis of the influence of neighbourhood characteristics on real estate values is more direct than for locational characteristics. Thus, the hedonic price function is represented as βNij.

Hence, rates would be based on the summation of coefficients that fall under this category as follows:

$$\sum \beta Nij = \beta Nij1 + \beta Nij2 + \beta Nij3 + \beta Nij4 + \ldots \beta Nijn$$

For the purpose of rates, a simple equation– $\sum NI$ is derived. Where NI stands for 'Neighbourhood Infrastructure'. $\sum NI = (NI1 + NI2 + NI3 \ldots + NIz)$. The grouping of property into bands is not applied here, since the proximity factor is not used in the hedonic regression coefficients for neighbourhood infrastructure.

5.3. Value capture property tax schedule

The ultimate schedule altogether is carried out in 3 steps - similar to Parsons and Noially (2004). First stage is the hedonic regression analyses of the implicit prices of property characteristics (independent variables) on property rental values (dependent variable) as seen in subsection 3.4 (Table 3). Next, the tax index is created, which encompasses the implicit prices of significant neighbourhood infrastructure, and locational infrastructure as explained in subsection 4.1 and 4.2. Hence the tax index is '$\sum(LNBX) + \sum NI$' for locational and neighbourhood infrastructure, as a representation (implicit prices) of municipal infrastructure in property values.

Thirdly, the entire tax burden is proposed, which takes into consideration the following:

(a)   Property (annual rental) values denoted as 'P'.

(b)   Implicit prices of municipal infrastructure in property values denoted as '$\sum(LNBX) P + \sum(NI)P$.

(c)   An additional amount may (in some cases) may be required to augment revenue from the LVC tax, to support budget requirements from the property tax, by the authorities. Such as a constant charge applicable to all rateable properties regardless, is denoted as 'C'.

(d)   Any other criteria deemed necessary by the authorities such as a rateable value (percentage of property value that can be taxed), denoted as 'RV'.

This tax schedule thus is given as: $\{\sum(LNBX) P + \sum(NI)P + C\} RV$.

For bare (undeveloped) land, which has not been discussed so far, as a matter of policy, the application could comprise of the additional amount explained in (c) above– the minimum constant sum which would help discourage land speculation. This can be applied by government, only where this is deemed necessary.

6.   Concluding Comments

In light of the poor state of infrastructure, and the dire need for reform, this study set out to develop an LVC rates schedule for Lagos state, Nigeria, in order to aid sustainability in financing municipal infrastructure. The study

argues that there are varying influences of municipal infrastructure on property values, and this should be reflected in property tax rates. This is demonstrated using the largest local government in Lagos; Alimosho Local Government area. Using the hedonic regression analysis, the financial influences of municipal infrastructure are revealed to have significant positive impacts on real estate values. This confirms the long-standing notion that municipal infrastructure has substantive effects on real estate pricing. From the regression results, an LVC property tax rates schedule is developed based on the influences of infrastructure on property values. Rates therefrom are thus considered equitable as they are aligned with the benefits received from infrastructure services. This approach in setting of LVC property tax rates has not been taken into consideration in the existing property tax system in Nigeria, and is recommended for use in Lagos. Also recommended is the enablement and empowerment of local government areas in the state, due to their critical role in effectively implementing the recommended tax rates schedule. Clear policy intent on property rates, entrenched in the LVC concept must also be well established. If the critical relationship between infrastructure and property values is entrenched as a fundamental basis for assessing property taxes, it will appreciably improve equity in the property tax system, creating compliance and revenue buoyancy. Optimally provided infrastructure thus implies higher tax revenues for government and enhances economic empowerment by way of cost savings gained from reduced expenditure on private provision of services. As mentioned in the second section of this paper (2.1) revenue generation in property taxation is highly linked with improved infrastructure spending. This will engender reform in the infrastructure sector in Lagos state.

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Characterising Real Estate Value as Co-Determinant of Housing Choice Optimality in Nigeria

Ayodele Isaac Olatunji[1]

[1] Department of Estate Management and Valuation, Federal University of Technology, Minna, Nigeria.

Abstract

Nigeria remains classified as a lower middle-income nation. Among middle-income households (MIHs), there exists an idea that real estate value is central to housing well-being, but the significance of the anecdote has not been empirically established.The principal aim of this study is to characterise real estate value (REV) as a co-determinant of optimality, the adopted proxy for housing well-being, through regression modelling of selected MIHs in Abuja and Minna, Nigeria. This study examined the impact of REV as well as the effects of four other pertinent variables (household income, commuting cost, workplace distance and household activity pattern) on housing choice optimality in Nigeria. Using primary and secondary data from purposively selected MIHs in Abuja and Minna, the study employed multiple regression to explore the relationships among the variables. The results show that the housing optimality model has a reasonable predictive explanation of approximately 57–77% for the explanatory variables. The study's findings also reveal that household income, real estate value and activity patterns have significant effects on housing choice optimality, albeit with varying magnitudes across the two cities. It is worth noting that the t-statistic ranges between -5.20 (Abuja) and 2.12 (Minna), thus implying that REV impacts optimality negatively and that REV is a burden which households must bear in order to secure the right to an apartment of their choices. The study concludes that given the real estate value, the consequential housing choice optimality could be predicted across different housing markets in Nigeria as a decision-support guide for rental seekers. Furthermore, given the consistency of these results with earlier studies, this work provides greater knowledge on the lifecycle of housing choices and realities in Nigeria. By adapting and extending the optimality idea to real estate, this study has made an important contribution to the discourse of optimal rental housing.

Keywords: Housing Choice Optimality; Real Estate Value; Multiple Linear Regression; Nigeria

[1] tunji.ayo@futminna.edu.ng

1. Introduction

Over the last ten years, Real estate had been the single most productive and important economic asset to most middle-income households (MIHs) in Nigeria, a nation classified by the World Bank (2020) reports as a lower middle income country (LMIC) among 50 nations ; thus, one dominant aspiration of households during their lifecycles is to obtain optimal housing along with non-housing consumptions, subject to budget constraints (Zabel, 2004; Oktay et al., 2014). However, the notion of optimisation is subjective, given its multiple dimensions and household's idiosyncratic preference. Consequently, most households' current utility functions are only partially optimised.

Against this background, many international scholars of housing economics have examined the drivers of a households' location choices: commuting cost and workplace distance (Zax & Kain, 1996; Stutzer & Frey, 2004b), household demographic factors (Cinar, 2014), activity pattern (Ben-Akiva et al., 2006; Bocarejo et al., 2017) and property value (Nechyba and Strauss, 1997; Maclennan & O'Sullivan, 2012). Additionally, Bratt (2002) and Grzeskowiak (2006) study housing and family well-being based on owner-occupiers' perceptions. In Nigeria specifically, studies by Olatubara (1994, 1998), Arimah (1997), Jiboye (2009) and Olatunji (2013; 2017) are notable representative articles on real estate value and residential location choice. In a nutshell, this means that REV is a factor for the housing-specific well being of the typical household: an empirical study is therefore imperative to reveal the nature and extent of REV's contributory role in the housing choice process.

