ASSESSING RENEWABLE ENERGY PRACTICE IN TURAKI ALI HOUSE KADUNA-NIGERIA

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Abstract

The research investigated tenant understanding and preparedness to embrace renewable energy practice as an alternative to public power supply during an outage from the national grid. International standards of sustainable building occupation from Building Research Establishment Environmental Assessment Methods (BREEAM) and Leadership in Energy and Environmental Design (LEED) were adopted to form the parameters of the investigation. The study covered knowledge and utilization of the solar energy system amongst tenants and their readiness to embrace alternative energy systems as well as incentives from the management Company of Turaki Ali House to encourage sustainable occupation. A qualitative and quantitative technique was employed; the interview conducted covered two members of the tenants’ committee and a member of the staff from the management company who has been the desk officer responsible for the property for twenty years. Fifty-six questionnaires were distributed among tenants with forty-one questionnaires returned and used for the analysis. Results from the research revealed limited knowledge of the advantages of the solar energy system over generators; in addition, there was apprehension to embracing the solar system due to the higher initial costs of acquisition and substandard solar systems and components. Managers of the property are reported not have been performing their contractual obligation of the lease, thus justifying the use of individual generators by tenants despite the inherent dangers associated with the practice. The research concluded with a recommendation to raise awareness and encourage the use of sustainable energy sources by means of reviewing the content of tenancy agreements to ensure compliance with sustainable building occupation standards.

Key words: renewable energy, sustainability, property management, BREEAM & LEED.

JEL Classification: K11, Q51, R32.

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1. Introduction

Office operation is ineffective without an uninterrupted energy supply (Nii, et al., 2017), while the national power holding company performance in energy provision is weak. The company has proven to be incapable of providing adequate energy to teeming consumers. This has necessitated personal effort by individual occupants to provide an alternative supply. Alternative energy sources within the buildings are mini generators ranging from 1kva to 5kva, depending on the individual requirements and abilities. These sources are detrimental to global environmental health and sustainability as they increase greenhouse gases through carbon dioxide emissions and cause noise pollution to the immediate environment by making the entire premises noisy, and thereby negating the requirement of a sustainable building occupation. Sustainable building occupation has become popular with a clear objective of limiting greenhouse gas emissions; the research adopted a definition by the LEED and Nigerian environmental standards regulatory agency (NESREA). The agencies defined sustainable building occupation as the usage of a building without causing harm to other users and the environment.

Providing alternative energy by an individual tenant is never friendly to the environment and superficially costlier than a collective arrangement, though it is cheaper in the long run to embrace a cleaner renewable energy alternative such as solar and wind energy (Abdullahi, 2014).

2. Review of literature

The proliferation of new buildings for various uses, including office accommodation, is associated with increasing energy demand beyond what is available (Shohet & Levy, 2017; Nii et al., 2017). The generation of energy requires exploration and utilization of environmental resources with glaring environmental consequences, capable of not only affecting the present generation but also the generations to come. This necessitates efficient management of the limited available energy through building information modelling systems (Yousefli, et al., 2017) as well as the search for alternative renewable energy sources intended to achieve sustainability. Several studies on the subject have been conducted by scholars, such as Abdullahi (2014), who conducted a study in Nepal concluding that renewable energy sources do not only provide alternative energy, but also aid climate change mitigation.

Alternative energy provision depends largely on the availability of resources, such as sunlight, wind (Laska, 2017) or biomass, all of which are readily available in Nigeria, albeit underutilized due to heavy reliance on fossil fuels to generate power for the past 45 years. Although all sources could be productive, certain kinds are most viable, thus requiring selection and prioritization based on needs, resource availability, and technological abilities, as well as selecting the environmentally friendly option (Che-Ani & Ali, 2019), and exploration of Nigeria’s market (Yüksel, 2008; Jailani, et al., 2015; Global Legal Insight, 2018).
Energy provision is connected with climate change and adaptation, whereas the use of renewable energy reduces vulnerability to climate change and its health repercussions (Perera, et al., 2015). In recent times, the Nigerian government has declared solar energy to be a viable alternative due to the nature of the country’s climate, thereby investing approximately $20 billion to build mini solar grids for rural areas, in an effort to reduce reliance on hydro power and coal. This concept is to be expanded by 2023 to produce 10,000 megawatts from solar energy, using a World Bank loan of $350 billion to cater for hospitals, schools and households in rural areas, to achieve a target of 90% access to uninterrupted energy by 2030 (Kawuwa, et al., 2015).

