Sustainable real estate management practice: Exploring the priority of operational stage for actualizing sustainable built environment goal in sub-Saharan Africa

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Abstract

In the real estate and construction industry, the built environment contributes to environmental crises and climate threats . However, what are the environmental negative effects/impacts at the post-development stage (operational stages)? Are they different from those at virgin constructions? After the construction phase, what factors inhibit the adoption of sustainable real estate management practice, herein referred to as the green lease movement? To what extent has sustainable real estate management practice been adopted in Nigerian commercial cities? Specifically, this study examines negative environmental crises at the operational stages and confirms if different from the conventional counterpart. It also examines the factors inhibiting the full adoption of sustainable real estate management practices. Similar to conventional construction, carbon dioxide emissions and toxic waste generation emerged as the major negative effects/impacts during the operational stage. Lack of prerequisite skills, enforcement of green leases, inadequate training, and empowerment of licenced property managers and occupiers on how such leases operate significantly inhibit the full adoption of green leases in the region. Energy conservation bulbs and digital metering are the most adopted features. The current property management practice does not address these negative effects/impacts.

Keywords: *Building life cycle, green building, green lease, property manager, sustainability*

1.0 Introduction

Green lease is herein described as a sustainable property management practice. Property management practice refers to the operational stage of property development. The stage succeeds the virgin construction phase after the occupation. It entails maintenance, renovation, refurbishment, rehabilitation, and major repair activities. In the past decades, the built environment witnessed a high concentration of research on the environmental impact of new construction activities, while researches that focus on the seemingly dangerous impacts of the activities of the operational stage are under-represented in sub-Saharan Africa. In the African developing property market, affirmative response and assertive action have been growing gradually, evident in the growing awareness and adoption of sustainable property features (Oyewole, Komolafe, & Gbadegesin, 2021; Komolafe, Oyewole,

& Gbadegesin, 2019). Building and environment connections are profound at the operational stage where property redevelopment and management tasks, including maintenance activities such as renovation, rehabilitation, and refurbishment, take effect (Yudelson, 2013). Over the centuries, buildings that have sheltered humankind have experienced a great deal of transformation in design, materials, and operational infrastructure (Nagrale & Bais, 2020). Buildings usually go through four stages of construction, consisting of the siting and design stage, building construction stage, occupation (operational) stage, and the decommissioning stage. There is an ongoing worldwide recognition that buildings constitute a tremendous and unsustainable impact on the environment in all of the above stages of their life cycle. In this regard, Deloitte (2014) reported that buildings in the UK released a staggering 45% of the greenhouse gas (carbon dioxide) emission generated at different stages of their life-cycles. The emissions were seen to emanate from construction activities, particularly from the consumption of energy for various activities during the occupation of buildings under property management. There is also a vast consumption of water, materials, and primary waste production during this stage (Deloitte, 2014). In the US, the emission figures in buildings were estimated to be around 70 per cent and 38 per cent of energy use and CO2 emissions, respectively (Parsons, 2009). Concerning Sub-Saharan Africa, the UN-Habitat (2010) reported that 56 per cent of energy use was as a result of building operations. The position of CO_2 emission is terrible because of frequent power outages (which make occupiers of residential, commercial, and industrial buildings frequently depend on generators for power supply). Besides, there are massive waste generation and disposal problems.

The globally advocated way out of the problem of emissions and other environmental issues peculiar to buildings is to ‘green’ the buildings. Green building according to the RICS (2008) is the ‘display of characteristics that minimises environmental impact through all parts of the building's life-cycle and focuses on improved health for its occupiers, optimises utility for the owners and occupiers, and the broader public while minimising the use of natural resources and environmental impact’. The greening advocacy was amplified by the submissions of scholars such as Ahmad et al., (2020 p. 634), who asserted that 'building-related problems including land degradation, toxic gas emission, and water pollution could be resolved if the buildings are sustainable (green) buildings. This is consistent with the submission of Yas & Jaafar (2020). The US Environmental Protection Agency (2013) asserted that typical green buildings would usually incorporate features such as the use of available natural resources for conservation of energy and water, among others.

The problem addressed by this study relates to the gap observed in the literature (within the African context). It was noted that builders and architects largely dominate the field of green building primarily at the design and construction stages. The operational stage, a phase handled by property management practitioners, is mostly neglected. It is a paradox

because the vast majority of buildings in most cities are in the operational rather than the design and build stages. Accordingly, as Yudelson (2014) and Nagrale & Bais (2020) point out, it is at the operational stage that building environmental problems lies, and most of the corrective research should be primarily focused on this stage. Unfortunately, the contrary is the case. There is a definite gap in the literature on green property regarding research into the operational stage, that is, concerning the institution and use of green leases. In this paper, we define green leases as the formal consensus between landlord, manager, and tenant within the context of the lease process regarding how sustainability efforts in a building would be pursued, managed and measured. Unfortunately, green property management and green leases are mostly unknown in most parts of Africa. Oladokun (2010) asserted that in Africa, many property management surveyors are unaware of green property management!

Consequently, many fundamental questions remain unanswered in theoretical and empirical research on the operational stage: For example, what is the nature of the negative effects/impacts that are generated by buildings during their operational stage? To what extent does property management in Sub-Saharan Africa contain green features that tackle negative impacts in the operational stage? What are the factors that can stimulate a more robust green property management in Sub-Saharan Africa? The paper investigated these fundamental questions in an attempt to begin to correct the imbalance in African literature on greening the operational stage by providing information that could enhance property management practices in green buildings across the African continent, using Ibadan as a case study.

2.0 Research questions, aim, and objectives

Research questions

Against the backdrop on the state of property development and management in Nigerian major cities, the following research questions emerged:

- Are the environmental impacts at the post-development stage (operational stages) different from those at virgin constructions?
- After the construction phase, what are the factors inhibiting the adoption of sustainable property management practice, herein referred to as green lease movement?
- To what level has sustainable property management practice been adopted in Nigerian commercial cities?

Aim and objectives

Specifically, this study examined the negative environmental crises experienced during the operational stages and confirmed if different from the conventional counterpart. After identifying sustainable features herein, the study also examined factors inhibiting the full adoption of sustainable property management practice. The paper finally identified sustainable features and the extent of adoption.