Given the centrality of real estate value in the literature and all real estate decisions, the study examines this concept in Nigerian rental housing markets. At present, no known research has focused on this nexus– revealing the impact of REV and its ability to predict housing well-being or optimality in Nigeria through empirical and comparative evidence. As part of this objective, the paper examines variables of interest and optimality as well as the impact of four other applicable variables: household income, commuting cost, workplace distance and activity pattern (AP). These were investigated in the cities of Minna and Abuja, to ascertain housing choice optimality and add to the literature.

1.1. Rationale for focusing on rental housing over owner-occupancy

Durrand-Laserve (2002) asserts that globally, rental housing and owner-occupancy among others are easily considered the most common means of access to urban housing. It is logical to expect that homeownership would be more attractive owing to its comparative security and investment advantages over rental housing; but budgetary constraint is its limiting factor. Nevertheless for many Nigerians, renting is the popular option en route to the ultimate goal of owning a house. This could be an underlying reason for global attention on homeownwership by world bodies especially the World Bank in the recent past. Olatunji (2010) argues that rental housing and owner-

occupancy are the two most common forms of access to property rights in Nigeria. Debates often arise as to their performances or competitive efficacy as solutions to housing delivery in Nigeria and more generally Africa as a distinct region. Contributing to the discussion to identify which option is more people-centric, Olatunji (2014: p.100-101) asserts that:

> *"The populist goal of the UN that promised housing for all by the year 2000 eventually turned out to be abortive. The goal expired with the year 2000 without fulfilment, at least in Nigeria, where the housing deficit as at 2010 was put at 16 million houses. Perhaps it is on the strength of these failures that Durrand-Lasserve (2002) asserted variously that the homeownership approaches had achieved limited results because the goals are rarely attainable and are not always desirable. Opportunities for medium-term and long-term interests in rental housing are a viable alternative route to tenure security for the urban poor. Universal homeownership should not be pursued rigidly by governments because other opportunities are available in the rental housing subsector"*

In line with the above, this research focuses on rental behaviour given its frequency in Nigeria. Rental is a more viable avenue for tenure security given circumstantial variables and the persistent nature of housing deficit in Nigeria as of 2019. This has been suggested over the past decades by researchers, for example Adebayo (2007) and Tibaijuka (2013).

2. Literature Review

2.1. *Theoretical background of housing location choice and optimality*

The theoretical work on housing location dynamics is deeply rooted in utility maximisation. Random utility theory assumes that individuals exhibit self-interest behaviour and tend to maximise their total utility subject to demand, time and budget constraints (Ortuzar & Willumsen, 2001; McFadden, 2002; Handy, 2005). Households, based on their discrimination capability (Ben-Akiva & Lerman, 1985; Ben-Akiva & Bowman, 1998) weigh housing alternatives with other enumerative non-housing factors (socio-demographic characteristics, commuting cost, living and workplace, activity nodes and the cost of housing) to decide on location. Ultimately, households select the alternatives that best optimise their overall household utility function (McFadden,1978; Zabel, 2004; Oktay et al., 2014). In most cases, a household's actual utility is observed in the housing market as a partial optimisation due to bounded rationality. For instance, the spatial fixity and heterogeneous nature of housing imply that households suffer from information asymmetry, which constrains their housing choices to their immediate activity spaces or neighbourhoods (Adams, 1969).

Households typically do not possess the technical capacity to gather and process the information they need for making optimal house choices. For example, they may have information on income, but not on distance. They may not be able to calculate appropriately the family activity pattern (AP) or

the superficial dimensions of plots and lettable spaces for analytical purposes. They may have little or no time nor the patience required to take these actions and conclude them logically. Thus, trained professional real estate advisory becomes imperative. Behavioural theories also suggest that most households have a limited cognitive ability to process large sets of information simultaneously and therefore act under hierarchical decision making (Kahn et al., 1987; Olatunji, 2017).

The search for optimality is traced back to Pareto, the Italian economist who introduced the concept of Pareto optimality and Pareto 80-20 rule. They are two different economic concepts. Pareto optimality, also known as Pareto efficiency has to do with efficiency in the allocation of public resources in a manner that does not leave one person worse off to make another better off. On the other hand, the 80-20 rule inspires decision makers to identify the most dominant 20% efforts that determine 80% of the results of an endeavour, and direct their resources parsimoniously towards the dominant factors. The usage of the term has since been applied to housing choice by Limbumba (2007) and housing well-being by Olatunji (2013; 2017) to determine the respective dominant factors. Limbumba (2007) poses a rhetorical question as to whether renters do seek optimality. Bratt (2002) argues that housing well-being (or optimality) is dependent on six factors: decency, safety, space, affordability, investment and security. Similarly, Coleen et al. (2002) and Arimah (1997) study the notion of tenure choice between ownership and rental. From their perspectives, the determinants of housing can be jointly summarised as income, investment motive, number of children, the gender of house head, stage in lifecycle, length of stay in city and access to land. Another study by Sirgy et al. (2005) explains housing preferences and choice based on two factors– social and psychological determinants. For instance, the image or status of the homeowner and functional aspects are the major determinants considered by tenants or homeowners in choosing a house. Grzeskowiak et al. (2006) present a model of six factors (which are quite distinct from Bratt, 2002) linked to housing satisfaction and perceived quality of life (QOL). In terms of conceptual basis, residential research has relied almost exclusively on peoples' perceptions, opinions, axioms and popular notions. Olatubara (1994), Guo (2004), Fernandez et al. (2005), Grzeskowiak (2006) and Jiboye (2009) are some examples of this research methodology. Cultural and communal heritage suggested by van Duijn et al. (2013) are not measurable directly in quantitative terms for empirical study. Olatunji (2014, 2017) provides empirical responses from the context of Minna and Abuja and develops a simulation framework for assessing optimality, following Bolton's (2005) utility optimisation modelling.

In summary, three major themes are reflected in the literature: first, the methodology is either qualitative (perception and logits) or quantitative (regression). Second, the variables identified and used are either quantitative or qualitative. Lastly, the focus of the studies is split between owner-occupancy or rental housing. There is no clear position as to which theme is most commonly adopted. The adoption of mixed methods, variables and foci are observed in past studies. This present study employs quantitative methods and variables with a focus on rental housing. The decision is supported by the

facts that the variables are directly measurable in units well known to market participants especially household respondent, since rental housing is more popular with MIHs. A critical reflection on the reviewed literature revealed a gap in knowledge about determinants of optimal housing choice for middle income households.