The concept and practice of renewable energy is relatively new to most Nigerians, mostly at the exploration stage due to the accompanying high costs, limited technical expertise and skilled labor to propel the operation of renewable energy practice, especially on a large scale and of requisite quality in line with international best standards (Amankwah, et al., 2019). Awareness of its existence among Nigerians remain scanty and the costs continue to be high; this is evident in the country’s power generation profile, which shows solar power to be the smallest contributor, followed by thermal and nuclear power in ascending order (Environment Agency, 2018).

It is worthy noting, however, that renewable energy sources can be cost effective when energy is harnessed properly, as reported by Malaudzi, Muchie and Makhado (2012), Roman, Votteler and Brent (2016) and Ahmadi, Pishvae and Jokar (2017), who conducted studies on the possibilities of renewable energy sources on mining operations. The above studies concluded that the cost of energy from photovoltaic panels and generated by wind are considerably lower than diesel generators, in addition to lowering carbon emissions. The study further posited that self-generation of energy from renewable sources proved positive, thus encouraging on-site own investments to generate energy.

Alternative energy sources, such as solar and wind, are adjudged sustainable and as having limited negative environmental consequences when compared to coal, gas and hydro-energy whose levels of carbon emissions are considerable (Perera, et al., 2015). Solar and wind sources are natural, requiring only a sustainable system for harnessing, using some regulatory frameworks to avert possible misuse (Kawuwa, et al., 2015).

Adoption of solar energy as an alternative renewable energy source by the Nigerian government ought to reduce noise and air pollution caused by the use of petrol and diesel generators, which has become an everyday burden. The available literature suggests that no specific study has been conducted to establish the volume of pollution associated with the use of diesel and petrol generators in the study area; a generalized amount could be deduced from Jailani et al. (2015), thus concluding that the presence and use of individual diesel and petrol generators in Turaki Ali House for the purpose of generating power contributes to air and noise pollution.

The present study therefore intends to assess the tenants’ understanding and preparedness to accept renewable energy practices in conformity with existing policies to facilitate and promote renewable and sustainable energy consumption (legislative research commission, 2009). Major international rating standards as Leadership in Energy and Environmental Design (LEED), Building Research Establishment Environmental Assessment Method (BREAM) and Australia’s Green Star guidelines are used as a guide to measure sustainable energy practice in Turaki Ali house Kaduna.

2.1. Legislations to promote Renewable Practice in Nigeria

A national renewable energy action plan was unveiled in 2016 by the Minister of Work, Power and Housing; attending the unveiling were all ministries, allied agencies, parastatal and state government representatives in order to promote the use of alternative energy, such as solar, wind and biomass, on a larger scale. The plan proposed an alternative energy source contributing to up to 16% of the national energy requirement by 2030, a major improvement on the 0.8% contribution in 2012. Achieving such an improvement may be difficult without incentives, thus the rationale behind prioritizing energy purchase from alternative sources by energy distribution companies, in addition to tax incentives, financial aids, loans and grants for renewable energy projects (Global Legal Insight, 2018). The action plan for renewable energy practice may not be disparate from the United Nation call for environmental sustainability aimed at reducing greenhouse gaseous emissions. The building industry accounts for 40% of world’s energy demand (IEA, 2018), thus making the building industry sector a priority when it comes to curbing the menace of greenhouse gaseous emissions.

