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Sustainable Management Practice (SMP) of Green Features in Office Property in Lagos, Nigeria

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Abstract

In this study, we examine the adoption of sustainable management practice (SMP) for green features in an office building using Lagos office property as a case study. The opinion of the professional property managers was sampled, and their responses were analyzed by weighted mean score (WMS), one simple test statistic (t-stats), severity index (S.I.), and factor analysis model. The study discovered that while energy-efficient related green features were the most incorporated, property managers often manage *the efficient use of spaces* among other green features in the office property. The property managers are yet to fully adopt the SMP, but *sustainable resource management* and *repair and replacement maintenance management* were highly considered among the SMP. The challenges of SMP were categorized into three broad barriers: *GB project cost/finance*, *economic/market expectation,* and *professionalism/institutional* barriers. We concluded that the country's property managers are yet to adopt SMP fully. We recommended the integrated GB practice advocacy, encouragement of strong institutional backing for developing the country's GB rating tools, and professionalism for SMP to thrive in the country.

Keywords: sustainability, green building, green features, management practice, office property

1. Introduction

The concept of 'sustainability' has gained the interest of numerous disciplines in recent years. The sustainability concept birthed the introduction of green building (GB) practice in the real estate industry, and the adoption rate has been on the increase. The upsurge in the global adoption of green construction cannot be disconnected from the global sustainability agenda, which encourages property development that is socioeconomically sustainable and environmentally responsible (United Nations, 2021). In some emerging economies such as Nigeria, evidence of green building developments has been witnessed, but very few are scattered across the major cities. An example of such a building is the 'Heritage Place', the first green office building developed by Nigeria's FCMB Group Plc. in the Lagos property market (Sotunde, 2014). Also, a respectable number of newly constructed buildings, including office properties with some elements of green features, are emerging (Nduka & Ogunsanmi, 2015; Komolafe & Oyewole, 2105; Dalibi et al., 2017). Specifically, Gou (2016) study argued that office property characterized by green features of low emitting materials, energy-efficient equipment, and appliances exhibited outstanding performance.

Unsurprisingly, developed economies such as the US and the UK are leading the league in adopting GB practice. This is because those countries, over the years, have developed resources and human capacities toward green construction and sustainable management practice through a rating system. The rating standard ensures that buildings' construction and management are green and conform to global best practices. The emphasis on compliance with best practices leads to a recommendation by the World Green Building Council (WGBC) on sustainable management practice (SMP) comprising sustainable procurement, sustainable operation, resources management, repair and maintenance, and environmental health (Aghili et al., 2016; Gunasekaran, Irani, & Papadopoulos, 2013). Surprisingly, in developing countries such as Nigeria, green construction regulations and management practices are yet to be standardized, and little is known about the management style adopted by property managers in the country.

This was one of the reasons why Nduka & Sotunbo (2014), in their work, proposed the possible adoption of Leadership in Energy and Environmental Design (LEED), a US green rating system, in the Nigerian construction industry. Similarly, Atanda & Olukoya (2019) suggested a developed framework that reflects the local inputs to improve sustainability criteria for the Nigerian green building rating system. Nevertheless, up to date, there has been no local measure or rating standard for green construction in the country, and the management practice of the eco-friendly property type is left to the property manager's expertise and experience, which in many cases are carried out based on manager's discretion and may hamper the conformity to the global best practice. Meanwhile, Nduka & Ogunsanmi (2015) attributed the barriers to sustainable building practice to include lack of awareness, expertise, and high cost. A study by Alohan & Oyetunji (2021) posited that the support for GB practice by professionals is weak, as less than 50 percent believed in GB practice advocacy. From the investor's point of view, Berawi et al. (2019) noted limited experience and rewards as major barriers to the building owner. However, Chukwu et al. (2019) stressed the need for capacity building if the country is to compete and gain global relevance in striving for sustainability agenda in the construction industry among nations.

Despite the absence of rating standard, evidence of green-like property types has been affirmed in some major cities, including the Lagos property market (Alohan & Oyetunji, 2021; Chukwu et al., 2019; Komolafe & Oyewole, 2015). Lagos property market and, by extension, its office submarket host over 60 percent of heads and branch offices for public and private institutions. It is one of the experimental cities for green/smart city development and remains a real estate investment choice. The office property market is experiencing an upsurge in the new supply of properties with green features, which aim at contributing to the actualization of Net-Zero carbon emission strongly pursued by the United Nations sustainability agenda (United Nations, 2021). Despite the growing cases of green-like office property type, little is known about the style of management practice deployed and the level of sustainable management practice (SMP) adoption.