2.2. Housing choice outcome: Real estate value, income, workplace, commuting, and activity patterns

Several studies investigate the factors influencing household's preference and residential choice optimisation (Olatubara, 1994, 1998; van der Straaten & Rouwendal, 2010; Marsh & Gibb, 2011; Dunning & Grayson, 2014; Spickermann et al., 2014; Sinniah et al., 2016). Within the scope of this research, housing choice outcome represents the result of a combined set of variables (income, real estate value, workplace distance, commuting cost, and activity pattern) on a given household.

Housing choice optimality framework was developed as an assistive tool to assess the choices that a seeker is confronted with, based on 5 variables including REV. In the opinion of Ifediora (2009) value considerations are central to all real estate decisions. To underscore the importance of REV, valuers believe that some of the major real estate decisions such as mortgage, sale, purchase, transfer, taxation, leasing, compensation and insurance should hardly ever be resolved without determining value professionally. Floyd and Allen (2005) put it succinctly that a key requirement for making effective real estate decisions is having a clear understanding of how REVs are determined. This understanding is central to all aspects of real estate, including consumption (as per rental housing) and investment decisions. In the same vein, the Appraisal Institute (2013) argues that residential optimality and REV are expected to have reciprocal effects on each other, but the nature and magnitude of these effects need to be scientifically established to guide MIHs in the process of optimal housing choice decision making. This is more so because real estate decision is characteristically capital-intensive and so, an inordinate choice could lead a household to a decline in well being.

Concerning income-effects on residential choice location, Dunning and Grayson (2014) suggest that homeowners maximise their lifetime utility subject to wealth and borrowing constraints for optimal housing and non-housing consumption. Similarly, Priemus and Maclennan (2011) highlight the importance of available finance and associated interest rates in housing decisions. Ball and Harloe (2005) note that income distribution has become more polarised in most countries, and this has a significant impact on individuals' housing standards. In a 2002 study, Srour et al. highlight that a household's income level is a vital index of the status of a household and its lifecycle stage (Kauko, 2006). The literature also emphasises the effect of activity patterns (AP) on residential choice. A household's AP includes not only its movements but interactions with peoples and spaces. It is seen to constrain access to socioeconomic opportunities (Paez et al., 2010; Bocarejo and Oviedo, 2012; Bocarejo et al., 2017). APs are linked to urban form/land patterns, location and the range of travel to access socioeconomic activities (van Wee et al., 2001; Ben-Akiva et al., 2006; Wu and Hine, 2008; Bocarejo

et al., 2014). Srour et al. (2002) argue that workplaces and residences are not always coterminous, and the degree to which both activity nodes are linked is defined by accessibility as well as cost. Weisbrod et al. (1980) hypothesise that household activity occurs in spaces which are connected by transport systems. Consequently, commuting influences residential location choice, with households making a significant trade-off between housing costs and travel time. These findings support both microeconomic theory (Alonso 1964; Muth, 1969; Olsen, 1969) as well as 'New Urban Economics' (Beckmann, 1973) which analyses the housing market based on the assumption that housing and accessibility are jointly purchased in a residential choice location. The study by Pagourtzi (2003), however, finds contrary evidence to this theoretical explanation. Looking to Nigeria specifically, Olatubara (1994) studies two groups (736 households) whose residential decisions are classified as 'convenient' or 'inconvenient'. The findings from the step-wise discriminant analysis show that households optimise their residential locations to ensure convenience to activity areas. Also, AP such as longer commuting distance, poor knowledge of the urban structure and the need to change workplace contributed to a household's move from an 'inconvenient' residence. In a follow-up study, Olatubara (1998) examines the factors of residential location decisions within Ibadan City.

The determinants of housing choice decision have also been partly explained by a reflection of commuting cost and workplace distance across locations in space (Fujita, 1989; Marsh and Gibb, 2011; Aditjandra, 2012). Donacby et al. (2005) examine the driving forces and response behaviour of households over space and time. Based on the theory of constant time budget, Kung et al. (2014) emphasise that a rational household may relocate its workplace and residence or alter its commuting behaviour to maintain a reasonable commuting time. Contrastingly, Stutzer and Frey (2004a) note that there is no systematic relationship between a household's utility level and commuting cost. Instead, they argue that in the short run individuals in a perfect housing market are not adequately compensated for their travelling costs, either by lower rents or higher wages. Lim and Kim (2019), nonetheless, observe that the relationship between commuting and relocation from sub-optimal housing is not always straightforward. Housing heterogeneity, dispersal of employment opportunities and other contextual factors can reshape the visible pattern of interaction (Kim & Hewings, 2013; Kim, 2014). Looking to Europe, Stutzer and Frey (2004b) report that a 19 minute increase in a German household's commuting time reduces subjective well-being by 12%. Vanderstraaten and Rouwendal (2010) examine the co-location problem of educated and working households who require a residence within a reasonable commuting distance of the multiple workplaces in the Netherlands. The authors conclude that households who commute only to a single workplace are willing to pay €919 per year to live 1km closer to a large labour market. In contrast, households who commute between two jobs are willing to pay €6,046 per year.

Relating to workplace distance, empirical research suggests that as the distance between housing, workplaces and other services potentially increases, a household's gravitation to such houses starts to decrease (Cinar,

2014). Cram (2005) notes that the growth of long-distance work journeys has partly resulted in a household's choice of housing location based on accessibility to a potential workplace. (Spickermann et al., 2014). Similarly, Friedman (1981) analyses the impact of local public goods and community attributes on the residential location choice of 29,000 households in San Francisco bay. Using a conditional logistic model, Friedman argues housing services, longer time and distances to one's workplace significantly impact on residential choice decisions of the households.

Most importantly, it is commonly acknowledged that urban dwellers are exposed to several burdens of housing insecurity challenges which make optimal housing choice a crucial issue especially for the renters. Home owners and renters in Minna and Abuja have an intuitive idea that among other considerations, value is central to all real estate decisions including the choice of an apartment. In spite of being conversant with this intuition, there was no assistive mechanism available to the rental house seeker who desires optimal house choice. The main issue on the ground is that in the two study areas, anecdotal evidences point to agitations by MIHs for improved well-being and standard of living. In particular the extortionate behaviour of landlords is an issue of regular enquiry. The summary of these challenges suggests that the choice set available, the process of choice and the characteristics of the factors guiding peoples' choices, particularly REV, needed to be empirically investigated as attempted in this study.

3. Methodology

3.1. Study Area

Nigeria's real estate value is concentrated in Abuja, Lagos and Port Harcourt. Of the three cities, Abuja's property and rental prices are the highest. Many features of a property boom are noticeable in Abuja's medium-density neighbourhoods like Durumi I and II, Utako, Gudu, Wuye and Mbora (Fig. 1). Here, rents are increasing, and properties are let shortly after becoming available. Rental practices such as apartment sharing (housemate practice) and the under-consumption of housing rights (overcrowding) continue to rise as people prefer lesser space than they trully need in order to reduce housing cost. Concurrently, contrasting features of property depression are not uncommon in Abuja. For one, the over-consumption of housing spaces by tenants in some neighbourhoods forces landlords to deliberately delay the lettings of their properties in anticipation of higher rent offers from desperate prospective tenants. Optimal residential choice issues emerge prominently with these fluctuations– property booms and depressions. Rural-to-urban migration is a global phenomenon and its impacts on housing conditions do not exclude Abuja. The continued influx of workers and urban dwellers to Abuja (the country's administrative and federal capital city) requires both public and private interventions so that housing stock grows with the populous need.