Efficient utilization of energy is of paramount concern, requiring policies and regulations to maintain appropriate environmental quality (Environment Agency, 2018), especially in emerging
economies like Nigeria, where demand is high and relies on a narrow non-sustainable source (Kawuwa, et al., 2015). Policies, codes and standards on sustainable energy provision and utilization merely exist on paper in Nigeria, lacking implementation as reported by Tamaraukuro, Jibril and George (2017), and are selective, such as the National energy policy declaration in 2003 by the energy commission of Nigeria. The policy specifically targeted the industry, agriculture and transport sectors thereby neglecting other sectors, such as the construction and building sector, which is the focus of this study and a consumer of 40% of the generated global energy (IEA, 2018). Other legislation, such as the building codes of 2006, principally set minimum building standards from pre-design, design, construction and post-construction stages to ensure quality, safety and proficiency without considering energy efficiency and sustainability (Global energy insight, 2018). Energy efficiency and sustainability is a global objective promoted by international agencies including the Building Research Establishment Environmental Assessment Methods (BREEAM) and the Green Building Council Leadership in Energy and Environmental Design (LEED). These concepts holistically address issues of sustainability from building design through construction, operation and maintenance.

2.2. Building Research Establishment Environmental Assessment Methods (BREEAM)

The BREAM concept was first introduced in 1990 in the UK and, later, in some parts of Europe before extending to other parts of the world. The concept was updated several times, up to the most recent version of 2014. BREEAM focuses on health, wellbeing, energy, transport, water, waste, land use, pollution control, ecology, innovation and management to achieve sustainable building occupation (Tamaraukuro, et al., 2017).

2.3. Leadership in Energy and Environmental Design (LEED)

The LEED concept was founded in the US eight years after establishing BREEAM, with its recent version being that of 2014, recognized as the most widely used system of building assessment and certification on reducing carbon dioxide (CO2) emissions, saving energy, increasing water efficiency, and improving indoor environmental quality as well as the management of resources and sensitivity to their impacts (Tamaraukuro, et al., 2017; Chatzimouratidis & Pilavachi, 2009). LEED is intended to provide owners and operators with a workable framework for design, construction, operation and maintenance solutions in a sustainable manner for all manners of building use (commercial, residential, industrial etc.), throughout their life cycles. Achieving LEED certification signifies healthier places of production, minimal stress on the environment, capability of attracting tenants/higher lease rates and decreased utility costs, thus lower operating costs and resulting in happier occupants (http://www.bu.edu/sustainability/what-were-doing/green-buildings/leed/). BREEAM and LEEDS are different systems promoting the same chief objective of sustainability using various interrelated components presented in a table adapted from (Tamaraukuro, et al., 2017).

| Categories          | BREEAM | LEED |
|---------------------|--------|------|
| **Ecology**         |        |      |
| Biodiversity protection contaminated land | * | * |
| Enhancing site ecology | * | * |
| Ecological impact   | * | * |
| **Construction site** |        |      |
| Site protection     | * | * |
| Site selection      | * | * |
| Site development    | * | * |
|                      | * | * |
| **Energy**          |        |      |
| Natural resources   | * | * |

Table 1

Areas of coverage by BREEAM and LEED
| **Renewable energy strategy** |  |
|------------------------------|---|
| **Energy performance** | * | *
| HVAC | * | *
| Lighting (internal) | * | *
| Lighting (external) | * | *
| Ventilation | * | *
| Heat transmission |  |
| **Operational** |  |
| Energy monitoring | * | *
| Optimizing energy | * | *
| CO2 reduction strategy | * | *
| Insulant GWP |  |
| **Water and Waste management** |  |
| Water | * | *
| Water consumption |  |
| Indoor water reduction | * | *
| Outdoor water reduction irrigation system | * | *
| Rain water harvesting | * | *
| Water conservation/metering grey water recycling | * | *
| Waste water technology | * | *
| **Waste** |  |
| Construction waste management | * | *
| Waste treatment | * | *
| Recycling activities | * | *
| **Materials** |  |
| Low environmental impact materials | * | *
| Renewable natural materials | * | *
| Insulation | * | *
| Source of raw material | * | *
| Reuse of structural material | * | *
| Use of non-structural frame material | * | *
| Use of finishing material | * | *
| Efficient use of material over life cycle | * | *
| **Economic Aspect** |  |
| Operation and maintenance costs | * | *
| **Pollution** |  |
| Prevention of refrigerant leakage | * | *
| NOx emission | * | *
| Co2 emission | * | *
| Night light | * | *
| Noise pollution | * | *
| Watercourse pollution | * | *
| Natural disasters | * | *
| **Indoor Environment & Health** |  |
| **Ventilation** |  |
| CO2 monitoring | * | *
| Provision of natural ventilation | * | *
| Ventilation system | * | *
| Fresh air supply | * | *
| **Lighting and Illumination** |  |
| Daylight | * | * |
### View out and glare control
* *

