Developers’ willingness to invest in green features in Abuja, Nigeria

Matthew Oluwole Oyewole
Department of Estate Management, Obafemi Awolowo University, Ile-Ife, Nigeria

Adeola Adisa Ojutalayo
Department of Resettlement and Compensation, Federal Capital Development Authority, Abuja, Nigeria, and

Funmilayo Moyinola Araloyin
Department of Estate Management, Obafemi Awolowo University, Ile-Ife, Nigeria

Abstract

Purpose – The purpose of this paper is to investigate the degree of willingness of property developers to invest in green features in Abuja, the federal capital city of Nigeria, to determine the level of their preparedness for green building development.

Design/methodology/approach – Data were elicited from the property managers of the various property development companies through self-administered questionnaire and analyzed with the use of frequency distribution, percentages and measures of developers’ willingness to invest index.

Findings – The study showed that the developers’ level of willingness to invest in green features is above average with the value of willingness indices on most features rising above 2.5 on a five-point scale. Features that are less capital intensive such as “Location of air intake that are far from source of pollution” (RWI = 4.14) and “Building design that utilize natural and cross ventilation” (RWI = 4.12) attracted higher developers’ level of willingness than features such as “Mechanical ventilation of enclosed parking area” (RWI = 2.15) and “Design for energy efficient deconstruction and recycling” (RWI = 1.84) that are more capital intensive. In addition, the index of willingness (relative willingness index of developers) on features that are associated with occupants’ comfort is higher than the index of willingness on features that confer more of environmental benefits.

Practical implications – The study concludes by advocating that parliamentary arms of all tiers of government should formulate environmental policies and laws that will entrench sustainable practices in the building industry in the country.

Originality/value – This is one of the few studies on the willingness of major stakeholders to invest in green features, particularly in the Nigerian context.

Keywords Investment, Environment

1. Introduction

In recent times, green building investment has gained importance among property market participants and other major stakeholders in the green movement globally. This is a result of the threat posed by the exploitation of the natural environment at a faster rate than can be replenished and its implications on the survival of human race (Pachauri and Meyer, 2014). The threat has manifested in forms of excessive carbon dioxide level, global warming and environmental degradation (Warren-Myers and Reed, 2010). The development is a result of human actions including built environment based activities that call for restraints in order to preserve the interest of the future generation (Boyd, 2007).

It has been established that the building sector contributes significantly to greenhouse gas emission, global warming and climate change through activities such as the destruction of natural habitat and the use of natural, non-renewable energy and materials to make and control the climate of buildings (Urge-Vorsatz et al., 2007; USGBC, 2009). Consequently, efforts are being made particularly in developed economies to embrace the concept of green building in order to promote sustainable development. Green building is a concept that calls
for developers and investors to take account of economic, social and environmental issues otherwise known as “Triple Bottom Line” in their decision-making processes (Connelly, 2006). The term describes the practice of incorporating extra financial factors such as social and environmental considerations into investment decisions (Pivo and Fisher, 2011). It seeks a balance between economic prosperity, social well-being and environmental protection (Oyewole et al., 2012). The practice of green building would ensure a judicious use of resources and a healthy environment for people to live and work in while reducing maintenance costs.

Evidence abounds that green building investment has been embraced in varying degrees in some developed economies. The result of the study carried out by McGraw Hill Construction (2016) shows that green building is growing across the globe and that green is becoming a business opportunity in an increasingly competitive global market. Meanwhile, green building development is still unpopular, particularly in developing countries of the world owing to knowledge gap (Puerst et al., 2011; Samari et al., 2013; Komolafe et al., 2016). It is in this context that information on the desire of the principal stakeholders in green building, especially the developers, to invest in green building is particularly important in overcoming the major constraint to green building practices. Such information will be useful for government agencies for better awareness program and policy formulation.