Overcrowding in Abuja is a feature of underconsumption of housing rights: as more persons are admitted into the fixed lettable space, lesser space is available for letting per capita and people demand less space than they need

in a bid to reduce housing cost. In another vein, lower level tenants paying lesser rents for high-valued properties represent over-consumption of housing rights. In such cases, landlords prefer to have their properties kept vacant for as long as it takes for a new tenant to emerge, whose status and capacity to pay are commensurate with the REV. This explains the reason for massive vacant houses that abound in many residential neighbourhoods of the city. Given these features and points of interest, Abuja is included in the study.

Figure 1: Abuja Study Area
Source: Abuja Municipal Area Council (2020)

Minna, the Niger State capital, is a city of social, political and economic significance. The social structure of the city, cultural diversity, population size and its physical expanse make it suitable for location analysis. At present, Minna houses the government of Niger State as well as many federal establishments; banks, multi-media broadcasting stations, a university, major transport networks, the national headquarters of the National Examinations Council (NECO) and a host of other vital institutions. The city's status as a ready and expanding market for real estate services draws many private and public economic investments. For these reasons, Minna is often categorised alongside Kaduna, Lokoja and Jos as one of the satellite cities of Abuja. The four cities are State capitals and approximately equidistant from Abuja to the north-west, north, south and north-east directions respectively. They are geographically the closest to Abuja of all the 36 State capitals in Nigeria. By reason of proximity, diverse linkages are frequent among the four cities.

A significant consideration for households is optimal residential location. Both cities, in response to rapid investment in physical infrastructure in the housing sector have witnessed massive housing development and a subsequent upswing in housing market activities, especially rentals. Thus the housing choice sets available to house seekers have been widened and choice has become an urban problem.

Together, this concept and these study areas present an opportunity to test some of the well-known theories (such as location and rent theories) against empirical factors that influence optimality in both study areas. Comparatively, it is worth noting that the private development of housing stock in Minna occurs at a lower positive rate than in Abuja. Despite this, it is common to hear statements such as 'times are hard' among urbanites in both cities. Other comparative considerations include size; Minna covers an approximate land area of 148km2 while Abuja is approximately 8,000km2. In terms of regional location, two cities are both located in the North-Central geopolitical zone of Nigeria and assumed to be coterminous with functional housing markets. In terms of regional strategic importance, the two cities lie approximately 112km apart and provide a gateway to the Northern and Southern parts of Nigeria.

Figure 2: Minna Study Area
Source: Niger State Min of Lands and Housing (2020)

3.2. Data collection and measures

The data used in this study is sourced from earlier work by Olatunji (2013; 2017). This includes household surveys conducted in the city of Minna and Abuja, but also independent field surveys and observations conducted in 2019. Despite the time gap, spatial variables (workplace distance, activity pattern, house size and plot size) have remained substantially unaltered. Where substantial differences were observed, and the purposive selection criteria was not met, respondents' details were excised. It is noteworthy that Nigerian household incomes have since experienced upswings in both the private and public sector. Rental values in medium-density neighbourhoods, where middle-income earners predominantly reside, are presumed to have equally moved upwards even at a greater rate than incomes. In Nigeria, incomes rarely move upwards unless employers are compelled by strikes and industrial actions. The Nigerian Labour Congress was on industrial action for much of 2019, and Academic Staff Union of Universities were on similar strike action for the first half of year 2020. Conversely, rents are not subject to such trappings. An affirmation of this rental trend is made by Adeogun et al. (2017), and still largely persists. As depicted by a leading online property bulletin based in Abuja, PropertyPro, rents in medium density neighborhood of Durumi now tops ₦2 million per annum for a well-finished 3-bedroom apartment.

Secondary data from Olatunji (2017) was originally obtained from 282 households; 159 in Abuja, and 123 in Minna. For the optimality survey of this study, only the households that met three specific criteria were purposively selected and analysed in this present study. The first criterion was a positive response by respondents to a 'choice problem' regarding residence, this indicates that the respondent specifically had an encounter with the choice problem while in search of accommodation. The second criterion was whether that decision had occurred three years before the study, it is reasonable to assume that decisions taken more than 3 years earlier may be unreliable due to the passage of time. Third, was the disclosre of household income. Income was the most significant variable in earlier studies. Respondents who did not explicitly disclose their incomes would not qualify for further analysis. In all the criteria were formulated to ensure that the respondents were competent for the survey.

In line with these criteria, there were 107 matches– 56 in Abuja and 51 in Minna. It is noteworthy that these 107 selected cases, by stochastic spontaneity, cut across all neighbourhoods within the study area, signifying that the criteria are reasonably justifiable. The criteria seem to have a fair spread in the sense that quite unexpectedly and without researcher interference, the said respondent-cases were found pervading all neighbourhoods without exception; their distribution did not exclude any of the selected neighbourhoods. By pooling data from the two study areas, a valid basis is laid for generalised findings. This approach is consistent with the views of Badu et al. (2012), who supports purposive sampling when specified data is needed for a clear objective. Furthermore, Blaxter et al.

(2010) assert that purposive sampling is appropriate where the frame of a target population is not readily established.

Owing to the peculiarity of this study, a multi-scale sampling approach was adopted involving stratification, randomisation and purposive techniques. The choice of a middle-income sample group was premised on the fact that Nigeria has been recognised as a lower-middle-income country (World Bank, 2009). Given the low purchasing power of this subgroup in any urban setting, these households are likely to be associated with consciousness for optimality in their housing choice decisions but also representative of the housing market for this present analysis. Furthermore, the residential neighbourhoods in the two cities were stratified along density lines into low, medium, mixed and high-density neighbourhoods to determine where relevant subjects were residing. The MIH subgroup, unlike the low income class, has the capacity to exercise choice, but must be guided towards optimality because members are incapable of the luxury of high-end choices like holiday houses or weekend resorts associated with high income subgroup. MIHs were dominant yet not exclusively found in medium-density neighbourhoods. From 11 medium density neighbourhoods of Minna, five were randomly chosen to represent 20%, and from 32 in Abuja, six were randomly selected, representing 19%. These neighbourhoods are Tunga Low Cost, Tunga Interior, MI Wushishi, Shiroro Hotel Road I and II in Minna, and Utako, Durumi I and II, Wuye and Mbora, Gudu in Abuja. See Figure 1 and Figure 2.