### Lighting control
* *

### Illumination level
* *

### Noise and acoustics
- **Noise level**: *
- **Sound insulation**: *

### Contaminate level
- **Volatile organic compounds (VOC)**: *
- **Microbiological contaminate level**: *

### Thermal comfort
- **Cooling/heating and humidity control**: *
- **Proper zoned control**: *

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3. Method and material

The Turaki Ali House is a 5 storey commercial building located within the New Nigeria Development Company Head office Complex along Ahmadu Bello Way in Kaduna CBD. It has grown over time to become a hub for private practitioner offices, chosen due to the advantages of complimenting professional services and proximity to the city center, thus requiring the efficient provision of energy services for effective service delivery, which is largely dependent on the quality of property/facility management services provided on the property with a view of achieving sustainable property occupation.

The research approach was a case study approach, using both the qualitative and quantitative approach. Achieving an in-depth understanding of an issue from the practitioner is best done through carrying out interviews, as reported by (Merriam & Associates, 2002). The interview method was thus adopted for the managers of Turaki Ali house and some of the tenants to obtain reliable findings. Tentative findings were presented to respondents for validation before ultimately being transmitted as a research finding, in line with interview protocol presented in (Merriam & Associates, 2002). According to Steinar (2007), Cresswell (2014) and Johnson (2002) “researcher seeking to gather valid information on past and present practices should better consult those in actual operations,” this solidified the researchers’ choice of property managers responsible for the Turaki Ali house.

A questionnaire instrument was prepared from the literature search, adapting some concepts from past related research to suit the subject of the research in acquiring firsthand information from occupants/users of the Turaki Ali House in Kaduna-Nigeria, for they were at ease to state their true opinion without having to disclose identities, especially in regards to areas of knowledge and awareness. Openness in their responses greatly assisted the research findings. The questionnaire was prepared on a four point rating scale to guide respondent decisions on some items, with four points being the highest, and one being the lowest - signifying the weakest - position on the item. Fifty-six questionnaires were distributed personally by the researcher, and forty-one filled out questionnaires were collected and analyzed. The analysis of questionnaire responses was based on the Lekirt four-point rating scale as follows:
- SA strongly agree - 4 points; A agree - 3 points, DA disagree - 2 points, and SD strongly disagree - 1 point.

4. Empirical results

4.1. Qualitative Results

Interviews were conducted with two members of the tenants’ committee representing the tenants occupying the offices in the building, with one interview conducted with the desk officer responsible for managing the Turaki Ali houses.

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Source: Tamaraukuro, et al. (2017).
Table 2

| s/n | Item                               | Interviewee 1                                      | Interviewee 2                                      | Interviewee 3                                      |
|-----|------------------------------------|---------------------------------------------------|---------------------------------------------------|---------------------------------------------------|
| 1   | Knowledge and awareness about renewable energy | Have a superficial idea but have reservations regarding its use | Have little knowledge | Fully aware, but not practicable in Nigeria |
| 2   | Need to regulate carbon emissions  | We contribute little carbon emissions               | There is the need to regulate emissions            | Hydro power generation contributes more emissions |
| 3   | Cleanliness of generators as an alternative source of energy | Generators are the only alternative we have, though not clean to the ozone layer | Generators emit smoke, but we have to use them | Generators may not be clean, but are my only option, despite being harmful to the environment |
| 4   | How do you feel about the noise from generators | It truly disturbs the occupants                      | The noise is more audible on the ground floor while my office is on the second floor | My office is sound proof but there is noise to others |
| 5   | Do you have the consent of property manager to use an individual generator | There is no formal consent but the managers are aware and have not halted it | The managers could not maintain the central generator | It is impliedly agreed |
| 6   | What is your average cost of using a generator per annum | N120,000 (USD 320)                                    | N180,000 (USD 480)                                    | N210,000 (USD 560)                                    |
| 7   | Availability of solar systems within your reach | It is available as the government claims            | They are present, but I am uncertain of the quality | The quality of what is available on the market is poor |
| 8   | How do you compare the price of a solar system to that of running a generator | I have never used solar so I cannot say            | Solar is more expensive of course; even though I have not tried it, people say it is inferior compared to what is available in developed nations | I believe solar is more expensive and the quality of products is not commensurate |
| 9   | Would you embrace a solar system against a generator? | Yes, if the cost was affordable                     | Not until it became so common that it could be easily maintained | I have always preferred it to generators, but it is not common |
| 10  | Could you mention some of the environmental disasters you commonly know? | Desertification, flooding, drought and water-borne diseases | Industrial pollution, flooding, global warming | Air and water pollution, rising temperatures, desert encroachment |
How do you assess the content of your tenancy agreement on environmental sustainability and occupation