Meanwhile, green features in purposely built office properties have made its management practice more dynamic and strategic than the conventional property management practice. The effective and efficient management practice of property that possesses green features not only contributes significantly to solving social, economic, and environmental sustainability issues, but SMP also is key to optimizing the earning capacity of a property, prolonging the building's economic lifecycle, enhancing the building performance and improve user's experience and satisfaction. The sustainability significance of property management is emphasized by Illankoon et al. (2017) study, ranking building management as one of the key credit criteria considered in the international GB rating tools. However, the significance of this study is the response to the dearth of literature on the SMP in the Nigerian context. The study, however, explores property managers' involvement in green features in office property management, adopting the sustainable management practice (SMP), and attendance challenges using the Lagos office property market as a case study. The findings provide useful information for policy guidance and implications geared towards improved sustainable property management practices (SMP) in the Nigerian real estate industry.

2. Literature Review

Green building (GB) has some critical sustainability elements that enhance its eco-friendly performance. As United State Green Building Design (USGBD) pointed out, the primary components of green construction entail sustainable site design, water conservation and quality, indoor environmental quality, conservation of energy, environmental materials, and resources. However, different rating systems exist across countries for measuring the extent to which building is green. For instance, Building Research Establishment Environmental Assessment Methods (BREEAM) rating system is used in the United Kingdom, the United States operates Leadership in Energy and Environmental Design (LEED), Japan and Hong Kong apply Comprehensive Assessment System for Building Environmental Efficiency (CASBEE) and Comprehensive Environment Performance Assessment Scheme (CEPAS) rating standard respectively (Zhang et al., 2019; Aghili et al., 2016). Illankoon et al. (2017) highlighted key credit criteria of GB across international ratings as site, energy, water, indoor environment quality, material, water, and management. Nevertheless, there is universal consensus on the sustainable features incorporated into building construction to qualify it as completely or partially green (Zhang et al., 2019; Aghili et al., 2016).

By examining the features of GB, international agencies such as US Green Building Council (USGBC, 2009) and The United States Environmental Protection Agency (USEPA, 2016) identified its unique features as a recycling water system, a natural building that tends to rely on the use of renewable resources more than technology, a passive solar design which uses solar energy for the heating and cooling of living spaces, green building (renewable) materials, green roof, green walls and living architecture which compress the integration of ecological functions into the building design and constructions among others. The green features provide socio-economic benefits to the buildings, including office property and its neighborhood in general. Ragheb, El-Shimy & Ragheb (2016) explained that the low-energy feature is committed to reducing greenhouse gas emissions and promoting renewable energy resources. Also, the net zero energy and passive building design features optimize the heating, ventilation, and air conditioning (HVAC) system. The indoor air quality and ventilation features enhance the occupant's health and improve indoor environment quality. Green roofs absorb rainwater, provide insulation and create a habitat for wildlife. Green wall introduces plants on the building facade, thereby increasing the organic mass on the site. Compared to the convention office property, the green features possessed by office property have made the property unique, requires a strategic sustainable management approach.

The sustainable management practice (SMP) is summarised in five property management activities by Aghili et al. (2016): sustainable procurement, sustainable operation, repairs, maintenance management, resources management, and environmental health. Sustainable management practice is critical to a property's physical, eco-friendly, and economic lifecycle. That is why the work of Lam (2020) advocated the need to encourage a sustainable acquisition process of building materials, operations, and services to ensure that building development creates social and economic values that meet users' satisfaction and enhance the economic life cycle of the building at minimum harm to the environment. The advocacy was supported by the argument of Opoku (2019), who posited that the traditional rule of building materials procurement of the *lowest price wins the bid* should be neglected, thereby focusing on reuse, recycling, and reduction of waste in an eco-friendly manner. In spite, the rate of adoption of SMP, especially in developing countries, has suffered a setback; reasons attributed to barriers such as burdensome implementation, lack of supported atmospheres, resistance to change, inadequate knowledge and information, negligence, high cost of green building options, insufficient supervision, lack of awareness, low availability of green products on the market, and lack of building management role (Piller & Nyoni, 2022; Wimala et al., 2016; Hwang & Tan, 2010).