3.0 Theoretical and Empirical Papers

Brief Global History of Green Buildings

The Green (sustainable) building movement has been traced by the Marble Institute (2007) to Architects' activities in the United States in the early 1970s. At that time, the type of building that was prevalent in US cities (and which indeed is still prevalent), were the eco-unfriendly glass box type of high rise buildings. The real kick-start for the green movement was traced to the OPEC oil embargo experienced in 1973; which resulted in gas (petrol) lines stretching for blocks. As a result, Americans began to question the wisdom of reliance on fossil fuels for energy (Ogunba et al., 2015). This motivated a group of Architects, in the seventies, to initiate the building of structures with green features such as photovoltaic cells and other devices . By the early eighties and nineties, more features such as improved varieties of solar panels were introduced. Similarly, water conservation and reclamation systems, as well as more usage of natural lighting, among others, were equally introduced. It was at this period that the White House in the US was transformed into a green building as a model to drive home the concept and acceptability of greening buildings.

Another notable development in the nineties was the establishment of the US Green Building Council (USGBC). The USGBC was established to promote 'the design and construction of buildings that were environmentally responsible, profitable, and healthy places to live and work'. The founding fathers were David Gottfried, Rick Fedrizzi, and Mike Italiano. Between 1990 and 1995, the USGBC worked out a rating system called Leadership in Energy and Environmental Design (LEED) which was unveiled in 1998. The introduction of LEED and

the successes it achieved motivated other countries (especially developed nations) to adopt similar rating systems. An example of such include the Green Star System in Australia (GBC). Countries such as Singapore, New Zealand, Britain, Malaysia, and Canada have also introduced similar rating systems (Krups, 2014). In the year 1999, the World Green Building Council (WGBC) was created to champion the cause of green building globally.

In Africa, the green building momentum is just starting. South Africa has been the clear continental leader in Green building. The South African Green Building Council was launched in 2007 and is the first African country member of the WGBC. Other countries in Africa with Green Councils are Morocco, Mauritius, and Egypt. However, most of them are still in their early stages of development. As of June 2013, there were 36 green building certifications in the country (South Africa. Information, 2013). The second 'green' country in Africa following South Africa is Kenya, whose green buildings society has prepared green rating standards benchmarked on South African standards. The Kenyan government made a draft policy on green buildings in 2013. Kenya is ahead in East Africa in the adoption of green building standards. A notable development in East Africa is that the UN-Habitat liaised with governments in Kenya, Uganda, and Tanzania to use resources as part of building codes efficiently. The program reported having trained 300 architects and construction engineers (but significantly no real estate managers). Wanzala (2013) noted that green building technology is now incorporated in the curricula of all architectural courses in Kenyan universities. In West Africa, the progress of the green building movement has been slower. There are , at present, only four green buildings in Nigeria.

The point in the historical analysis is that except for South Africa and Kenya, the whole of Africa – and particularly Sub-Saharan Africa - lags behind the rest of the world in the green building movement. The next section would show that the problem is exacerbated in literature by a glaring research focus on siting, design, and construction stages of the building life cycle to the exclusion of the property management (operational) stage in the green building movement.

Green Buildings & Sustainable Real Estate Management Practice

The literature on green buildings appears to have concentrated on four issues, namely, the siting of buildings and use of green (sustainable) building materials, the rating systems for green buildings, government policy on green buildings, costs and benefits of investing in green buildings, and promotion of awareness of green buildings. For reasons of space, only a snapshot of the papers in these four categories is provided here.

The first category of papers concentrates on the green siting of buildings and green building materials in building construction. An example of a green siting paper is that of Stone (2011) who advocated that houses should be situated proximate to public transportation to reduce CO_2

generation through personal cars. Haase et al. (2017) highlighted the advantages of sitting green buildings in cities which include improvement in man's wellbeing and aesthetics of the environment. Samer (2013) is an example of the papers focusing on building materials used in green building construction. Samer reviewed green building materials in use in agricultural buildings and advocated green designs, green roofs, and green technologies. Similarly, in Australia, Duda (2009) examined the use of green building exteriors, suggesting that green exteriors can provide more than just environmental benefits. In Lagos, Nigeria, Nwokoro & Onukwube (2011) examined factors influencing sustainable construction, with findings that the essential elements were waste management strategies, improved working conditions, and flexible building designs. Jami et al. (2019) advocated for a paradigm shift concerning the building materials used. The authors asserted that vegetal building materials from biomass are the ideal materials to use in constructing green buildings.

The second category of papers advocates for green building rating systems and suggests the review of green government policy. An example of this is Mehta & Vishal (2013), who examined green building construction in India and reviewed green building rating systems and design strategies. An additional example is Janak (2009), who examined the longstanding state-run green building programs in four cities: Massachusetts, California, New York, and MN, to provide insights into the logistics involved in establishing green building programs. Adebowale et al. (2017) proposed a strategy for developing a local rating council for Nigeria in response to the global acceptability of green buildings. This is consistent with a similar study conducted in Brazil by Fastofski et al. (2017). The authors emphasised the need to create rating systems that take into cognisance the local content of the country in order to provide relevant features to be considered in the classification of buildings as green. Varma & Palaniappan (2019) compared the green rating systems of ten rating councils in Asia, North America, and Europe. The authors identified and proposed strategies for the establishment of a local rating scheme for India. In Australia,

Kim & Lim (2020) found that green building sustainability rating was the strongest predictor or motivating factor for tenants' choice of green as opposed to conventional buildings.

The third group of papers has focused on investigating the costs and benefits of green buildings. An example of such papers is Pieldingt et al. (2011). The authors examined the economic advantages of selected green buildings with findings that green attributes such as energy efficiency contribute to premiums in rents and asset values. Swathi & Amaladas (2014) examined the costs and benefits of European green buildings to developers; the findings suggest that long-run benefits outweighed preliminary costs. Sundbom (2011) highlighted the difficulties that developers in Sweden face in analysing customers' preference for green buildings and the absence of suitable green buildings incentives for such developers. Vinyangkoon (2012), examined whether a value-added gap (or green profit) existed between high green construction costs and energy savings vis-à-vis rental values, finding that a small value-added gap did exist. Golbazi et al. (2020) found that financial benefits are inherent in green buildings as students of higher institutions revealed that they are willing to pay more in terms of rent for green compliant residence.