2. Literature review

Several studies have been carried out in recent years in the area of the green building. The studies cover subjects such as users’ perception of green buildings, the impact of green features on property performance, and willingness to pay for green buildings. Among the studies that have examined users’ perception of the green building are Abbaszadeh et al. (2006), Addae-Dapaah et al. (2009), Brown and Cole (2009), Investment Property Forum (2009), Adnan and Daud (2010), Wilkinson et al. (2011), Simons et al. (2014), Komolafe and Oyewole (2015) and Oyewole and Komolafe (2018). The foci of such studies have been the nature and dimension of the benefits of green building, users’ satisfaction on green building or users’ preference for green building features.

The extent to which construction costs and return on investment influence consumers’ willingness to pay for green building alternatives was explored by Grosskopf (2003). The study matched the return on investment of more than 100 high-efficiency bid alternatives with consumer willingness-to-pay survey of new home buyers. The outcome of the study showed that more than 90 percent of the respondents were willing to invest in green buildings for either soft or hard cost benefits. The result also indicated that age and personal income were the major factors influencing consumers’ willingness to pay for green buildings.

Addae-Dapaah et al. (2009) explored commercial property users’ perception of the benefits of green buildings and how their opinions influence the decision to occupy or invest in green properties. Employing a primary data obtained through a survey of commercial property users in Singapore, the study revealed that users were aware of and appreciated the benefits of green building. Meanwhile, the analysis showed that the users were not willing to invest in green building owing to financial risk.

In another emerging economy, Yau (2012) assessed residents’ willingness to pay and preferences for green building attributes in Hong Kong. The study employed a structured questionnaire and found that moral and altruistic reasons and economic incentives were the drivers of consumers’ willingness to pay for green buildings. Chen and Chan (2012) assessed the influences of green perceived value and perceived risk on the propensity to invest in green assets. Applying the questionnaire survey and structural equation modeling to verify the research framework, the results showed that green perceived value would influence the inclination to invest, while green perceived risk would discourage the investment in green assets.
Wiencke (2013) investigated the willingness of firms in Switzerland to pay for green building features. The study employed data from the corporate real estate and sustainability survey and found that Swiss corporations were willing to pay a premium price of 3.0 percent for leasing, 4.75 percent for purchasing and 5.0 percent for retrofitting. The result also showed that firms from the building and financial service industries, as well as public corporations and authorities, indicated the highest willingness to pay.

Park et al. (2013) evaluated preferences for the environmental factors of residential properties using both conjunct analysis and ranking method. The authors tested consumers’ marginal willingness to pay to identify their monetary value regarding environmental performance. The result showed that the energy bill ranked highest in preference, while IT facilities ranked lowest. The finding also showed that preferences varied according to respondents’ socio-demographic factors.

Isa et al. (2013) investigated factors affecting office property investment in Malaysia with a view to establish the attractiveness of returns expected by property investors. The authors found that returns and risk were the major factors driving investment in green building. The study concluded that investment in green office buildings would lead to a new dimension in the Malaysian real estate industry.

Simons et al. (2014) examined office tenants’ willingness to pay for green features in the United States of America. The study considered 18 green building features and discovered that the tenants were willing to pay a premium of 9.3 percent on office buildings. The result also indicated that the tenants’ level of willingness to pay ranked highest for improved indoor air quality and access to natural light.

Zalejska-Jonsson (2014) explored stated and rational willingness to pay for a green apartment in Sweden. The study considered the responses of residents of green and conventional multi-family buildings to investigate the existence of willingness to pay and to test the difference in the perception of those living in the green and those living in the conventional building. The result showed that the respondents were willing to pay for the green building but not for buildings with the environmental certificate.

Among the studies that have considered the perception of developers/investors on green buildings are Pivo (2008), Richardson and Lynes (2007), Myers et al. (2008), Rhode and Lutzkendorf (2009), among others.

Pivo (2008) examined responsible property investing among investment organizations in the USA through a survey of senior American executives. The study found that most organizations were going beyond compliance, implementing management strategies and investing in responsible property. Apart from the fact that the study focused on a more matured market, the level of willingness of the investors to invest in constituent elements of green buildings was not investigated.