I believe that when we effectively manage our property, it is also part of the environment. Well, my understanding is that they are only concerned about their property, not even the occupants let alone the environment. My understanding of environmental sustainability is not captured anywhere in the tenancy agreement.

Source: field interview 2019.

4.2. Quantitative Data

This section involves an analysis of questionnaires distributed among occupants of Turaki Ali; the distribution was done in a systematic manner by stratifying the population based on floor level to give equal opportunity to occupants on all the floors to stand the chance of being selected at random, this conforms to quantitative sample selection methods in Bryman (2012). Questionnaires were administered in the following distribution.

Responses from the survey revealed a higher mean in favor of using individual and central generators than solar power as alternative sources of power, thereby affirming the interview response from Interviewee 1. Biomass and wind energy sources emerged as slightly less popular than solar energy. All three alternative sources fall within the class of disagreement based on the four point rating scale adopted in the analysis of questionnaires, thereby supporting Cicelsky (2009).

Table 4 shows preferences to using individual generators expressed by most occupants and can be related to limited knowledge about the operation of a solar energy system as seen Table 5, and thereby having limited confidence in the concept; this supports the findings of Limmeechokchai (2017) and is not likely to change until proper enlightenment on the subject matter is pursued as a panacea to encouraging sustainable energy utilization. Such mobilization is currently handled by marketing and promotion companies with low participation from the government and NGOs, despite the government’s recent pronouncement to encourage solar energy consumption. Landlords’ strategies towards embracing solar energy sources are the least prominent, thereby reflecting poor practice.

Table 3

| S/N | Item                | Distributed | Returned | Percentage Response |
|-----|---------------------|-------------|----------|---------------------|
| 1.  | Ground floor        | 8           | 7        | 12.5%               |
| 2.  | First floor         | 10          | 10       | 17.86%              |
| 3.  | Second floor        | 10          | 7        | 12.5%               |
| 4.  | Third floor         | 10          | 5        | 8.9%                |
| 5.  | Fourth floor        | 10          | 6        | 10.71%              |
| 6.  | Fifth floor         | 8           | 6        | 10.71%              |
| Total|                    | 56          | 41       | 73.18%              |

Source: survey 2019.

Table 4

| S/N | Item                  | SA | A | DA | SD | Mean | Ranking |
|-----|-----------------------|----|---|----|----|------|---------|
| 1.  | Solar system          | 2  | 3 | 30 | 6  | 2.02 | 3rd     |
| 2.  | Central generator     | 38 | 2 | 0  | 0  | 3.85 | 2nd     |
| 3.  | Individual generator  | 36 | 5 | 0  | 0  | 3.88 | 1st     |
| 4.  | Biomass               | 0  | 0 | 28 | 13 | 1.68 | 5th     |
| 5.  | Wind energy           | 2  | 1 | 32 | 6  | 1.81 | 4th     |