The fourth category of papers - particularly those emanating from developing countries - has focused on promoting green building awareness. An example of this is Dodo et al. (2012), which attempted to create awareness of green building in Nigeria among architects and builders. In doing this, the authors compared the progress of green building in Nigeria with Malaysia and drew lessons and suggestions on how green building can be incorporated into Nigeria's '*Vision 2020'*. Another paper is Nwokoro & Onukwube (2011), in which the authors found that the current construction practice in Nigeria is unsustainable as it does not contain green features. The authors also suggested a variety of factors that could influence successful green building implementation. Papers that have promoted awareness of green/sustainable building from the property management perspective are few. Such papers include Rani (2012), which identified the challenges encountered by the property managers while managing the green (sustainable) building in Green Tech, Malaysia. Kamarudin et al. (2013) examined the property manager's awareness of green management in Energy Commission buildings, which were GBI certified in Malaysia, and the gap towards implementing such management. In Nigeria, Oladokun (2010) reported an inadequate level of awareness and preparedness among real estate surveyors' perspectives. Komlafe et al. (2019) and Ahmad et al. (2020) observed that the level of green building awareness in Nigeria needs to be increased to encourage its adoption. Ogunba et al. (2015) argued - albeit from a theoretical viewpoint - that property managers should adopt green leases.

The overall gap identified in the brief review of the various groups of literature above is that

literature, the world over, is focused mainly on the design as well as the build phases during the life cycle of the buildings. Moreover, most of the papers have been generated in the more developed areas of the world. The scanty literature that focuses on Africa is pedagogic, merely promoting awareness of the design and build of green building. Apart from papers like Oladokun (2010) and Ogunba et al. (2015), there is scanty evidence of papers addressing the building life cycle's operational stages, which is particularly evident in Africa.

Sustainability and sustainable real estate management

Sustainable development is rooted in the need for progress, growth and development within the social, economic, and philosophical contexts from antiquity to postmodernity (Du Pisani, 2006). Sustainable Development Goals (SDGs) is an offshoot and extension of Millennium Development Goals (MDGs), designed with overarching international visions, and frame worked in nineteen (19) goals (Hák, Janoušková & Moldan, 2016). One of the goals is ensuring sustainable cities and settlements towards improving human and planetary wellbeing (Sachs, 2012). In meeting the present needs without compromising the future, Holden, Linnerud & Banister (2014) expounded on the Brundtland Commission report that the built environment and settlement are critical. A sustainable built environment can be described as sustainable construction, green building, ecological building, and sustainable architecture (Du Plessis, 2007). Du Plessis (2002) and Du Plessis (2007) emphasised the need for a research and development framework to be developed from Agenda 21 for Sustainable Construction in Developing Countries. Built environment (construction activities) affects ecosystems and disrupts nature with devastating effects on environment and climate (Graham, 2009). Bosher, Carrillo, Dainty, Glass & Price (2007) posited that vulnerability can be mitigated if construction stakeholders can take proactive steps in planning, design, construction, and operation of the built environment. Kibert, Sendzimir & Guy (2000) suggested the adoption of sustainability principles. Hill & Bowen (1997) described the built environment within social, economic, biophysical, and technical concepts in connection with environmental and construction management parlance. Hill and Bowen (1997) and Ofori (1998) argued for an extensive approach, particularly in developing countries where a number of support resources and the enabling environment are lacking. Lützkendorf, Fan & Lorenz (2011) opined that financial stakeholders' cooperation with the conventional supply-side and governmental authorities is germane . Sustainable property/facilities management is an evolving area in the built environment (Elmualim, Shockley, Valle, Ludlow & Shah, 2010). Lai (2006) suggested the incorporation of property management into sustainable development concepts. Evidence shows that lack of knowledge and lack of senior management commitment are the main barriers to the implementation of consistent and comprehensive sustainable facilities management policy and practice (Elmualim, Shockley, Valle, Ludlow & Shah, 2010).

Pivo (2010) posited that green leasing requires the cooperation of tenants and landlords' technical skills and new social capabilities for eco-efficiency .

4.0 Research Method

As earlier stated, the paper's empirical sections investigated three questions in an attempt to fill the identified gap in the literature and enhance green (sustainable) property management practices. Ibadan, one of the largest cities in Sub-Saharan Africa, and arguably the second-largest in Africa (after Cairo, Egypt) is selected as the case study for this research work. The study utilised a sequential mixed method approach that incorporated qualitative (interview) as well as quantitative (questionnaire survey) methods. Onwuegbuzie & Leech (2005), posited that an investigation of emerging developmental events demands a pragmatic, exploratory, and multi- dimensional inquiry approach capable of unfolding hidden information. The study utilised primary data. The interview process was conducted with real professionals who are based in Ibadan and are experts in property development and management until a point of saturation was attained (Hennink et al., 2020). In qualitative study, the discourse on sampling frame and size is not a point of emphasis because the process of semi-structured interview stops at a point where repetition emanates. The outcome of the interview, combined with the findings in extant literature resulted in the developed survey instrument for quantitative approaches. In other words, it is a qual-to-quant approach of mixed methods . A combination of membership record and enumeration indicated 73 operational property managers' firms at the time of the study. The structured questionnaire was administered to the heads of management department of each firm and the senior management staff of the 69 property management firms listed in the directory and located in Ibadan (a total enumeration survey & professional association directory). Two tenants were chosen from each of the firms' portfolios accordingly (making a total of 138 tenants). With the aid of research assistants, the entire 69 listed real estate firms were surveyed , out of all the 73 identified firms. At least one representative was affiliated with each of the 69 firms (NIESV Directory).

The design process took the form of qualitative-quantitative subsequent mixed method. For the qualitative data analysis, the paper utilised the advantage provided by CAQDAS (*Atlas.ti*) to analyse the transcripts generated after a careful coding cycle, which generated about *forty (40)* codes with attached comments and memos. Narrative and analytical approaches using thematic analysis based on both a *priori* and a *posteriori* themes informed the structured interview. The a priori codes used were context, essential elements, and usage understanding of sustainable properties management (green lease). The a posteriori codes were the various dimensions of the green lease features in the real estate which form the constructs of the investigation. It also utilised SPSS software to analyse the quantitative data