Richardson and Lynes (2007) investigated barriers and motivations for the development of green properties at the University of Waterloo, Canada. The authors conducted a semi-structured interview with key officers of the institutions and found that, though the university had implemented many green initiatives, the institution had weaknesses in key ingredients required for a successful green building development. Apart from the fact that the study focused on a developed economy where implementation framework exists for green building, the subjects of the study were institutional properties.

Myers et al. (2008) investigated the market perception of developers and investors towards the green building in New Zealand. The result of the study indicated that the respondents were of the opinion that sustainable building will play an important part in the property portfolio in the future. Rhode and Lutzkendorf (2009) documented that considerable potential exists for green buildings in Germany owing to an underdeveloped market for certified green building and knowledge deficits among private and institutional investors. Newell (2009) highlighted some of the strategies used by the property companies.
in the UK, Europe, the USA, Australia and Asia to incorporate sustainability in retail property investment. He noted that sustainability had been embraced by all stakeholders and that developers and investors, in particular, had integrated sustainability practices in their businesses. Although the study considered the developers’ strategies in investing in green buildings, the level of willingness to invest in respective elements of green building was not evaluated.

Pivo (2010) examined the possibility of the engaging owner–tenant cooperation in improving existing properties to enhance sustainability. The author focused on the United States of America, Europe, and Australia and found that owners were finding ways to cooperate with tenants through green leasing, incentives, and educational programs. He stated further that transformation to sustainable property investing would not only require skill but also cooperation between property owners and tenants.

Leif and Mahapatra (2010) employed data collected on owners of detached houses in Sweden in order to analyze the factors affecting the adoption of investment measures to improve the energy efficiency of their buildings. The finding showed that personal characteristics such as income, education, age and contextual factors including age of the house, thermal discomfort, past investment and perceived energy cost influence homeowners’ preference for a particular energy efficiency measure.

Relative to emerging economies, Liu et al. (2012) investigated the drivers and obstacles to green building construction in the Chinese building industry. Having conducted an industry-wide survey, the study found that “to obtain countenance and incentives from the government” was the most significant driver, while “High fabrication cost” in design and “Cost control” appeared to be the largest obstacles to green construction. However, the focus of the study was not on the willingness of the developers which this study intends to achieve.

Oyewole et al. (2012) examined the level of involvement of investors in sustainable property investment practice in Nigeria. The authors carried out a survey on Nigerian property companies and found that insignificant attention was given to social and environmental issues by the investors. The paper advocated the need for various stakeholders to embrace and promote sustainability in the Nigerian built environment in accordance to global trends.

Nurul and Zainul (2013) explored the drivers of green building construction. The study identified financial, business strategy, image and ethical as four main drivers of green building construction. Apart from the fact that this study was not empirical, the focus of the paper was on the drivers and not about the willingness of developers to invest in green features.

Kirk (2017) reported that the Institute of Real Estate Management in collaboration with Institute of Market Transformation investigated into what inspired property owners to improve energy performance and found that owners were favorably disposed to invest in energy efficiency improvement if they could charge higher rent. Although the focus of the study is on the willingness to invest in green features, the survey was carried out in a more matured and developed market.

Razali et al. (2017) assessed the level of sustainability practices amongst the property companies in Southeast Asia. The study considered the websites and annual reports of the companies to assess the strategies based on related sustainability issues. The result showed that green property development remained at a moderate level. Although the study focused on the sustainability practices among the developers, the willingness of the property companies that were the developers was not investigated. There is the need to inquire into the extent of willingness of real estate developers to invest in green features in the study area. This information is pertinent to effective green building policy and awareness programs in the country.
3. Research method

The data for the study were collected from real estate development companies operating under the umbrella body of Real Estate Development Association of Nigeria, Abuja, the Federal Capital Territory of Nigeria. In total, 64 companies were identified and targeted for the purpose of the study.