Field data for this 2019 study obtained from individual households in Minna and Abuja, are compressed into Tables 1 and 2. The data is analysed to present the mean decision variables. The data include the monthly household income (₦ per month), workplace distance (km), commuting cost; all out-of-pocket expenses related to commuting by all members (₦ per month), activity pattern (km per month), and real estate value (monthly rentals in four components: plot size, house size, land price attributable to neighbourhood quality, and house price). The optimality index (OPTi) is derived for each respondent based on all the above variables. In Table 2, REV components and optimality indices for the two areas are isolated from other variables for clarity and easier comparison.

Table 1: Comparative Profile of Mean Decision Variables for Minna and Abuja

	Y= Income (₦)*	D= Distance (km)	REV= Real Estate Value (₦)*	C= Community Cost (₦)*	AP= Activity Pattern (km)*	OPTi**
Minna	190,060	7.064	21,011.55	24,746.2	142.8	0.5114
Abuja	603,156.30	6.46	134,947.9	32,433.71	259.75	0.5711

* Amounts shown are per month
** OPTi is the Optimality Index

Table 2: Real Estate Value and Optimality Isolated from Other Variables

	Real Estate Value (₦)*	PH= House Price (₦'000/hectare)*	PL**	H= House Size (m²)	L= Plot Size (hectares)	OPTi*
Minna	21,011.55	2,488.4	118.2	139.8	0.039	0.5114
Abja	134,947.9	6,675.833	1707	149.19	0.044	0.5711

* Amounts shown are per month
** PL= Price attributed to neighbourhood quality (₦'000 per hectare per month)
Source: Field Survey (2017).

The survey provides information about each household's income, average commuting cost, tenure status (owner-occupancy and rental holding), plot size, property type, non-work AP, OPTi and REV (actual and imputed rents). The data on REV was supplemented with information from Estate Surveyors and Valuers (ESVs). They act as real estate advisors and specialists in the management of rented and owner-occupied residential properties. In total, seven firms were chosen from Abuja and four from Minna. Furthermore, the dataset from households was augmented by estate firms to enhance the level of accuracy. This included the addition of distances to key points of accessibility, location quality indicators as well as instrument-backed and geo-referenced distance measurements.

A review of the data further reveals that the housing OPTi (dependent variable) was developed from a computer simulation framework - an iterative process for modelling the best choice of a house available to a willing and able household from a range of alternatives. The derived OPTi for a house h, at location i, to a household j, lay in the range between $-1 <OPTi \leq 1$. The values represent the levels of housing optimality. An OPTi index of 1.00 is the highest value, depicting that the household choice being assessed attains the best optimality as a result of the combination of the variables chosen. Hence, the OPTi of 1 represents the idealized optimality, a condition that portrays a perfect house choice; it is largely unachievable, but the closer the assessed index is to OPTi of 1.00, the better for the well-being of the subject household. Conversely. OPTi of 0.00 is the lowest value and it depicts the poorest level of optimality which no rational household would wish to experience or endure. Table 3 provides further description of the variables and data sources used in this study.

Table 3: Data Description and Data Sources for the Study

Variable	Description	Source
Dependent Variable:		
Housing Optimality	Index of the level of household's well-being or fulfilment derived in the choice of a house from a range of alternative (denoted as a per centum)	Household
Independent Variables:		
Household Income	Individual household income (₦)	Household
Commuting Cost	Commuting Cost (₦)	Household
Real Estate Value	Real estate value (₦)	Household & ESV Firms

Activity Pattern	Household non-work activity pattern (km)	Household
Workplace Distance	Home-workplace distance (km)	Household & Google Maps

The OPTi entails survey details and observations that require rigour and costs in the data collection process. These arose from (i) physical survey of the plot (ii) physical survey of the house (iii) a physical survey of workplace distance (iv) AP (observation of spouses' workplaces, children's schools as well as frequented markets, places of worship, health centres and recreation). These criteria assisted the selection process of the cases while the purposive specimen for the ensured that the OPTi respondents were seen to be competent for the survey. It is important to note that the category AP represents non-work activity areas regularly frequented by the household. The cumulative distance covered by each respondent in the course of performing these activities over one month is adopted as a proxy for the AP. For each household, the AP is calculated by adding the distances between the present home and the stated activity nodes in km per month. This was assisted using handheld GPS, in conjunction with Google Earth and Google maps to establish the total network distances and employment of survey assistants. An electromagnetic distance measurement device (EDM) was also used for faster data collection. No signs are ascribed to AP as it is obtained through practical observations.

3.2.1 Deriving the Optimality Index (OPTi)

Olatunji (2017) provides an exhaustive derivation of the OPTi. To avoid running the risk of replication, only an abridged version of the process is attempted in line with the Cobb-Douglas utility function as modified by Bolton (2005). Olatunji (2014) critiques Bolton's (2005) model for six main weaknesses and later develops a modified utility function in 2017.

According to Olatunji (2017), the development of the housing choice optimality model and simulation programme begins with the transformation and adaptation of the existing Cobb-Douglas utility functions and decision variables. The functions are utility function, land price function, and the commuting cost function. Each has its own set of variables and identifiable parameters. Olatunji's (2014) critique of the Bolton (2005) states the critical weaknesses in his work are the absence of any scientific basis for the selection of decision variables and the omission of variables that might prove crucial in household residential choice decisions in the study area (house attributes, neighbourhood quality and tenure choice). Other weaknesses include the erroneous specification of a key variable, so unique as land, as a typical consumer article, the lack of empirical data upon which the simulation technique could be tested and monotonous transformation inherent in Cobb-Douglass and Marshallian demand functions. Thus, the modified utility function is derived from a series of equations and algorithms, a modified utility function which adressed all the stated weaknesses was developed in Olatunji(2017), as well as in reference to the Cobb-Douglas utility function which critiques of Bolton's (2005) version of the development of optimality index. Remediation of the Bolton's (2005) weaknesses resulted in new modified utility function presented in Equation i.

$$U_{ijc} = A.L_{jc}{}^{\alpha}.E_{jc}{}^{\beta}.H_{jc}{}^{\theta} - gD_{wc}{}^{\gamma} \qquad\qquad \text{(i)}$$

Where L_{jc} is the plot size of location j, E_{jc} is the size of the essential pack, H_{jc} is the size of the house chosen, and D_{wc} is the distance between workplace (w) and house chosen (c). The parameters α, β and θ, are indices depicting the trade-off between the three goods/services to be selected by a household. Their proportions represent the marginal rate of substitution between the three distinct goods that are concurrently demanded. Still, since the household income is fixed, the proportion allocated to each will vary according to the choice of the household. Their values cannot be negative as depicted by the relationships α, β, $\theta > 0$; and their sum is always between 0 and 1, thus: $0 < \alpha + \beta + \theta < 1$.