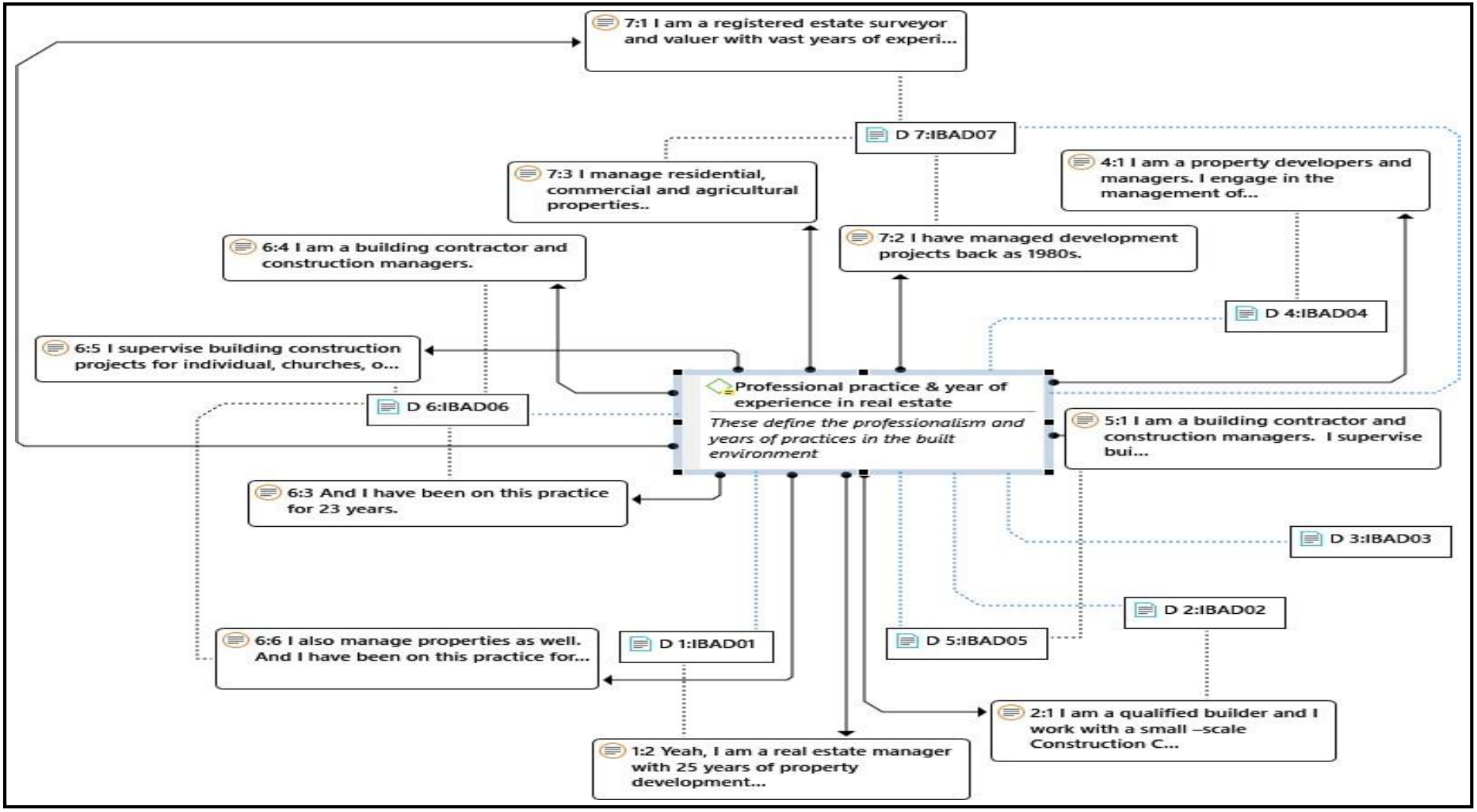
(questionnaire survey on the broader population).

a. Analysis and findings

b. The qualitative phase

The qualitative phase of the study provided the premise to address the four research questions in this paper-specific negative effects of operational stage activities; aspects of sustainable building elements adopted in property management, and the influencing factors in Ibadan. *Figure 1* provides a glimpse of the interviewed professionals' profiles, including their practical years of experience in Ibadan with their respective code IDs. *Figure 2* provides the visualisation networks with nodes of the broad range of the identified negative impact and concerns of massive construction activities in Ibadan.