Source: survey 2019.
Table 5

| S/N | Item                                      | SA | A | DA | SD | Mean | Ranking |
|-----|-------------------------------------------|----|---|----|----|------|---------|
| 1   | Have adequate knowledge on solar system operation | 3  | 1 | 29 | 8  | 1.98 | 4<sup>th</sup> |
| 2   | Through formal learning                    | 3  | 1 | 37 | 0  | 2.17 | 3<sup>rd</sup> |
| 3   | Public campaign (Government and NGO)       | 0  | 9 | 30 | 2  | 2.17 | 3<sup>rd</sup> |
| 4   | Landlord briefs/strategies                | 0  | 1 | 21 | 19 | 1.54 | 6<sup>th</sup> |
| 5   | Production/marketing companies            | 25 | 7 | 4  | 5  | 3.27 | 1<sup>st</sup> |
| 6   | Environmental practices                   | 2  | 3 | 31 | 5  | 1.95 | 5<sup>th</sup> |
| 7   | Media campaign                            | 11 | 7 | 19 | 4  | 2.61 | 2<sup>nd</sup> |

Source: survey 2019.

Table 6

| S/N | Item                                      | SA | A | DA | SD | Mean | Ranking |
|-----|-------------------------------------------|----|---|----|----|------|---------|
| 1   | Using central generators is cheaper than individual generators | 13 | 10 | 7  | 10 | 2.59 | 4<sup>th</sup> |
| 2   | Using solar systems is more convenient than generators | 22 | 7 | 9  | 3  | 2.20 | 8<sup>th</sup> |
| 3   | Generators pollute the air                | 17 | 17 | 3  | 4  | 3.15 | 2<sup>nd</sup> |
| 4   | Generators cause noise pollution          | 22 | 12 | 5  | 2  | 2.34 | 6<sup>th</sup> |
| 5   | Generators are not environmentally friendly | 5  | 15 | 11 | 10 | 2.37 | 5<sup>th</sup> |
| 6   | Using individual generators negates the concept of sustainable building occupation | 6  | 9 | 10 | 16 | 2.12 | 9<sup>th</sup> |
| 7   | Protecting the earth is a collective responsibility | 14 | 22 | 5  | 0  | 3.22 | 1<sup>st</sup> |
| 8   | Global warming is caused by gaseous emissions | 16 | 16 | 8  | 1  | 3.15 | 2<sup>nd</sup> |
| 9   | Our individual generators contribute to global warming | 3  | 10 | 11 | 17 | 1.98 | 10<sup>th</sup> |
| 10  | The use of individual generators is harmful to the property | 5  | 7 | 22 | 7  | 2.24 | 7<sup>th</sup> |
| 11  | Individual generator supply cables can ignite fires in the case of electric voltage leakage | 4  | 32 | 3  | 2  | 3  | 3<sup>rd</sup> |

Source: survey 2019.

Table 6 above reported overwhelming agreement in regards to protecting the earth collectively, ranking first amongst the many variables; the respondents agreed that global warming is caused by gaseous emissions from various agents. Dangers of frayed cables conveying power from individual generators to offices ranks third among non-sustainable practices. The use of a central generator ranks fourth, thus agreeing that a central generating system is a means of reducing emissions when compared to individual generators. All generators are considered unfriendly to the environment by causing not just air but also noise pollution, thus reporting that the use of generators is harmful to the property, despite the lack of strong agreement with the notion that the use of solar energy is more convenient than generators, and that the use of individual generators is harmful to the property.

Individual preferences to using generators are influenced by their low cost of acquisition in addition to the availability of technology for routine maintenance, availability of the product and cheaper operational /maintenance costs compared to solar technology. Availability of technical support is reported as the last reason behind the respondents’ decisions to use generators; the occupants rejected the assertion that using generators are environmentally friendly, as reflected in its
ranking - 4th; this may be related to their limited knowledge on environmental consequences (pollution) as reported in Li and Yu (2016).

Table 7

| S/N | Item                                                                 | SA | A  | DA | SD | Mean  | Ranking |
|-----|----------------------------------------------------------------------|----|----|----|----|-------|---------|
| 1.  | Cost of acquisition is low                                           | 29 | 9  | 4  | 0  | 3.68  | 1st     |
| 2.  | Cheaper operating/maintenance cost                                   | 8  | 12 | 14 | 7  | 2.51  | 3rd     |
| 3.  | Availability of technology                                           | 15 | 16 | 7  | 3  | 3.05  | 2nd     |
| 4.  | Availability of technical support                                    | 10 | 31 | 0  | 0  | 1.78  | 5th     |
| 5.  | Environmentally friendly                                             | 7  | 5  | 20 | 9  | 2.24  | 4th     |

Source: survey 2019.