Meanwhile, the sustainable management practice does not end at the acquisition, procurement, and operation of building construction stages but extends to repairs, maintenance, and resource management. Willer et al. (2021) noted that the procurement of materials and services spans the entire lifetime of the building project, including the post-property development stage. The post-development stage of building is the longest, critical to building functionality and performance, and its success/failure relies heavily on the property management style. In Nigeria's real estate industry, the green building practice is lagging, and the hardest hit is on the sustainable management practice (Chukwu et al. 2019). A few local studies examined the country's green building practices focused primarily on architecture, construction, prospects, and adoption challenges. While another critical aspect of GB practice, such as SMP, remains un-investigated (Alohan & Oyetunji, 2021; Atanda & Olukoya, 2019; Chukwu et al., 2019; Dalibi et al., 2017 Nduka & Ogunsanmi, 2015; Komolafe & Oyewole, 2015; Nduka & Sotunbo, 2014).

From the Nigeria perceptive, Dalibi et al. (2017) and Komolafe & Oyewole (2015) affirmed the evidence of real estate property with green features attributed and discovered that space users demonstrated a strong preference for green property over the conventionally built property. The authors highlighted properties' most preferred green features, including energy efficiency systems, building envelope, water efficiency systems, indoor environmental quality, and day-lighting systems. Dalibi et al. (2017) further suggested incorporating the preferred green features in the building action plan across the country. However, concerns have been raised about the challenges of GB practices in the country. For instance, a study by Nduka & Ogunsanmi (2015) probed the barrier to GB adoption and pointed out the prominence of low levels of awareness among the stakeholders and the users in the real estate sector. Dahiru, Dania & Adejoh (2014) added lack of enabling environment in the form of policy or legislation that will encourage prospective clients to use GB, a shortage of technology and technical know-how, and a high-cost GB project development

Similarly, the findings of Chukwu et al. (2019) agreed on the dearth of human capacity development in GB practice and stressed the need for capacity building of professionals in the industry. Alohan & Oyetunji (2021) discovered that less than 50 percent of the professionals supported the advocacy for GB practice, creating a major hindrance to GB development. However, Nduka & Sotunbo (2014) study recommended the adaptation of Leadership in Energy and Environmental Design (LEED) and suggested the establishment of the Green Building Council of Nigeria (GBCN) to regulate GB practice in the country. Nigeria, Atanda & Olukoya (2019) developed a framework for assessing GB practice regulation in the country. In summary, research efforts on GB practice in Nigeria have been directed to design, construction and operation, while little is done on SMP of the green features office property. Meanwhile, a study by Aghili et al. (2016) argued that while GB design remains the top debate topic in the public domain, management style is the key to a successful, high-performing, and eco-friendly building. The lacuna in Nigeria has become the research focus, and the Lagos office market is one of the most developed built environments in the country.

3. Research Method

The study is quantitative, and a non-probabilistic sampling technique was employed. The study carefully selects estate surveying and valuation (ESV) firms that had involved/currently managing office property with green features. The target population was identified through a reconnaissance survey and the referral sampling technique. A total of 96 ESV firms participated in the questionnaire survey exercise, out of which 63 valid questionnaires were retrieved, giving a response rate of 80.77%. The responses were analyzed by simple frequency distribution (SFD), percentage (%) estimation, weighted mean score (WMS), principal component factor (PCF) analysis, one-sample test statics (t-stats), and severity index (S.I) for ranking purposes. Thus, the parameters scale measurement and the mathematical expression for the weighted means score (WMS) and severity index (S.I) are further discussed in *Eq. 1 & 2,* respectively.

Weighted mean score (WMS) is used to rank the responses on the types of green features managed by ESV firms in the office property and the level of adopting sustainable management practices. A 5-point Likert measuring scale was adopted, ranging from the least weighted option: 1-Very Low (VL), 2- Low, 3-Moderate (M), 4-High (H), and 5- Very High (VH). The WMS is mathematically expressed in Eq. 1

$$\text{WMS} = \frac{Wn5 + Wn4 + Wn3 + Wn2 + Wn1}{N} \quad (1)$$

Where WMS is the weighted mean score, W denotes the assigned weight to the scale (1-lowest to 5-Highest), and N represents the total number of samples.