Figure 1: Glimpse of the real estate professionals' profiles and experiences

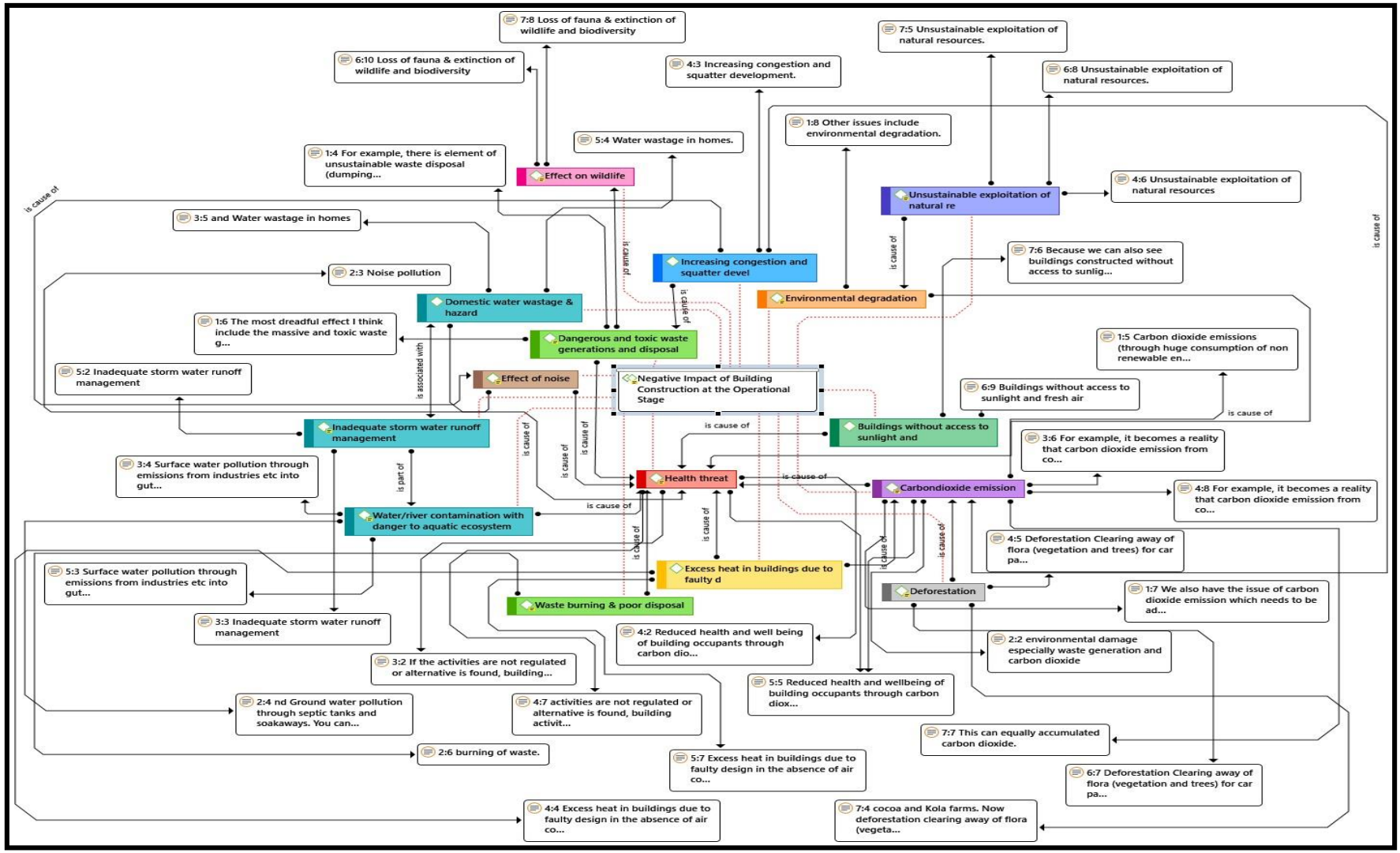


Source: Atlas.*ti* version 8 output

The implication from *Figure 1* is that the respondents have relevant experience in the sector as portrayed by their substantial years of professional practice in property management. At the point of eight turns of the interview, repetition was noticed and it was no longer necessary to continue with the same process (Saunders, Sim, Kingstone, Baker, Waterfield, Bartlam & Jinks, 2018). In addition to the traditional property management practice, the respondent professionals indicated other areas of experience including *construction management, project management, facilities management, building contracting, and other built environment areas.*

Research question one: Are the environmental impacts at the post-development stage (operational stages) different from those at the virgin constructions? We addressed the question by analytically and thematically identifying the negative environmental crises experienced during the operational stages and confirming if they are different from the conventional counterpart as indicated in Figure 2.0.

Figure 2: Negative impacts of building activities at operational stage in Ibadan



Source: Atlas.*ti* version 8 output

Implicit in *Figure 2* is the centrality of the negative impacts (*negative impacts of building maintenance activities at the operational stages). The main impacts are annotated* (*effects on the wildlife, increasing congestion and squatter development, environmental degradation, unstable exploration of natural resources, domestic water wastage and hazards, buildings without adequate sunlight and ventilation, dangerous and toxic waste generation, inadequate storm water runoff management plan, health threat, waste burning and reduced disposal, excessive heat in the building, deforestation, water contamination, danger to the ecosystem, and carbon dioxide emission*). The interconnectivity through labelled links resulted in *six (6)* broad themes: Water-related crises, waste management crises, habitat and ecosystem crises, building-related crises, carbon dioxide emission, and health concerns.

Water-related crises

Building construction activities pose current and future challenges to domestic, agricultural, and commercial usage, which are germane to the lives of Ibadan residents. The primary concern here is centred on the contamination of water for human consumption. There was an emphasis on lack of adequate water management in the construction process and the implication for future water sustainability. Some of the interviewees pointed out some precursors to water-related crises as:

> *Inadequate storm water runoff management, surface water pollution through emissions from industries into gutters, and water wastage in homes…makes water consumption and preservation dangerous in a big city like this (3:1:2:3).*

Waste management crises

The professionals and real estate consumers are concerned about the implication of waste generation and the state of management. Instances of construction waste burning instead of proper disposal and recycling are degrading to the city environment. Like water-related crises caused by construction activities, building waste also emerges as a threat to the people's health.

> *…burning of building waste (2:6)…rather than proper disposal using incinerators affects the environment (1:8). Other issues include environmental degradation… management via lease agreements, lease provisions against the burning of waste, waste separation and recycling (2:8:9) could serve the purpose.*

Habitat and ecosystem crises

Emphasis is placed on where people and animals live, which include aquatic and ecosystems. The unstable exploration of natural resources, contamination of ecosystems, and deforestation negatively affect animals' survival. A significant effect on wildlife is evident in the interview. Some of the interviewees pointed out the following as causative factors to the habitat and

ecosystem crises:

> *Deforestation, clearing away of the flora (vegetation and trees) for car parking, cement screed , unsustainable exploitation of the natural resources. (4:2:3).*

Building -related crises,

If the activities are not regulated, or an alternative found, building activities can threaten our society and livelihood. The implication is that houses and structures are generally exposed to environmental crises, as stated by some of the interviewees:

> The issues of *unsustainable exploitation of natural resources. Buildings without access to sunlight and fresh air. Loss of fauna and extinction of wildlife and biodiversity* ***(6:7:8).*** *Excess heat in buildings due to faulty design in the absence of air conditioners (urban heat island effect) (4:1)*

Carbon dioxide emission

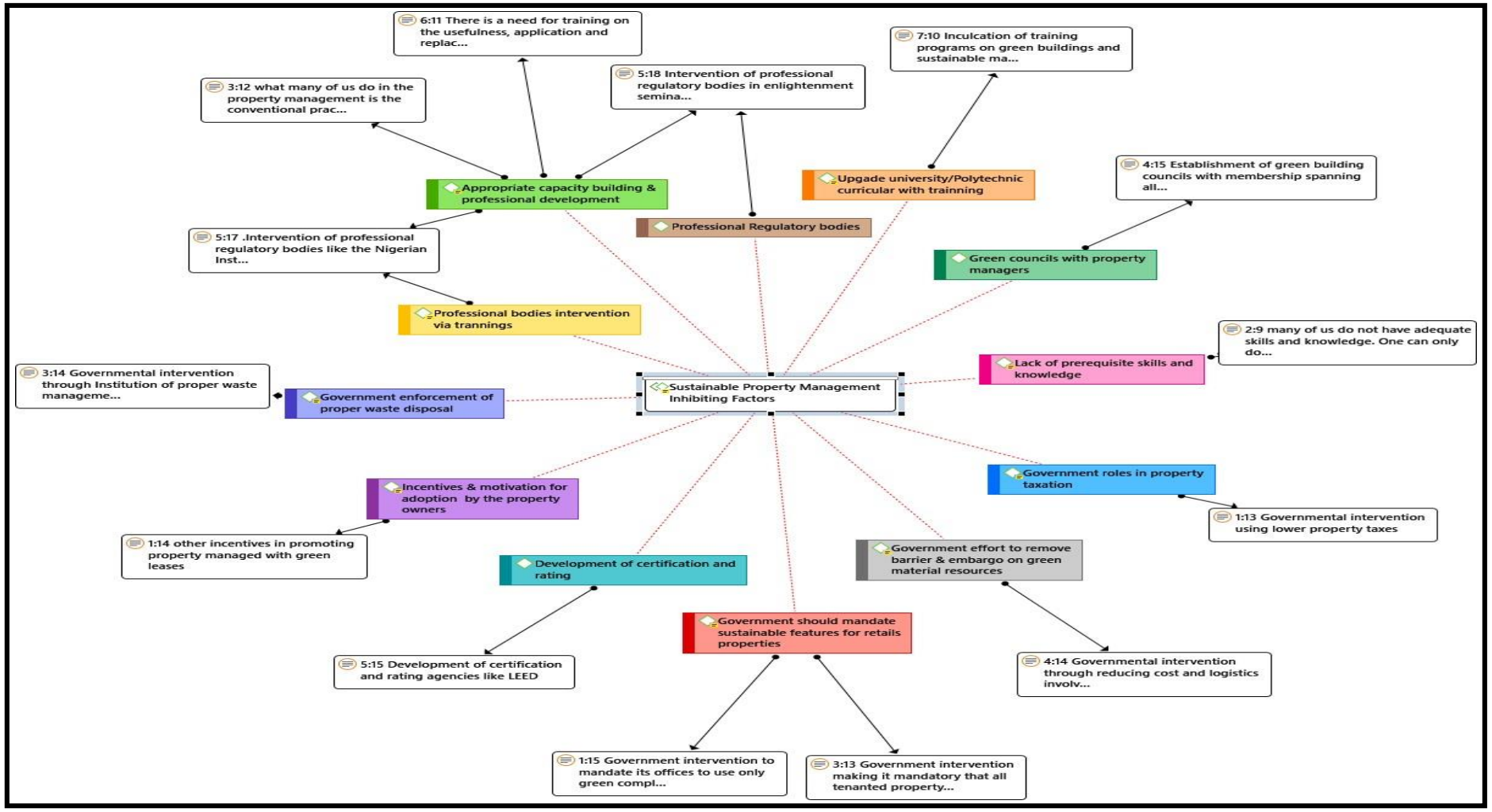
The sources of carbon dioxide emissions are the massive consumption of non- renewable energy from petrol/diesel in generators. In the construction process, the emission of CO_2 has been enormous and has drawn attention. The agitation is that environmental damage, especially waste generation contributes to the emission of carbon dioxide, thus reducing the health and wellbeing of building occupants.