Prices are specified for each variable in the function as follows: the price of land in Equation ii, price of composite good in Equation iii, price of housing and price of commuting in Equation iv.

$$PLj = Pw \exp (\delta D) + N \qquad\qquad \text{(ii)}$$

Where PLj is the price per hectare of the plot located at j. Pw is the price per hectare of workplace location (also the rack-rent/ bid-rent for w by household i), and N is the market value of the quality of location j.

From Bolton (2005), $PEjc$ is the unit price of a composite good upon which the remainder of the household income is spent.

$$PEjc = 1 \qquad\qquad \text{(iii)}$$

The commuting cost function remains as specified, thus:

$$C = vD^{\eta} \qquad\qquad \text{(iv)}$$

However, the parameters **v** and **η** are to be fixed within their feasible ranges.

The price of housing structure (P_{Hc}) is market-determined rather than a function of the unit price of housing structures which tends to be spatially stable for the same specifications and property attributes for most intra-urban locations. This position is more realistic, especially when housing market data is available. The study areas now have a growing property market data in terms of sales, rentals, and tenure (type, terms and length).

3.2.2 The Optimality Index (OPTi)

The index is a representation of the level of optimality that a household stands to obtain from the given household choice. It also can measure the reallocation efficiency of a housing choice for a household. The utility obtained (U_{ijc}) represents the satisfaction level achieved, as indicated by the factors mentioned above.

The utility obtainable (U_{iwc}) represents the highest satisfaction possible for the household, given the combination of factors, variables and parameters that exercise control over a household choice. It is the highest figure of utility,

and, from this study, it tends to occur at, or close to D=0, if the workplace and house choice are coterminous. The OPTi, is derived from the simple relationship:

$$OPTi = (Utility\ Obtained)/(Utility\ Obtainable)$$

$$OPTi = Uijc\ /\ Uiw \qquad\qquad (v)$$

OPTi is a measure of the level of fulfilment, contentment or satisfaction that a household (i) whose primary workplace is (w), stands to achieve from a house choice (c) in a neighbourhood (j). Uijc is the utility obtained by a household (i) from house choice (c) in a neighbourhood (j). Uiwc is the highest possible utility obtainable by a household (i) from house choice (c) at workplace (w) or at any other location for that matter.

At the peak of any choice, Uijc will equate Uiwc. This implies that the maximum OPTi, which represents the optimal choice, is 1. Under extremely adverse conditions, utility obtained or obtainable could be negative, thus rendering OPTi negative. Any values less than 1 can be construed or interpreted as sub-optimal choices. Thus, the range of possible values of OPTi extends from the maximum of +1, to the minimum of negative results. Given these attributes, the OPTi scale shares common features with the Kappa-Test, which is also a coefficient used for statistical measurement of performances. Details on these statistics are available from StatData-Pro-Nigeria and the Analyse-it-Leeds-UK Course Manual (2011) accessible at www.stat-DataPro.com.

3.3. Model

The study employed a multiple regression model to analyse housing optimality variations due to the influence of REV. The formulation of the multiple linear regression analysis underlying the current empirical study takes the following form:

Housing Optimality= α + β1 Household Income + β2 Commuting Cost + β3 Real Estate Value + β4 Activity Pattern + β5 Workplace Distance + ε (vi)

In Equation vi, the household's well-being, arising from a revealed or stated residential choice from a range of available options, is denoted as housing optimality. is the constant term, are the estimated regression coefficients and ε is the uncorrelated residual term.

4. Findings and Discussion

4.1. Demongraphic profile of the sampled middle-income households

Table 4 provides a summary of the statistics used in the study. They suggest that a typical middle-income household in Minna city that resides in an apartment house commanding a market value of ₦21,000[1] earns a monthly

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[1] Equivalent to US$ 54.6 as per https://cbn.gov.ng/rates as at 15/04/2020

income of about ₦211,000, but commutes an average distance of 6.6km to work and 159km to other non-work activity destinations at the cost of ₦25,207. That household would have housing well-being of 0.51. In Abuja, a middle-income household living in a house with a market value of approximately ₦21,000 and with an average income of about ₦589,000, but commutes a distance of 6.8km to work and 200km to other non-work activity destinations at an average cost of ₦33,500, has a housing well-being of 0.57. Apart from the household income and REV variables, the values of the mean in the two samples exhibit similar patterns. In terms of the variability of the distribution, any observed differences in analyses cannot be aligned to any unsystematic oddity in the original data. (All values are denoted on monthly terms).

Table 4: Summary of Descriptive Statistics for the Samples

Variable	Mean	Standard Deviation	Minimum	Maximum
Minna				
Dependent variable:				
Housing Optimality	0.51	0.43	-0.81	0.98
Independent variable:				
Household Income (Monthly)	₦211,279.90	₦62,140.11	₦100,000.0	₦358,333.30
Commuting Cost (Monthly)	₦25,207	₦9,9371.93	₦11,500	₦45,000.00
Real Estate Value (Monthly)	₦21,011.55	₦3,867.15	₦847.76	₦26,495.87
Activity Pattern (Monthly)	159.59	5.62	85.00	246.00
Workplace Distance	6.64	3.17	0.72	14.60
Number of Sample	51			
Variable	**Mean**	**Standard Deviation**	**Minimum**	**Maximum**
Abuja				
Dependent variable:				
Housing optimality	0.57	0.42	-0.96	0.97
Independent variable:				
Household Income (Monthly)	₦589,211.90	₦195,811.50	₦360,000.0	₦1,300,000.00
Commuting Cost (Monthly)	₦33,517.86	₦7,906.25	₦15,000.00	₦46,000.00
Real Estate Value (Monthly)	₦142,389.63	₦124,727.15	₦17,430.56	₦565,347.22
Activity Pattern (Monthly)	200.79	43.99	72.00	300.00
Workplace Distance	6.79	2.78	0.90	11.55
Number of Sample	56			

Source: Olatunji (2017)

4.2. Preliminary check on the parsimony of the housing optimality model

A diagnostic check on the parsimony of the multiple regression model shows a high level of predictive explanation for the independent variables ($R2 = 0.773$ for the Minna city and $R2 = 0.571$ for Abuja city). This range of R2 values supports the assertion that multiple regression can be used to predict housing choice optimality in the urban market. The low standard error of the estimates (0.213 and 0.397 respectively) reveals a high level of statistical

precision for both housing optimality models. Furthermore, the Durbin-Watson statistics of 1.40 and 2.26 surpass lower critical values and thus are rejected at 5% level of significance. This suggests that the error term of the regression is uncorrelated. Lastly, the F-statistic of 30.74 for the Minna city model and 11.06 for Abuja model imply that the regression coefficients are statistically different. In other words, the null hypothesis of parameter equality is rejected at 5% significance. This outcome was further affirmed by examining the Variance Inflating Factor (VIF) presented in Tables 5 and 6. VIF was used to detect the extent of collinearity among variables, which in turn explains why it is used by researchers as an indicator of multicollinearity. Typically, if the VIF of any variable exceeds nine, that variable is adjudged high on a collinearity scale. None of the variables used in the models have a VIF that violates the stated rule. Specifically, VIF for REV is 1.021 (Abuja) and 1.164 (Minna) while that of the commuting cost, the highest is 5.576 (Abuja) and 5.281 (Minna). Though the VIF for the commuting cost (CC) is relatively higher than the others, it is still well within statistically accepted range; VIF for workplace distance is 4.922 (Minna) and 4.861 (Abuja). Again, though it is reasonable to assume that workplace distance is collinear with commuting cost, these results do not violate regression rules for collinearity.