Data were elicited from the project managers of the various property development companies through a self-administered questionnaire. In earlier works (Komolafe and Oyewole, 2015; Komolafe et al., 2016; Oyewole and Komolafe, 2018), building attributes with materials use and conservation; indoor air climate; energy conservation; water, rainwater and sewage; site selection, site design and landscape ecology; building ecology, waste and recycling and owner and occupant education features were identified as green features. These features constitute 69 attributes used in this study as green features.

The investors were asked to rate each of the attributes using Likert’s scale of very much willing, willing, somewhat willing, not willing and not at all willing. During analysis, these ratings were assigned weight values of 5, 4, 3, 3, 2, and 1, respectively. The relative willingness index (RWI) for each of the variables was arrived at by dividing the summation of weight value (total weight value – TWV) by the total number of respondents. The TWV is the addition of the product of the number of responses to each of the variables and the weight values attached to each rating (see Afon, 2007; Oyewole, 2010). The RWIs thus ranged between the values of 5 and 1. This is expressed mathematically as:

\[
TWV = \sum_{i=1}^{5} P_i V_i, \tag{1}
\]

where TWV is the total weight value, \(P_i\) is the number of respondents rating an attribute \(i\) and \(V_i\) is the weight assigned to each attribute \(i\).

The DWI to each attribute is arrived by dividing TWV by the summation of the respondents to each of the five ratings of an attribute. This is expressed mathematically as:

\[
RWI = \frac{TWV}{\sum_{i=1}^{5} P_i}, \tag{2}
\]

where RWI is the relative willingness index and \(P_i\) is as defined previously.

The closer the RWI of an attribute is to five, the higher the assumed relative willingness.

The mean of the RWI distribution was computed. The deviation about the mean of each variable was also computed to measure the scatter in the data relative to the mean.

4. Results and discussion

In presenting the result of the study, the paper first examined the profile of the developers and, subsequently, the degree of developers’ willingness to invest in green features.

4.1 Profile of real estate developers

The profiles of real estate development companies examined are as shown in Table I. The result shows that 3 (5.2 percent) of the property development companies aged between 1 and 5 years; 7 (12.1 percent) aged between 6 and 10 years; 34 (58.65) aged between 11 and 15 years; 11 (19 percent) aged between 16 and 20 years; while 3 (5.2 percent) of the companies aged above 20 years. Majority of the companies (24.1 percent) had an additional branch. The finding also revealed that the majority (50 percent) of the development companies gave priority to residential property, while 29.1 and 20.9 percent of the developers gave priority to retail and office commercial properties, respectively.
4.2 Developers’ willingness to invest in green features

In order to ascertain the willingness of developers to invest in green buildings, the researchers sought information from property developers on their willingness to invest in green features such as “water, rainwater and sewage,” “indoor air quality,” “material use and conservation,” “ecology, waste and recycling,” “energy conservation,” “site selection, site design and landscape ecology” and “owner and occupant education.” The developers’ level of willingness was assessed. This is through RWI, computed for each of the green features.

4.2.1 Material use and conservation. The developers’ level of willingness to invest in green features relating to “material use and conservation” was assessed. This was through the RWI computed for each of the following features: “use of materials that protect against the local weather condition,” “use of durable materials,” “surfaces that are treated with materials that are indoor certified,” “foam materials using CFC and HCFC is avoided,” “use of natural and local materials in construction,” “availability of equipment on-site to deal with environmental emergencies,” “use of recyclable/recycled materials in construction” and “water installation, cable works and related installation without PVC is applied.” The RWI obtained for each of the features is as presented in Table II. Also shown in the table is the average RWI denoted by RWI for each feature. This is obtained by summing up the RWI for each feature and dividing it by the number of the identified features (n = 8). Thus, the average willingness index (RWI) of developers for features relating to “materials use and conservation” is 2.68. The result showed that “use of material that protects against the local weather condition” attracted the highest RWI of 3.25 as the most preferred feature, while “water installation, cable works and related installation without PVC applied” attracted the lowest RWI of 2.36.
Further analysis indicated that three out of the eight identified attributes had positive RWI deviations about the mean of RWI: “use of materials that protect against the local weather condition,” “use of durable materials” and “surfaces are treated with materials that are indoor-climate certified.” The implication of this is that the level of willingness of developers for each of the features was higher than the average willingness for green features relating to “materials use and conservation.” The deviations about the mean of RWI for the respective features were 0.57, 0.33 and 0.30, respectively. The level of willingness expressed by developers for the aforementioned features is not unexpected. This is probably owing to the desire of developers to use materials that will enhance the reduction of capital and operating costs and ensure the durability of buildings (property investments).