Health threat.

The other negative impact and concerns point to the health implications for the people. If the activities are not regulated, or an alternative is found, building activities can pose a threat to our society. The concern lies in the likelihood to result in reducing the health of the people. All the crises point to the devastating consequences on people's health.

Research question two and objective: After the construction phase, what are the factors inhibiting the adoption of a sustainable property management practice, herein referred to as green lease movement?

A Qualitative approach was adopted to examine inhibiting factors in the adoption of sustainable features in the properties managed by professionals in Ibadan. *Figure 3* provides a broad visual network with their comments.



Source: Atlas.*ti* version 8 output

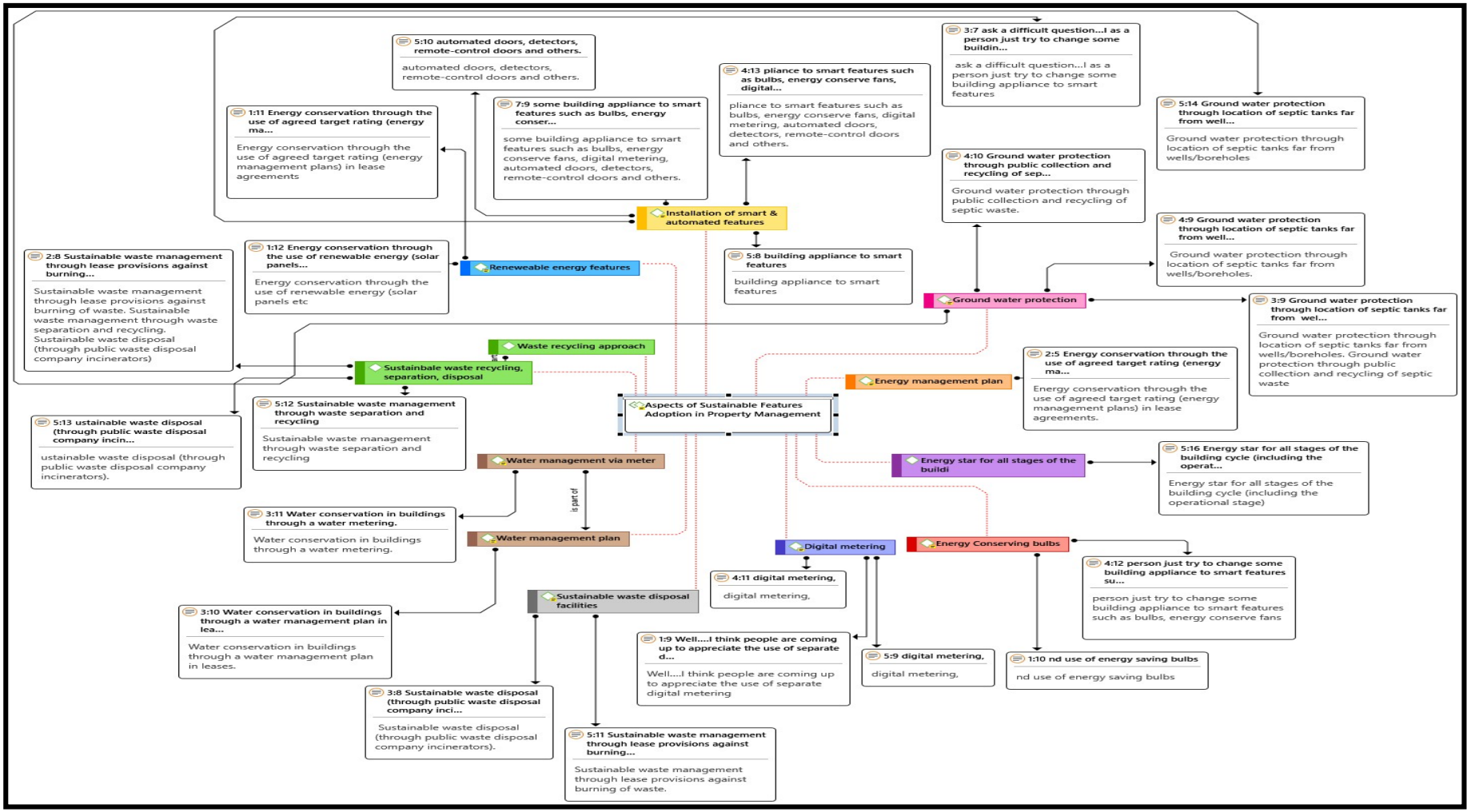
- In *Figure 3*, there are *12 (twelve)* factors (themes) identified. The factors can be classified into *three* main groups; government roles, professional roles, and educational institutions (universities and polytechnics) roles. By virtue of the grounded frequency counts, the roles of government and professional organisations take the more significant part of the responsibility. It brings to fore the importance of institutions and governance in the built environment and urban development (Komolafe et al., 2019; Gbadegesin et al., 2020a; Gbadegesin et al., 2020b).