4.3. Findings from the multiple regression model on factors affecting housing optimality

The results of the multiple regression models for each city are reported in Tables 4 and 5. Turning to the interpretation of the results, the constant in Table 5 provides a useful starting point, as it represents the lowest level of housing well-being (measured by OPTi) which can be attained by a household with a relatively limited income, commuting cost, activity pattern, property value and distance to the workplace.

In Minna city, the constant shows that the minimum housing optimality for a typical household was 0.382 in contrast to 0.2057 for Abuja city. As a result, the sign and magnitude of the estimated constant coefficients are consistent with the theoretical considerations on the household utility function. Based on the results reported for Minna and Abuja city models (Tables 5 and 6), most of the five predictors of housing optimality (except for commuting cost for Minna and workplace distance for Abuja) are highly significant at a level of 5% significance with the sign of the coefficient estimates consistent with theoretical expectation.

Table 5: Minna City Multiple Regression Model for Housing Optimality

Variable	Coefficient	95% CI		SE	T-Stat	P-val	VIF
		Lower Bound	Upper Bound				
(Constant)	3.84E-01	-1.09E-01	8.77E-01	2.45E01	1.57	0.1237	
Household Income	4.23E-06	3.04E-06	5.42E-06	5.92E06	7.14	0.0010*	1.481
Commuting Cost	-5.42E-06	-2.08E-05	9.92E-06	7.62E06	-0.71	0.4802	5.576
Real Estate Value	-9.44E-07	-1.69E-07	1.50E-07	1.99E07	-2.12	0.0454*	1.021

Activity Pattern	1.67E-04	-1.45E-04	1.79E-04	8.05E04	2.07	0.0369*	1.143
Workplace Distance	-9.47E-02	-1.37E-01	5.21E-02	2.11E02	-4.48	0.0010*	4.922
R²	0.773						
Adjust R²	0.748						
Standard Error(SE)	0.213						
Durbin-Watson	1.40						
F-Statistic	30.74						
N	51						

*Notes: ªDependent variable: Housing Optimality; *P < 0.05; SE: Standard Error*

The AP variable has one of the most extensive coefficient estimates affecting housing optimality. Its coefficient of 0.000167 for Minna city, implies that an increase in a household's AP by 1km significantly increases the household housing optimality by 0.000167 on average. Comparatively, the coefficient of 0.00026 for AP in Abuja city, implies an increase in housing optimality by 0.00026 in Abuja city. By extrapolation using the standard deviations for both cities, 43.99km change in AP in Abuja increase the optimality by 0.0114. For Minna, a 40.14km shift in AP increases the optimality by 0.0067. This empirical finding on AP is reinforced by the work Olatubara (1998), who suggests that an AP is a better factor than transportation costs in predicting residential location choice decision. A possible explanation for this positive relationship could be that the activity levels of most households are geared towards ventures that are economically productive as well as socially and culturally beneficial. Activities considered under AP include trips to spouse's workplace, children's schools, market/health/recreation and worship centers. Nigerians and indeed Africans are faith-inclined peoples, so it is appropriate to factor in their faiths among other things into their house choice decisions.

The coefficient of the variable household income, which is a measure of individual household income is also significantly positive. It contributes 0.00000422 and 0.00000190 to housing optimality levels in Minna and Abuja city, respectively. This finding indicates that higher wages are associated with higher levels of housing optimality.

Table 6: Abuja City Multiple Regression Model for Housing Optimality

Variable	Coefficient	95% CI		SE	T-Stat	P-val	VIF
		Lower Bound	Upper Bound				
(Constant)	2.057E-01	-1.139E+0	1.550E+0	0.66951	0.31	0.759	
Household Income	1.901E-06	1.225E0-6	2.576E0-6	3.36E-06	5.65	0.0022*	1.646
Commuting Cost	8.241E-05	7.083E-05	2.357E-04	7.63E-05	1.08	0.0501	5.281
Real Estate Value	-6.455E-07	-8.95E-07	-3.96E-07	1.24E-07	-5.20	0.004*	1.164
Activity Pattern	2.600E-04	-7.80E-04	1.300E04	5.18E04	5.02	0.018*	4.881
Workplace Distance	-4.022E-02	-9.91E-02	1.864E-02	0.29306	-0.14	0.076	1.341
R²	0.571						
Adjusted R²	0.528						
Standard Error (SE)	0.397						
Durbin-Watson	2.26						
F-Statistic	11.60						

N	56						

Notes: ᵃDependent variable: Housing Optimality; *P < 0.05 ; SE: Standard Error

This result reflects previous research (Cinar, 2004; Ball & Harloe, 2005) which indicates that income has a significant impact on an individual's housing standards and overall expectation in the housing market.

Though commuting cost is not statistically significant in the regression model for the study areas, the negative sign of its coefficient is consistent with prior empirical evidence (van Ommeren et al., 1997; van Ommeren et al., 2000; Stutzer & Frey, 2004b) which depict that household utility function decreases with increase in commuting cost. The Abuja model, however, provides further insights. For example, the commuting cost is, by a narrow margin, not significant, but with a positive sign. This result can be attributed to the diversified nature and dispersal of employment opportunities in Abuja and its urban form. The coefficient of workplace distance for Minna is significant but negatively correlated with housing optimality. This signifies that with a 1km increase in workplace distance, housing optimality is expected to drop by approximately 0.00947. Similarly, in Abuja, housing optimality is expected to decline by 0.0402 with a 1km increase in distance to workplace. An increase in commuting distance to work logically and practically implies a loss of leisure-time but also reduced effective working hours. Thus, a work-distance-threshold for housing optimality arises. The results of this research, therefore, aligns with previous studies (Phe & Wakely, 2000; Guo and Bhat, 2007; Cinar, 2014) and gives context-specific information for Nigeria's residential market.

Concerning REV, its coefficient for Minna city is negative. This implies that an increase in REV by ₦1 significantly decreases, on the average, housing optimality by 0.00000094. Similarly, in Abuja, housing optimality tends to decline by 0.000000646 given ₦1 increase in REV. A clearer picture emerges if the figures of standard deviations of REV, (₦124,727.15; Abuja and ₦3,857.15; Minna per month respectively) are applied as illustrations under a condition of anticipatory increase in REV. In this manner, optimality would drop by -0.0805 and -0.0037 respectively, indicating that the rate of diminishing optimality in Minna is higher than Abuja. This implies that the burden of REV on medium-income households is more substantial in Abuja study area.