The severity Index (S.I) is used to determine how the identified challenges severely hindered the adoption of sustainable management practices of office property in the study area. The S.I. is expressed in Eq. 2 and estimated in percentage (%).

$$S.I = \sum a\left({}^{n}/_{N}\right) * 100 \quad (2)$$

Where a is the constant expressing weighting given to each response (ranges from scale 1 (Not severe) to 5 (Most severe)), n is the frequency of the responses, and N is the total number of responses. However, the rating is presented in Table 1.

Table 1. Measurement scale for severity index (S.I)

Scale	Index	Percentage (%)	Measurement Scale
5	0.70 & above	70 & above	Highly Severed
3	0.40 – 0.69	40 – 69	Moderately Severed
1	0.39 & below	39 & below	Less Severed

4. Result and Discussion

The study examines the forms of green features commonly characterized by office property, and the result is presented in Table 2. The analysis shows that some office properties in the study area have an element of green features but varying degrees of incorporation. The *energy-efficient lighting and appliances* are a prominent green attribute of office properties in the study area. The green feature has WMS 3.9811 and is ranked in the first position. Other highly green features characterized by the office property are *alternate power sources such as solar or wind power (3.9535)* and *landscapes planned to maximize passive solar energy (3.9534)*, occupying second and third positions, respectively. We also observed the WMS of some green features such as *efficient land use* (3.8537); *water-saving plumbing fixtures (3.8049), ventilation systems designed for efficient heating and cooling (3.6585); minimal harm to the natural habitat (36341);* and *adaptive reuse of older buildings (3.5610)* were also rated relatively higher.

Meanwhile, *locally obtained woods and stone* and *recycled architectural salvage* with respective MWS 3.3415 and 3.2683 were considered the least green feature attributes of office property. However, the statistical significance of the t-stats (p<.05) implies the importance of all the green feature items to the office building. The result further establishes that efficient energy-related green features are highly considered in the green design and construction of office property, and the property managers have a good knowledge and familiarity with the green features.

Table 2. Incorporation of green features into office property in Lagos

Green Building Features	WMS	t-Stats	Sig. (2-tailed)	Mean Rank
Energy-efficient lighting and appliances	3.9811	4.520	.000	1
Alternate power sources such as solar power or wind power	3.9534	3.855	.000	2
Landscapes planned to maximize passive solar energy	3.9021	4.520	.000	3
Efficient use of space	3.8537	5.877	.000	4
Water-saving plumbing fixtures	3.8049	6.767	.000	5
Ventilation systems designed for efficient heating and cooling	3.6585	4.765	.000	6
Minimal harm to the natural habitat	3.6341	4.483	.000	7
Adaptive reuse of older buildings	3.5610	5.804	.000	8
Non-synthetic, non-toxic materials	3.3659	4.817	.000	9
Responsibly harvested woods	3.3415	5.384	.000	10
Locally obtained wood and stone	3.3415	6.234	.000	11
Use of recycled architectural salvage	3.2683	4.585	.000	12

The efficient energy-related GB features were rated the most incorporated GB features for office property in the study area. This is because buildings consume many energy resources and emit junk toxic gas into the environment, causing huge environmental damage, and the ugly situation has received global attention. The significant adverse impacts of uncontrolled use/consumption of energy resources, characterized by building, especially the conventional types, necessitated intensified efforts on eco-friendly energy appliances. Such as using low-energy saving and carbon-emission appliances for cooling, heating, lighting and ventilation systems. The energy appliances are compact and powered by both main energy sources (public) and alternative (private) energy sources (solar or eco-friendly power plants). Similarly, Dalibi et al. (2017) noted that the preference for energy, water, indoor quality air, and cooling system was also rated higher by the users in F.C.T. Abuja. The careful consideration given to efficient energy-related green features could be seen as a response to a global call for a sustainability action plan on Net zero carbon to rescue the planet earth from destruction (United Nations, 2021).