4.2.2 Water, rainwater and sewage. The result of the analysis carried out on the developers’ level of willingness for green features relating to “Water, rainwater and sewage” is as presented in Table III. The result showed that “Water saving toilet and bath facilities” attracted the highest RWI of 3.95 and ranked as the most preferred feature, while “Design for dual plumbing” with RWI of 2.25 ranked least in this category of features. The average RWI for this category of features was 3.51. Other features with RWI higher than the overall average (RWI) were “Water efficient plumbing features,” “Availability of pressure reducing mechanisms on the plumbing features,” “Collection of rainwater for utilization to lessen pressure on potable water” and “Waste water reutilization.” The result showed that the developers were willing to invest in most of the green features in this category. The level of willingness to invest as expressed by developers for these features may be explained by a numbers of reasons. Perhaps, the most significant was that the developers were aware of the high demand on the path of residents to occupy buildings with regular water supply owing to the acute water shortage in some sections of the study area.

It is also important to carefully consider the feature relating to “water, rainwater and sewage” with RWI lower than the average. The feature was “Design for dual plumbing” with a negative deviation about the mean of –1.26. The implication is that the level of willingness...
expressed by developers for the feature is far below average. The level of willingness expressed by developers for this features is not unexpected owing to the extra cost of installation and higher cost of maintaining the feature.

4.2.3 Indoor air quality. In order to assess the level of willingness expressed by developers to invest in green features relating to “indoor air quality,” the RWI of the features was assessed and the result is as revealed in Table IV. From the table, it can be seen that the highest RWI was 4.14, while the lowest is 2.15. The feature with the highest RWI is “location of air intake that are far from sources of pollution” while “mechanical ventilation of enclosed parking areas” had the lowest. The average RWI for this group of features was 3.46. Other features with RWI higher than the average were “building design to utilize natural and cross ventilation” (RWI = 4.12), “building design which avoids the need for air condition” (RWI = 4.05) and “indoor materials that are less toxic” (RWI = 3.95). Each of the features in this category thus had a positive deviation about the mean of RWI. The implication of this is that the degree of willingness of developers to invest in these features is higher than the average degree of willingness to invest in green features relating to “Indoor Air Quality.” The deviations about the mean of RWI for the above features were 0.68, 0.66, 0.59 and 0.49, respectively. On the other hand, other features: “Building effective local exhaust into equipment rooms” and “Mechanical ventilation of enclosed parking areas” had negative deviations implying that the level of willingness of developers to invest in the features was lower than the average RWI for features relating to “Indoor Air Quality.” The results showed that developers were more inclined to invest in features relating to occupants comforts than features associated with the maintenance of machinery.

4.2.4 Site selection, site design and landscape ecology. Features analyzed in this section are those related to combating environmental imbalances through the proper siting and efficient design of energy and ecosystem. The result of analysis carried out on the level of willingness of developers to invest in this category of features is as shown in Table V. The result showed that “Flexibility of design to allow easy conversion of building” had the highest RWI of 4.02, while “Sustainable landscaping” had the least RWI of 2.21. Further analysis indicated that five of the features had positive deviations about the mean of RWI. The features were ‘Flexibility of design to allow easy conversion of building,’ “Position of building relative to complementary land use,” Sustainable transportation,” “Ease of access to technical installation” and “Ease of building facilities inspection.” This implied that the level of willingness of developers for these features was higher than the average level of willingness for features relating to “Site selection, site design and landscape ecology.” The level of willingness attracted by “The flexibility of design to allow for easy conversion of building” is not unexpected owing to the desire of investors to adopt the design that can easily accommodate conversion to suit users’ requirement.