Table 7: Interpretation of Regression Results

Minna			Abuja		
1. Change in REV	**Coefficient of REV**	**Change in OPTi**	**1. Change in REV**	**Coefficient of REV**	**Change in OPTi**
₦ 1	-9.44E-07	-0.000000944	₦1	-6.46E-07	-0.000000646
₦3,867.15	-9.44E-07	-0.00365059	₦124,727.20	-6.46E-07	-0.08051137
2. Change in Income	**Coefficient of Income**	**Change in OPTi**	**2. Change in Income**	**Coefficient of Income**	**Change in OPTi**
₦1	4.23E-06	0.000004227	₦1	1.90E-06	0.0000019

₦62,140.10	4.23E-06	0.262666245	₦195,811.50	1.90E-06	0.37204185
3. Change in Activity Pattern	**Coefficient of AP**	**Change in OPTi**	**3. Change in Activity Pattern**	**Coefficient of AP**	**Change in OPTi**
1km	1.67E-04	0.0001667	1km	2.60E-04	0.00026
40.14km	1.67E-04	0.006691338	43.99km	2.60E-04	0.0114374

Source: Olatunji (2019)

Table 7 illustrates interpretive information in the regression results. It uses figures of standard deviation for the three significant variables: income, REV and AP, in that order. Standard deviation is a measure of statistical dispersion of a dataset depicting the pattern of deviation from the mean. The regression result is a generalisable set of outcomes that can be interpreted by observing marginal changes in the dependent variable explained by small changes in each independent variable. Table 7 indicates that a shift in ₦1 in REV in Minna will cause optimality to drop by 0.000000944. Comparatively, an increase of ₦3,867.15 in monthly rent would, on the average, cause optimality to drop by 0.0037. Likewise, a change of ₦1 in REV in Abuja would cause optimality to drop by 0.000000646. Hypothetically then, an increase of ₦124,727.20 in monthly rent in a medium-density neighbourhood of Abuja would, on average, cause optimality to decline by approximately 0.0805. This example result indicates that REV exerts a greater negative impact on optimality in Abuja than in Minna. In this case, MIHs should seek professional guidance for optimising choice, given that the risk and burden are more substantial when relocating to Abuja. Real estate advisors are trained in housing choice optimality services and could provide professional decision-making support. This relationship is important as many households lack the technical capabilities to gather and process relevant information when compelled to seek accommodation.

As shown by the regression results in Tables 5 and 6 and interpretation in Table 7, household income impacts optimality positively and significantly. An increase change of ₦1 in monthly income in Minna would drive optimality higher by 0.000004227 implying that if monthly income increases by ₦162,140.10 optimality would receive a boost by 0.2627. Corresponding figures for Abuja suggest that a change of ₦195,811.50 per month would result in 0.3720 rise in optimality. Changes in income produce a greater positive effect on optimality in Abuja. Furthermore, these results suggest a simultaneous increase in both variables that gives households in Abuja an edge in optimality. In other words, the negative impact of an upswing in REV could be mitigated by a concurrent rise in wages for middle-income families. This conclusion seems to align with reason and previous studies especially Lim and Kim (2019).

The implication of these findings is the recognition that REV represents a burden which the household has to bear to secure an apartment of its choice. Against the backdrop that most current housing choices in both study areas fall short of what is considered to be optimal. One of two scenarios would need to occur for households to attain optimal housing during their lifecycles.

The first is characterised by rental or price upswing accompanied by renovation, modernisation and aesthetical or functional improvements. In this case, both optimality and rental or market value could gravitate in the same direction, apparently contradicting the regression results, but confirming parts of the regression results for Abuja. However, this gravitation would not continue ad infinitum, but rather cease given unsustainable property value escalation as seen in Minna city. The second scenario occurs whereby optimality rises with REV, as seen by the positive side of the 95% confidence intervale (CI) in the two regression models. The latter scenario is made possible because rental value is partly a reflection of neighbourhood location qualities, and higher rental value reflects better environmental attributes. Thus, greater the locational qualities linked to optimality would incur higher rental values. Households striving for greater housing well-being would need to choose and accept higher rental or market values subject to the limit set by optimality. When this limit is attained, the household would probably be advised to seek an alternative. This explains why some apartments remain vacant and unlet for a long time after the last tenant has vacated until a new party emerges for whom the apartment is optimal. The same apartment may be let only at a lower rent, and, even then some incentives such as renovation, refurbishing and general retrofitting may have to be considered and added.

5. Conclusion

This study has established that household income and activity pattern are other critical co-determinants with significant impacts on housing choice optimality. This agrees with earlier studies which defined housing choice as a multivariate phenomenon. The paper explored the contributory influence of REV and other pertinent variables on housing optimality in two cities in Nigeria; Abuja and Minna. From the analysis and discussion, the findings support the contention that multiple regression can be employed in the urban housing markets to predict housing choice optimality. The models also provide empirical evidence among the studied population to support the anecdotal idea of households in the two study areas that real estate value is central to most real estate decisions. Thus, the hypothesis proven in this research, was that real estate value is next only to income, as a significant co-determinant of housing choice optimality. Additionally, this study has shown that REV is a significant negative predictor of a household's level of housing optimality/well-being in both Minna's and Abuja's housing markets. By pooling data from two study areas, a valid basis is laid for generalisation of findings.

An important implication of this finding is that REV is a burden households bear to secure the right to an apartment of choice. In both housing markets, households attain improved housing well-being in the long run by either moving to an alternative house with higher market value (subject to the limit set by optimality) or when a rental or price upswing is accompanied or preceded by renovation, modernisation and aesthetical plus functional improvements. The latter is temporary and unsustainable, even if such houses are affordable. Real estate professionals can appropriate this knowledge and guide households towards their optimal housing choice.

By adapting and extending the idea optimality to real estate, this study has made an important contribution to the discourse of optimal rental housing. It lessens the information-gap created by the paucity of literature in this area of study, particularly in emerging markets. The study has implications for real estate practice and research in Nigeria, and Africa more broadly. Real estate practitioners can better their optimality services to residential seekers and train in optimality software packages as a decision-support guide. Though, OPTi of 1.00 signifies an idealised housing condition or a perfect housing optimality (which is largely unachievable), it is indeed necessary that MIHs be guided towards improving their housing well-being when revealed by the index to be on the near-side of 0.00 or unacceptably low.

Admittedly, the study has limitations, as is commonly the case. Although it has established that quantitative variables do provide a useful insight into assessing optimality, it does not claim that non-quantitative variables are inapplicable. Nevertheless, the procedure can be adapted in other forms, and further research is necessary in this regard. Accordingly, the study suggests that future researchers should consider studying the application of variables that are not directly measurable such as familiarity, cultural and communal affinity, and others more measurable elements such as noise and air quality, conjointly with those tested in this study to model housing choice optimality.

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