Research question three: To what extent has sustainable property management practice been adopted in Nigerian commercial cities? To address the research question, the identified sustainable features are presented in *Figure 4* and ranked in *Table 1.*

Sustainable features adoption and installation

After thematically examining the negative implications of construction activities, the paper further investigated how the professionals incorporate sustainable elements into existing properties in the process of management. *Figure 4* highlights the building components

Figure 4: Sustainable features in the property management practice



Source: Atlas.*ti* version 8 output

- As indicated in *Figure 4,* the installation of smart and automated features, renewable energy features, energy management plans, sustainable waste disposal facilities, waste management plans, waste recycling, and groundwater protection is essential in green buildings. However, the most emphasised sustainable features here are energy conservation bulbs and digital metering. To ensure affirmative response, assertive policy steps, and to gain an insight into larger population opinion, the developed instruments were administered to the identified property managers (registered estate surveyors). This leads to the quantitative section of the analysis.

c. The quantitative phase

The quantitative section examines two aspects; negative impacts identified in *Figure 2* on a broader perspective and the perception of the level to which leases in the study area contain green (sustainable) features that address the identified negative impacts of building , as identified in *Figure 4.*

The essence of mixed research methods includes in-depth exploration and triangulation (Ivankova et al., 2006). To solicit a broader view on the research objectives, a larger population is germane to the questionnaire survey. The relevant study population in this context is cross- sectional, which included landlords, tenants, and property management surveyors in Ibadan. However, it was considered on reflection that property managers are frequently the face and agents of landlords, therefore, the views of landlords could be encapsulated in those of the property managers. The sample frame of property managers was based on the 2014 edition of the Directory of the Nigerian Institution of Estate Surveyors and Valuers, which showed a total of 69 registered real estate surveying and valuation firms in Ibadan. An additional four (4) property management firms were identified which were not listed in the directory. A total enumeration survey of all the 69 estate surveying firms in Ibadan was conducted. The heads of each management department of the firms and senior management staff were approached to supply the necessary information about the selection of tenants. The study considered the multi-tenanted properties from the management portfolio of each of the management firms and two tenants in such property. The questionnaire was developed from findings from the qualitative study (*Figures 2, 3 & 4*) and the contextualised findings from the literature review. Accordingly, the sample frame for tenants was 138. Sixty-two (62) questionnaires were retrieved from the property management firms, while 102 questionnaires were retrieved from the tenants.

The data gathered in the study were measured using 5-point ordinal (Likert) scales and analysed using weighted mean scores. The weighted mean scores were determined using the

following expression:

$$Relative Importance Index(RII) = \sum wf/N \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots \ldots . \ldots \ldots \ldots \ldots . . (1)$$

Where: w = weight, f = frequency of specific responses and N = total frequency

Primarily, each point on the ordinal scale was assigned a weight. The weight so assigned was multiplied by the frequency of responses for each scale. The resulting product was then divided by the total frequency to obtain the weighted mean score.

The first question was to identify the nature of the negative effects/impacts generated during the operational phase of buildings in the study area. A range of sixteen possible negative impacts was presented to the respondents (management surveying firms and tenants), and they were asked to rate the occurrence of these impacts in the operational stage of buildings through a 5-point Likert scale. A scale rating of 5 represented a very strong negative environmental occurrence in the buildings under consideration, while a rating of 1

represented the complete absence of occurrence. The responses are documented in Table 1.

Table 1: Perceptions of negative impacts of buildings in their operational stage

Possible Building Impacts	5	4	3	2	1	TWF	WMS	RANK
Massive solid waste generation	33	71	22	27	11	580	3.54	3
Unsustainable waste disposal (dumping in garbage heaps or burning in the backyard)								2
Absence of waste recycling processes	11	76	44	22	11	546	3.33	9
Carbon dioxide emissions (through the massive consumption of non-renewable energy from petrol/diesel in generators)	71	49	27	11	6	660	4.02	1
Groundwater pollution through septic tanks and soakaways	22	87	16	27	12	572	3.49	4
Inadequate storm water runoff management	34	59	33	22	16	565	3.45	6
Surface water pollution through emission from industries into gutters	38	44	38	33	11	557	3.40	7
Water wastage in homes	44	38	38	39	5	569	3.47	5
Reduced health and well-being of building occupants through carbon dioxide emission	33	33	55	43	-	548	3.34	8
Increasing congestion and squatter development	27	33	22	49	33	464	2.83	15
Excess heat in buildings due to faulty design in the absence of air conditioners (urban heat island effect)	23	66	33	27	15	587	3.33	10
Noise pollution	33	49	16	49	17	524	3.20	12
Clearing away of flora (vegetation and trees) for car parking cement screed (Major refurbishment where there was a garden or orchard)	5	38	55	44	22	452	2.76	13
Unsustainable exploitation of natural resources	27	33	22	49	33	464	2.83	15
Buildings without access to sunlight and fresh air	32	34	49	44	5	536	3.27	11
Loss of fauna & extinction of wildlife and biodiversity	15	30	38	48	33	438	2.67	14

The results pointed to several significant adverse environmental impacts of buildings on the environment in their operational stage. The five most notable of these impacts were: carbon dioxide emissions – mainly through the massive consumption of non-renewable energy from petrol/diesel generators (WMS = 4.02); massive solid waste generation (WMS =3.58); unsustainable waste disposal (WMS =3.54); groundwater pollution through septic tanks and

soakaways (WMS = 3.49) and water wastage in homes (WMS = 3.47).

To investigate the extent of sustainable features adoption using quantitative survey data, and triangulating the findings in *Figure 4,* respondents were presented with possible green lease solutions to the five identified and selected building environmental problems. They were requested to rank the degree to which such solutions were employed in current lease practice using a 5-point Likert scale. In the measurement scale, 5 represented the secure use of such a solution in current lease practice, while 1 represented absolutely no use. The items are the extracted variables from *Figure 4* and augmented from extant studies that formed the construct of the survey.