4.2.5 Building ecology, waste and recycling. This section focuses on features that reduce, reuse and recycle building materials, conserve natural resources and reduce emissions associated with manufacturing and transporting raw materials. The level of willingness of

<table>
<thead>
<tr>
<th>Features</th>
<th>RWI</th>
<th>RWI – RWI</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location of air intake that is far from sources of pollution</td>
<td>4.14</td>
<td>0.68</td>
<td>1</td>
</tr>
<tr>
<td>Building design to utilize natural and cross ventilation</td>
<td>4.12</td>
<td>0.66</td>
<td>2</td>
</tr>
<tr>
<td>Building design which avoids the need for air condition</td>
<td>4.05</td>
<td>0.59</td>
<td>3</td>
</tr>
<tr>
<td>Indoor materials that are less air toxic</td>
<td>3.95</td>
<td>0.49</td>
<td>4</td>
</tr>
<tr>
<td>Building effective local exhaust into equipment rooms</td>
<td>2.36</td>
<td>−1.10</td>
<td>5</td>
</tr>
<tr>
<td>Mechanical ventilation of enclosed parking areas</td>
<td>2.15</td>
<td>−1.31</td>
<td>6</td>
</tr>
</tbody>
</table>

**Table IV.**

Indoor air quality

Note: RWI = 3.46
developers to invest in features relating to “Building Ecology, Waste and Recycling” is as presented in Table VI. It can be seen from the table that “Control of Site Pollution” ranked first with RWI of 4.10, while “Construction, renovation and demolition waste management policy” ranked last with RWI of 2.18. The average RWI for all the features in this category was 2.91. Other features with RWI higher than the average were “Freedom of building area from contamination,” “Right channelization of water drains” and “Availability of stormwater management.” Other features in “Building Ecology, Waste and Recycling” had lower RWI than the average RWI for all features in the group.

The result of the analysis, as shown above, suggested that the responding developers were more willing to invest in features related to occupants’ comfort than features that were of environmental benefits. This was probably owing to the desire of the investors to always attract and retain tenants in their investment properties.

4.2.6 Energy conservation. In this subsection, ensuring the provision and sustenance of energy is the focus as this is one of the main goals of green building. The degree of willingness of developers to invest in features relating to energy efficiency is as illustrated in Table VII.

<table>
<thead>
<tr>
<th>Features</th>
<th>RWI</th>
<th>RWI – RWI</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>The flexibility of design to allow easy of conversion building</td>
<td>4.02</td>
<td>1.25</td>
<td>1</td>
</tr>
<tr>
<td>The position of building relative to complementary land use</td>
<td>3.85</td>
<td>1.08</td>
<td>2</td>
</tr>
<tr>
<td>Sustainable transportation</td>
<td>3.90</td>
<td>0.83</td>
<td>3</td>
</tr>
<tr>
<td>Ease of access to technical installation</td>
<td>3.08</td>
<td>0.31</td>
<td>4</td>
</tr>
<tr>
<td>Ease of building facilities inspection</td>
<td>3.05</td>
<td>0.28</td>
<td>5</td>
</tr>
<tr>
<td>Workspace sufficiency</td>
<td>2.45</td>
<td>0.32</td>
<td>6</td>
</tr>
<tr>
<td>Availability of controllable blinds that prevent glare at visual display terminals</td>
<td>2.42</td>
<td>-0.35</td>
<td>7</td>
</tr>
<tr>
<td>Good lighting control</td>
<td>2.41</td>
<td>-0.36</td>
<td>8</td>
</tr>
<tr>
<td>Sufficient acoustic privacy</td>
<td>2.38</td>
<td>-0.39</td>
<td>9</td>
</tr>
<tr>
<td>Access to daylight penetration</td>
<td>2.35</td>
<td>-0.42</td>
<td>10</td>
</tr>
<tr>
<td>Shading of glazing achieved when necessary</td>
<td>2.34</td>
<td>-0.43</td>
<td>11</td>
</tr>
<tr>
<td>Smart transportation options, including access to public transit, along with bicycle racks, signage and storage facilities</td>
<td>2.30</td>
<td>-0.47</td>
<td>12</td>
</tr>
<tr>
<td>A green common area is included in each main plot of land</td>
<td>2.25</td>
<td>-0.52</td>
<td>13</td>
</tr>
<tr>
<td>Sustainable landscaping</td>
<td>2.21</td>
<td>-0.56</td>
<td>14</td>
</tr>
</tbody>
</table>