In Table 3, we investigate the level of involvement of property managers in managing the green features characterized by the office property. The result of the WMS showed that except for the efficient use of space, the level of management of property managers is relatively below the global expectation. The involvement in managing *the efficient use of space* was the highest, having WMS 4.2725, and occupied the first position. The result also showed that the property managers engaged in the management of *water-saving plumbing fixtures (3.3333); energy-efficient lighting and appliances (3.3261); adaptive reuse of older buildings (3.3256),* and *minimal harm to the natural habitat (3.2511)* to a moderate extent. However, a very low level of participation was noted for other green features such as the *use of recycled architectural salvage (1.6944), responsibly harvested woods (1.4444),* and *non-synthetic, non-toxic materials (1.3611),* ranked the least position. The higher involvement of property managers in the *efficient use of space* indicates the area of expertise and competence of the managers in the real estate industry. The need for effective involvement by property managers is vital to green features office property as indicated by the statistically significant t-stats ($p<.05$) for all the items

Table 3. Involvement in the management of green features of the office property in Lagos

Green Building Features	WMS	t-Stats	Sig. (2-tailed)	Mean Rank
Efficient use of space	4.2725	7.748	.000	1
Water-saving plumbing fixtures	3.3333	5.538	.000	2
Energy-efficient lighting and appliances	3.3261	3.876	.000	3
Adaptive reuse of older buildings	3.3156	4.105	.000	4
Minimal harm to the natural habitat	3.2511	5.731	.000	5
Alternate power sources such as solar power or wind power	2.8889	4.781	.000	6
Landscapes planned to maximize passive solar energy	2.8611	6.026	.000	7
Ventilation systems designed for efficient heating and cooling	2.8333	6.054	.000	8
Locally obtained wood and stone	2.7505	6.788	.000	9
Use of recycled architectural salvage	1.6944	5.381	.000	10
Responsibly harvested woods	1.4444	5.441	.000	11
Non-synthetic, non-toxic materials	1.3611	4.930	.000	12

Meanwhile, the property managers are more actively participating in efficiently using space. The level of involvement in office space management could be linked to their primary professional calling. Optimum space management starts from the design stage, making the function of a property manager relevant from the conception to the completion stage of a building project. The higher level of engagement in sustainable uses of water supply and energy appliances could be from the procurement and maintenance (repair and replacement) perspectives. Also, the adaptive reuse of older buildings in sustainable ways is part of the sustainability measures adopted. However, the very low participation in the management of some green features such as recycling, reuse, and use of non-synthetic and non-toxic materials could result from a higher level of technicalities required, in which the property manager may lack competency.

The study identified the SMP components, namely sustainable procurement, sustainable operation, repairs, maintenance management, resources management, and environmental health (Aghili et al., 2016), and property managers were asked to rank their level of adoption for the office property. The result of the analysis is presented in Table 4. In order of frequency, the property managers ranked the level of adoptions of the SMP as thus: resources management (3.5853); repair and maintenance management (3.5316); sustainable operation (3.3532); sustainable procurement (3.2707) and environmental health (3.2153). Asides from the statistically significant t-stats ($p<.05$) recorded by SMP items, the result indicates that the level of adoption of *resources management* and *repair and maintenance management* were relatively high to a larger extent compared to other sustainable management practices such as sustainable operation, procurement, and healthy environment.

Table 4. Adoption of the sustainable management practice (SMP) for office property in Lagos

Sustainable Management Practise Style	WMS	t-Stats	Sig. (2-tailed)	Mean Rank
Resources management	3.5853	2.944	.000	1
Repair and Maintenance Management	3.5316	2.805	.000	2
Sustainable operation	3.3532	2.666	.000	3
Sustainable procurement	3.2707	2.527	.000	4
Environmental Health	3.2153	2.944	.000	5

It is evidenced that the sustainable management practice is being practiced by the property managers but not yet fully. The management activities such as resources management and repair and replacement maintenance were often considered among the property managers. The building resources such as space, energy, occupants, and building premises are critical to the sustainability agenda. For instance, energy resources demand a sustainable management approach for the building to continually contribute to net zero carbon and clean energy. In addition, beyond procurement, maintenance management such as repair and replacement of damaged green features is equally essential to prolong the high-perform and eco-friendly attributes for the building to maintain its social, economic, and environmentally sustainable relevance. The property managers also engage in the management practice of the other SMP, such as sustainable procurement, operation, and environmental health. This further indicates their familiarity and adoption of SMP for office property with green features despite the country's lack of regulatory rating standards. This could result from SMP contributing to the sustainability agenda, minimizing building operation costs, and maximizing investment return, as affirmed by Aghili et al. (2016).