Table 1: Level to which leases in the study area contain green (sustainable) features that address the identified negative building impacts

Possible Green Lease Solutions to Identified Building Environmental Problems	5	4	3	2	1	TWF	WMS	RANK
Energy conservation through the use of renewable energy (such as solar panels)	-	-	24	64	76	276	1.68	7
Energy conservation through the use of energy-saving bulbs	50	53	41	20	--	625	3.81	1
Energy conservation through the use of separate digital meters	48	34	33	24	25	548	3.34	2
Energy conservation through the use of agreed target rating (energy management plans) in lease agreements	-	-	15	37	112	231	1.41	10
Sustainable waste management through lease provisions against the burning of waste	-	14	28	66	56	316	2.00	4
Sustainable waste management through waste separation and recycling	-	-	15	58	91	252	1.53	9
Sustainable waste disposal (through public waste disposal company incinerators)	-	-	30	57	77	281	1.71	6
Groundwater protection through the location of septic tanks far from wells/boreholes	31	24	40	36	33	476	2.90	3
Groundwater protection through public collection and recycling of septic waste	-	-	49	67	48	329	2.00	5
Water conservation in buildings through a water management plan in leases	-	-	21	57	86	262	1.60	8
Water conservation in buildings through a water metering	-	-	4	74	86	246	1.50	11

(5 = very high; 4 = high; 3 = low; 2 = very low; 1 = not decide or not certain)

As seen from Table 2, only three of the possible green lease solutions to building environmental problems in the study area were found significant (only three had WMS above 2.5 in the 5-point rating scale). These are energy conservation through the use of energy-saving bulbs (WMS = 3.81), energy conservation through the use of separate digital meters (WMS = 3.34), and groundwater protection through the location of septic tanks far from wells/boreholes (WMS = 2.90). These are only tangential to resolving the five significant environmental problems earlier identified. The implication is that property management, as conventionally practised in the study area, does not significantly address the five most important negative environmental impacts generated by buildings in their operational stage. One obvious inference

is that if the objectives of sustainable property management are to be achieved in the study area, many more features of green leases need to be adopted. However, what policy factors need to be instituted to ensure the full operation of such green leases in sub-Saharan Africa?

6.0 Policy implication

The results of the analysis in *Figures 2 and 3* provide the premises for assertive policy actions in the sustainable built environment. It is implicit that government intervention through various incentives and legislative power in promoting sustainable property management practice (green leases) should be initiated. This can be done in the form of lower property taxes incentive. Government can also utilize its legislative power to push for sustainability. For instance, in developed countries, such as the US , the government could intervene by mandating its offices to use only green compliant buildings in order to demonstrate readiness and willingness. Government intervention makes it mandatory that all tenanted property operate green leases in Australia. Government intervention through the institution of proper waste management programs such as recycling of non-biodegradable waste is now usual practice in the global North. It is imperative therefore that governmental intervention through reduction of the cost and logistics involved in importing the required green technology such as solar panels, wind turbines, and advanced building management systems is embraced and legislated. Establishment of green building councils with membership spanning all of architects, builders, and property managers may be ripe for adoption in the developing property market of Africa. This article argues for the attempt to develop certification and rating agencies such as LEED and Energy Star for all stages of the building cycle (including the operational stage).

The intervention of professional regulatory bodies like the Nigerian Institution of Estate Surveyors & Valuers and AfRES in the training of management professionals in green lease operation is also required. Capacity building relies on the intervention of professional regulatory bodies in enlightenment seminars for landlords, tenants, and the general public about the immense long term benefits vis-à-vis costs of managing and building properties sustainability. Inculcation of training programs on green buildings and sustainable management practices in University/ Polytechnic curricula will indicate the profound roles of government and other stakeholders including landlords, tenants, and property managers in the built environment and real estate industry.

7.0 Concluding remarks (Triangulation)

In conclusion, the paper adopted both qualitative and quantitative research perspectives to unfold the negative impact and concerns on development activities in Ibadan, the largest indigenous city in South-western Nigeria. It also investigated the sustainable features adopted and implemented in property management (operational stage). Lastly, the paper examined the

factors inhibiting the adoption and trajectory to full sustainable features adoption in property management (green lease). Similar to conventional construction, carbon dioxide emissions and toxic waste generation emerged as the major negative effects/impact during the operational stage. However, it was found that the current property management practice does not address these negative effects/impact. In addition to government role, lack of prerequisite knowledge and enforcement of green lease, inadequate training and empowerment of licenced property managers (real estate surveyors) and occupiers on how such leases operate, significantly inhibit the full adoption of green leases in the region (see figure 3). It explains the importance of and the state of policy in the emerging property market (Gbadegesin and Lochner, 2021).

While the two approaches provided a robust policy outcome, we found a convergence of results from both approaches. From the qualitative angle, sets of negative implications were identified, while the quantitative analysis identified carbon dioxide emissions as well as waste generation as the major negative effects/impact generated by buildings in the operational stage of their life cycle. While a number of sustainable features adopted were identified, the quantitative analysis pointed to minor solutions such as separate digital metering and the use of energy-saving bulbs. It implies that property management practice as conventionally practised in the study area did not significantly address these harmful impacts; the present green focus in property management in the study area was restricted to minor installations. These cannot significantly reduce carbon dioxide emissions and waste generation problems. While a plethora of factors were identified, the significant factors pointed to as necessary to stimulate more comprehensive solutions (solutions encapsulated in green leases) included a few specific factors. These are interventions by real estate professional bodies and governments to promote awareness, build the capacity of operators, enact regulatory laws, and provide incentives for the full operation of green leases. Accordingly, the findings of this study are recommended to the relevant stakeholders for urgent action. Methodologically, the paper revealed a convergence of opinion from a relatively smaller sized qualitative interview and broader sized response from the stakeholders.

As has been earlier pointed out, green real estate management practice in Africa currently lags the rest of the world. As such, property managers in Africa cannot afford to rest on their oars while the African physical environment depreciates due to conservatism in building management. African property managers must adopt a cutting edge mindset so as not to be cut off from green and other innovative developments embraced by the rest of the world. It is urged that the African Real Estate Society and the professional regulatory bodies of every African nation embrace the challenge of kick-starting a strong green momentum on the continent. It is hoped that this paper has contributed to ensuring that the green momentum in the building cycle's operational stage is stimulated and maintained. It thus points to the role policy and

governance can play. This study has implications. It can stimulate sustainable real estate management practice in Africa, which currently lags the rest of the world. This research work serves to be one of the kinds of work that investigates green buildings from the property management perspective empirically in sub-Saharan Africa. There is a need for policy improvement in the use of green products in real estate management practice with a view to sensitising the public and re-awakening policy importance on a sustainable built environment for better livelihood.

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