Table V.
Site selection, site design and landscape ecology

Note: RWI = 2.77

<table>
<thead>
<tr>
<th>Features</th>
<th>RWI</th>
<th>RWI – RWI</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control of site pollution</td>
<td>4.10</td>
<td>1.19</td>
<td>1</td>
</tr>
<tr>
<td>Freedom of building area from contamination</td>
<td>4.05</td>
<td>1.14</td>
<td>2</td>
</tr>
<tr>
<td>Right channelization of water drains</td>
<td>3.96</td>
<td>1.05</td>
<td>3</td>
</tr>
<tr>
<td>Availability of stormwater management measures</td>
<td>3.01</td>
<td>0.05</td>
<td>4</td>
</tr>
<tr>
<td>Noise from installations is kept moderate and under control</td>
<td>2.65</td>
<td>-0.26</td>
<td>5</td>
</tr>
<tr>
<td>Wastewater is treated from sinks and showers</td>
<td>2.55</td>
<td>-0.36</td>
<td>6</td>
</tr>
<tr>
<td>Means of waste diversion from living areas where it could be toxic</td>
<td>2.51</td>
<td>-0.40</td>
<td>7</td>
</tr>
<tr>
<td>Facilities for storing and handling recyclable materials</td>
<td>2.37</td>
<td>-0.54</td>
<td>8</td>
</tr>
<tr>
<td>Availability of suitable measures to ensure that food or food waste is well contained</td>
<td>2.35</td>
<td>-0.56</td>
<td>9</td>
</tr>
<tr>
<td>Availability of collection points for sorting wastes into paper, glass, metal and plastic for treatment</td>
<td>2.33</td>
<td>-0.58</td>
<td>10</td>
</tr>
<tr>
<td>Construction, renovation and demolition waste management policy</td>
<td>2.18</td>
<td>-0.73</td>
<td>11</td>
</tr>
</tbody>
</table>

Table VI.
Building ecology, waste and recycling

Note: RWI = 2.91
It can be seen from the Table that “Availability of contingency plans for both short-term and long-term power failure” ranked first with highest RWI of 4.35, while “Design for energy efficient building whose components could be dismantled for re-use and recycling” ranked last with RWI of 1.84. The average RWI of features relating to “Energy Conservation” was 2.54. The analysis as revealed in the Table also revealed that eight of the eleven features in this group of green features had RWI less than the average. The features were “Use of natural lighting systems,” “Use of solar cells, winds or photovoltaic means for power supply,” “Energy recovery ventilation systems,” “Use of natural cooling systems” and “Grow of natural vegetation in the surrounding environment. The implication was that these features did not attract a high level of preference by the developers. The degree of willingness attracted by “Availability of contingency plans for both short-term and long-term power failure” is not unexpected owing to incessant power failure experienced in the study area. It was established that residents in the study area required additional power source owing to the inefficiency of the power supply system which seemed to be erratic in the study area.

4.2.7 Owner and occupant education. This section focuses on the analysis of green features relating to the use, operations and maintenance of buildings. The response of developers on the level of their willingness to invest in features relating to “Owner and occupant education” is as revealed in Table VIII.