Further analysis was conducted in Table 5 to identify the major challenges affecting property management practice in the study area. The level of the challenges was rated by severity index (S.I). The property manager expressed the severe influence of the itemized challenges on their level of adoption of sustainable management practices. However, the extent of the severity varies across the inherent challenges, with most of the challenges having a high level of severity **(S.I ≥70).** Some of the critical challenges with their corresponding S.I (%) were *high investment cost (83.67); investor's perception (83.66); high cost of GB materials (81.48); support/commitment from the management team (81.42), and market demand/expectation (80.47).* In addition, other challenges rated as *highly severe* to the adoption of SMP (% S.I) were the *Level of technology (76.70); Low financial budget for GB (74.28); Lack of support from the government (73.96); Low interest in sustainable GB development (73.44); Volatile economic environment (73.55); Inadequate technical know-how/expertise (72.42); Low of public awareness (71.68)* and *Low professional knowledge (71.49)*. Moreover, the levels of severity of some of the challenges were rated *moderately high (40<S.I.<70)*. The categories of the challenges were *Effective feedback mechanism (68.92), Lack of credible research (67.13), and Lack of data and building performance index (66.50)*. However, the barriers to the increasing adoption of SMP in the country are linked to the identified challenges, and all the identified challenges are critical to SMP, as shown by t-stats (p<.05).

Table 5. Challenges of management practice of the green building features in Lagos

Challenges	S.I (%)	t-Stats	Sig. (2-tailed)	S.I Rate
High investment cost	83.67	4.917	.000	
Investor's perception (Simple building)	83.66	4.520	.000	
High cost of GB materials	81.48	3.391	.000	
Support/commitment from the Management team	81.42	4.855	.000	
Market demand/expectation	80.47	3.483	.000	
Level of technology	76.70	4.197	.000	
Low financial budget for GB	74.28	3.520	.000	
Lack of support from the government	73.96	4.855	.000	***Highly***
Low interest in sustainable GB development	73.44	4.520	.000	***Severed***
Volatile economic environment	73.35	3.877	.000	
Inadequate technical know-how/expertise	72.42	4.767	.000	
Low public awareness	71.68	3.765	.000	
Low professional knowledge	71.49	3.483	.000	
Effective feedback mechanism	68.92	4.804	.000	
Lack of credible research	67.13	3.817	.000	***Moderately***
Lack of data and building performance index	66.50	4.917	.000	***Severed***

In Tables 6 & 7, factor analysis was conducted to harmonize the SMP challenges demonstrating a homogenous behavioural pattern. SMP challenges that are highly correlated and have a high likelihood of exhibiting similar severe behavior was grouped by a principal component factor (PCF). Before the extraction of the PCF, the data were subjected to suitability and adequacy tests, a prerequisite analysis for data screening, and a fitness test for factor analysis, and the result is presented in Table 6. The result showed that the data have an estimated Kaiser-Myer Olkin (KMO) value of .819 (81.9%), Bartlett's Sphericity (chi-square) value of 273.36, and a p-value of .000.

The result implies that the estimated KMO value (81.9%) is greater than the critical value (60.0%) and it is statistically significant (p< .05). Therefore, the data is, suitable, adequate and fit to run a factor analysis model

Table 6. Sample suitability and adequacy for principal factor analysis

Tests	Result
Kaiser-Myer Olkin (KMO)	0.819
Bartlett's Sphericity (chi-square) df	273.36
sig.	54
	0.000

Note: df donates degree of freedom, Significant (sig.) at 0.05 confidence Level

The factor analysis was performed using the varimax rotation model specification, and variables with an eigenvalue greater than .10 (egv > .10) were extracted. As presented in Table 7, three (3) principal component factors (PCFs) were extracted. The principal component factor one (PCF 1) has six (6) correlated variables with a total eigenvalue of 8.078, a total cumulative percentage of 43.410, and explains 24.474% variation of the model. The PCF 1 comprises a low financial budget for GB, high cost of GB materials, investor's perception (simple building), lack of support from the government, low interest in sustainable GB development, and support/commitment from the management team. Similarly, six (6) variables were loaded on PCF 2: market demand/expectation, level of technology, volatile economic environment, lack of support from the regulatory bodies, lack of data and building performance index, and low public awareness. PCF 3 is made up of four (4) variables insufficient professional knowledge, inadequate technical know-how/expertise, effective feedback mechanism, and lack of credible research PCF 2 and PCF 3 have respective total eigenvalue, cumulative, and variance explained as thus: 5.301 and 2.948; 51.982 and 59.611 and 10.003 and 8.933. Therefore, we named PCF1 as GB project cost/Finance barriers, PCF 2 as economic/market expectation barriers, and PCF 3 as *professionalism/institutional barrier*s.