Table 8

| S/N | Item                                                                 | SA | A  | DA | SD | Mean  | Ranking |
|-----|----------------------------------------------------------------------|----|----|----|----|-------|---------|
| 5   | There exist regulations guiding occupation of the premises as a management policy | 7  | 5  | 22 | 7  | 2.29  | 3rd     |
| 6   | The property managers undertake routine inspection to check user breach | 2  | 4  | 12 | 23 | 1.63  | 7th     |
| 7   | Are there prescribed penalties in the lease agreement in respect of breaches of the sustainable occupation clause | 3  | 11 | 21 | 6  | 2.27  | 4th     |
| 8   | Property managers comply with their service agreement                | 3  | 3  | 18 | 17 | 1.80  | 6th     |
| 9   | Managers of the Turaki Ali house are yet to include the solar power option as the only acceptable alternative power supply | 30 | 7  | 3  | 1  | 2.88  | 1st     |
| 18  | The tenancy agreement permits the use of individual generators       | 7  | 22 | 7  | 5  | 2.76  | 2nd     |
| 19  | The concept of sustainable building occupation is reflected in the tenancy agreement | 3  | 5  | 30 | 2  | 2.17  | 5th     |

Source: survey 2019.

Managers of the property are agents of the landlord and, therefore, hold the same responsibility as if they themselves were the owners; respondents accepted the existence of regulations guiding their occupation, but rejected that managers undertake routine inspections to monitor user breach; this can be corroborated by the presence of multiple dangling supply cables to various offices without minding the associated risk. Respondents were not in support of punishing erring practice capable of jeopardizing sustainable occupation. The situation may be connected with the fact that the property managers themselves do not conform to their service agreement and would, therefore, have no moral justification to insist on total compliance by the occupants.

Management should take the lead and become responsible for coordination among the tenants, but instead have not been proactive, especially in regards to solar system power supply; this is knowing fully well that the central generator is faulty and beyond repair. They have also failed to procure or introduce solar systems as an alternative energy supply. Respondent three, who is an employee of the management company, reported limited or no effort towards embracing the technology, despite an offer from a solar technology company The use of individual generators in the building is not directly allowed by the tenancy agreement, but permission is given by the lack of clear prohibition; thus the rationale behind the responses that it is allowed in the tenancy agreement, despite not being included in the actual content of the agreement. Provision for sustainable building occupation in the tenancy agreement can almost be said to have been rejected by the responses, seeing as how the mean stood at 2.17 on a 4-point rating scale.
5. Conclusion

Effort in seeking to establish the level of the respondents’ knowledge and understanding of renewable energy sources revealed that it is limited, especially in regards to solar systems and the need for them. This has affected their practice, as evidenced in their occupation of Turaki Ali House, by littering the premises with all kinds of generators despite acknowledging the offensive noise and air pollution from generators during the day; this finding is supported by the findings of Tong & Zhang (2015).

Acceptance and readiness to embrace the use of solar power was queried by a cost comparison between generators and solar systems, from acquisition through operation; all answers from the respondents were geared towards generators, with no desire to accept solar systems as a better alternative source of power supply. Although readiness to embrace solar systems was expressed, it was accompanied by the condition that quality solar system components are made available at comparatively affordable prices, or even slightly cheaper than a generator of corresponding capacity; otherwise, readiness cannot be backed by action, especially since it is seen as moving from the known to an unknown.

Attempts to identify efforts made by property managers to regulate tenants with the sustainable building occupation standard revealed limited and vague provisions in the tenancy agreements that are not explicit on sustainable building occupation. In fact, related provisions to achieving sustainable building occupation are implied and relative to individual interpretation and understanding. Breach of service responsibility by the property managers has negatively affected sustainable building occupation in the property, due to failure in carrying out routine inspections to identify faults and breaches in real property occupation. This practice has fallen short of commercial property management requirements (UCEM, 2018).

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