The result showed that the average RWI for the aggregate features was 3.34. The result revealed that “Availability of tenants sub-metering” attracted the highest RWI of 4.79 closely followed by “Availability of regular procedure for checking and fixing leaks” with RWI of 4.51. Other features with RWIs higher than the average were “Availability of regular maintenance schedule” (4.12), “Availability of emergency response manual” (4.05) and “Availability of readily available operating manual covering operating instructions for all services equipment that may affect the energy consumption” (3.86). Each of the features in this category thus had a positive deviation about the mean of RWI of all features in the group. The implication of this is that the level of willingness of developers to invest in these features is higher than the mean of the aggregate features relating to “Owner and occupant education.” It was also observed that the majority (7 out of 12) attracted RWIs lower than the average implying that developers were unwilling to invest in features focusing on the enlightenment of the use and operation of green buildings.

4.2.8 Developers’ willingness to invest in different categories of green features. The developers’ willingness to invest in different categories of green features is evaluated in this subsection. The RWI for each of the features is as presented in Table IX. Also shown in the
Furthermore, the deviation about the mean of each feature was also calculated to measure the scatter about the mean. The result showed that the average RWI for green features was 3.32. The result indicated that “Water, rainwater and sewage” attracted the highest RWI of 3.51, while “Energy conservation” ranked least with RWI of 2.54.

Further analysis indicated that three of the seven identified have positive deviations about the mean RWI of the green features. These features were “Water, rainwater and sewage,” “Indoor Air Quality,” “Owner and occupant education”, suggesting that the degree of willingness of developers to invest in each of the features is higher than aggregate (mean) RWI for green features. The higher degree of willingness for these features over other categories of green features is explained by a number of reasons. Perhaps, the most significant was that the features were less capital intensive and more preferred by investors whose major goals was to minimize costs in order to maximize profits. The result also showed that the RWIs for all green features were above average (2.50 out of 5.00).

5. Implications and conclusion
The study presented an examination of the degree of willingness of developers to invest in green features in Abuja, the federal capital of Nigeria. The RWI was used to determine the
developers’ level of willingness to invest in seven elements of green features. The results revealed that the level of willingness to invest in all features was above average. Meanwhile, features that were less capital intensive such as “Location of air intake that is far from source of pollution,” “Building design that utilize natural and cross ventilation” and “Building design which avoids the need for air condition” attracted higher developers’ level of willingness than features such as “Mechanical ventilation of enclosed parking area,” “Construction, renovation and demolition waste management policy,” and “Design for energy efficient building whose components could be dismantled for re-use and recycling” that are more capital intensive.

To encourage the property developers to invest in green features, particularly the ones that are more capital intensive, government and other stakeholders in the green movement should intensify efforts in enlightening the developers and investors on the long-term benefits of incorporating the features. Investing in features such as “Design for dual plumbing,” Design for easy access to technical installations’ “Facility for storing and handling recyclable materials” and “Building ecology, waste and recycling” among other capital-intensive features will bring long-term economic benefits to investors in terms of low cost of maintenance.

The result also found that developers were more willing to invest in green features that are associated with occupant comforts such as “Location of air intake far from sources of pollution,” “Control of site pollution,” “Freedom of building area from contamination” and “Use of materials that protect against local weather condition” attracted greater level of willingness to invest (RWI) from the developers than other features that confer more of environmental benefits. Komolafe et al. (2016) also substantiated that developers and investors placed more priority on features linked to occupant use benefit rather than features that are environmentally friendly.

There is the need to educate developers on the need to embrace green features that are environmental friendly such as “Green common area,” “Design for energy efficient, deconstruction and recycling” “Use of solar cells, winds or photovoltaic means for power supply,” “Availability of collection points for sorting wastes into paper, glass, metal and plastic for treatment” and “Construction, renovation and demolition waste management policy” and others. As earlier advocated (see Komolafe et al., 2016), the parliamentary arms of all tiers of government should formulate environmental policies and laws that will entrench sustainable practices in the building industry. This will not only enhance the comfort and productivity of users but also ensure the sustenance of ecosystem for the survival of humankind.

References


**Corresponding author**
Matthew Oluwole Oyewole can be contacted at: wolesike@yahoo.com