Table 7. Categorisation of challenges to SMP for office property in Lagos

Factor Components	% Cumulative	% Variance	Rotated Factor Loading		
			PCF 1	PCF 2	PCF 3
Low financial budget for GB	27.479	27.479	.936		
High cost of GB materials	43.394	15.915	.930		
Investor's perception (Simple building)	53.336	9.942	.925		
Lack of support from the government	60.302	6.966	.901		
Low interest in sustainable GB development	66.723	6.420	.834		
Support/commitment from the Management team	72.959	6.237	.726		
Market demand/expectation	78.021	5.062		870	
Level of technology	82.717	4.696		.720	
Volatile economic environment	86.435	3.719		.691	
Lack of support from the regulatory bodies	89.541	3.106		.659	
Lack of data and building performance index	92.055	2.515		.622	
Low public awareness	94.404	2.349		.559	
Low professional knowledge	96.233	1.828			.800
Inadequate technical know-how/expertise	97.375	1.322			.796
Effective feedback mechanism	98.435	1.239			.792
Lack of credible research	100.000	1.207			.710

Model Summary			
Total Eigenvalue Extracted	**8.076**	**5.301**	**2.948**
Total % of Cumulative Variable Explained	**43.410**	**51.982**	**59.611**
Total % of Variance Explained	**24.474**	**10.003**	**8.933**

Extraction Method: Principal Component Analysis

Rotation Method: Varimax with Kaiser Normalisation

Rotation converged in iterations.

The high investment cost severity index is high, suggesting that the management of green buildings is expensive. Piller & Nyoni (2022) and Hwang & Tan (2010) explained that the GB project cost is a critical obstacle to sustainable development. The high cost of procurement, replacement, and repair of building materials is relatively higher in the country's volatile, orchestrated by high inflation and exchange rates crisis. The perception of investors toward green building development is another critical challenge to SMP. Berawi et al. (2019) work claimed that the stakeholders' perception on account of limited experiences and rewards risk is a great threat to GB development. The investor may see green building development as complex and technical, involving additional cost and uncertainty about the rate of market demand compared to the simple conventional office building.

Another severe challenge is the level of technology in the country. The country is still rated third world in technology development, and there is an acute shortage of technical-know how. Adequate and sustainable financing for managing and maintaining office property with green features also poses a great threat to SMP's success in office property. Green feature office property requires sustainable resources, repair, and replacement of damaged or spoilt facilities, and insufficient finance should not disrupt the process. Also, weak support from the government and the relevant professional bodies causes a setback in developing local GB measures and standards. Wimala et al. (2016) expressed that in addition to hurdles in awareness, knowledge, project cost, and financing, poor building management style challenges are also critical to successful GB practice. However, the challenges were categorized by the factor analysis model into three broad factors: GB project cost/Finance, Economic/Market expectation, and professionalism/institutional barriers.

5. Conclusion and Recommendations

Using Lagos as a case study, the study examines the adoption of sustainable management practice (SMP) of green features in the office property market. From the analysis result, the study concluded that green features, especially the energy efficient related green features, were widely incorporated in the office property. The level of adoption of SMP is low, and higher involvement of the property managers was observed for sustainable resources management and repair and replacement management. All the identified challenges were severe to SMP, with the prominent ones including the high cost of investment and building materials, investor perception of GB, weak institutional support, and technical issues. The challenges to SMP were further classified into three broad barriers: GB project cost/Finance, Economic/Market expectation, and professionalism/institutional barriers. We concluded that the SMP is yet to be fully adopted and, therefore, recommend the need to encourage sustainable management practice (SMP) through public sensitization, capacity building, strong support from the public and private institutions, and professionalism for the country to maintain global relevance in contributing to sustainability drives among the comity of nations.

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