

WEST AFRICA BUILT ENVIRONMENT RESEARCH (WABER) CONFERENCE
Knowledge, Interaction, People & Leadership

**PROCEEDINGS OF THE WABER 2017
CONFERENCE**

16th-18th August 2017

University of Ghana, Accra, Ghana

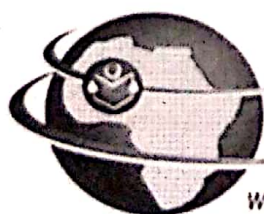
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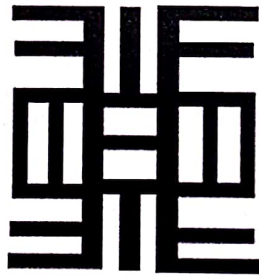
West Africa Built Environment Research Conference

Knowledge, Interaction, People & Leadership

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NEA ONNIM NO SUA A, OHU

"He who does not know can know from learning"

This is the Adinkra symbol of knowledge, life-long education and continued quest for knowledge. The Akan people in West Africa believe that the search for knowledge is a life-long process. This is evident from the Akan saying "Nea onnim sua a, ohu; nea odwen se onim dodo no, se ogyae sua a, ketewa no koraa a onim no firi ne nsa" which translates into "He who does not know can become knowledgeable from learning; he who thinks he knows and ceases to continue to learn will stagnate".

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Declaration

All papers in this publication have been through a review process involving initial screening of abstracts, review of full papers by at least two referees, reporting of comments to authors, revision of papers by authors and re-evaluation of re-submitted papers to ensure quality of content.

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INVESTIGATION INTO GREEN ATTITUDES TOWARDS SHOPPING MALLS' DESIGN IN MINNA, NIGERIA

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In Nigeria, the growing human population and its consequent demand for commercial activities have contributed to the design of numerous shopping arenas and complexes. This in turn has its force on the ecological status of the built environment; the phenomenon, which, has led to the quest for 'energy conscious', 'eco-friendly' and 'energy efficient' design approach. Although, various works have concentrated on environmental concerns and the need of greening the building industry, nevertheless, few works have focused on retail properties such as shopping centres. Meanwhile, the multifaceted environmental impact of this building type in the built environment is undoubtedly demanding attention. This paper investigated green attitudes towards the integration of eco-design features in existing shopping complexes in Minna metropolis. The aim is to promote eco-friendlier shopping centres that maximize energy resources and minimise the current environmental burden emanating from the commercial buildings in the retail sector. Shopping complexes in Minna were purposively selected based on zoning and their commercial activities. Initial findings show that the majority of the shopping centres do not undertake green initiatives. This is perceived to be as a result of the owners' interest. Results from the findings indicated that environmental sustainability of these buildings depends on adequate knowledge of energy efficiency needs and other factors such as the resource capacity and available capital perceived to influence environmental sustainability initiatives of the project. It concludes the need for these issues to be addressed in order to realize a greener retail industry where "green" initiatives are embraced and implemented more extensively.

Keywords: built environment, eco-design, energy efficiency, shopping complex, sustainability

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INTRODUCTION

The consideration regarding buildings' negative impact on the environment has indisputably become increased progressively in the few years. Consequently, the concept of green buildings has emerged along with huge multiples of environmental assessment methods and certification tools being introduced. Additionally, many studies such as Hara (2005); Ellison and Sayce (2007); Hinnells *et al.*, (2008); and Maneekum (2010) coupled with other investigations being carried are meant to present the advantages of committing to environmental concerns as an avenue of greening the industry. Nonetheless, very few of these studies and investigations have actually addressed the issue in association with retail properties such as shopping centres. Meanwhile, shopping centres are known to produce wastes and complex energy flow in abundance in such buildings.

Oladokun (2016) acknowledged that though several studies exist in respect of the causes of climate change and its effects on the environment yet, no direct focus on commercial buildings. A comprehensive overview of the attitude towards environmental concerns within a shopping centre context is therefore needed due to the paucity of studies in this area. This will hopefully function as a beginning spot for further deliberation on the issue (Maneekum, 2010). The issues that concern the environment such as climate change and global warming have significantly increase with much attention and main acceptance in the past few years. Meanwhile, along with this is the subsequent increase in consciousness and understanding of its implications on businesses.

Fundamentally, the environmental deprivation is undoubtedly negatively influencing businesses, irrespective of the industry. Moreover, the construction industry has been recognised as one of the most significant sector in combat with further environmental deterioration (Eichholtz *et al.*, 2009). According to Nelson (2008) buildings are considered to make significant contributions to environmental degradation due to their heavy energy consumption and carbon emissions both during their construction and lifecycle phase. Furthermore, Maneekum (2010) show that the feeling of corporate social responsibility (CSR) has steadily gained foothold among businesses within the construction industry which has recognized the implications of sustainability.

Maneekum (2010) further observed that the concept of "green buildings" has naturally emerged and numerous works in relation to commercial properties and offices have been carried out to know the potential financial benefits related to sustainable practices implementation. Therefore, environmental commitment and "green" investments among commercial property owners and built environment professionals involved are key to interpreting the cause of disparities between some property owners in implementing sustainable practices than others. Hence, the clarification about this event will aid in determining possible factors for low response to the event. Thus, appropriate steps can be taken to promote greener real

estate, commercial industry where “green” initiatives are embraced and implemented more extensively (Maneekum, 2010).

In Nigeria, shopping centres have become one of the most socially and environmentally influential forms of real estate. Evidences exist to demonstrate how shopping centres are increasingly perceived as a social interactive space for people involving a mixture of public and private services besides shops. In Minna, Nigeria, shopping centres could be perceived to act in an unsurprisingly significant part of a broader urban economic context. This is viewed by Maneekum (2010) as producing numerous job opportunities as well as creating benefits and added value for the citizens. Therefore, the paucity of previous studies on sustainability and eco-friendliness of shopping centres plainly implies a requirement of launching a discourse to encourage further sustainable practices implementation in the construction and delivery of commercial facilities. Therefore, this paper seeks to investigate the current state of environmental responsibility or obligation that exists within shopping centre design and operation sector.

Aim and Objective

The main purpose of this paper is to investigate the current state of environmental sustainability awareness prevailing among shopping centre designers, developers and operators in connection to the implementation of sustainability practices. The objective is to provide a comprehensive overview of the attitude towards environmental concerns within a shopping centre context.

LITERATURE REVIEW

Green Building

The emergence of two most serious threats that confront the world today are: the threat to the atmosphere and the biosphere, which are fundamentally urban and the solution is known and clearly understood (Low *et al.*, 2007). This requires the emergence of a green building movement in Nigeria, and the world as a whole, especially those countries who have not started the movement (Achyuthan and Balagopal, 2007). The world green building (WGB) movement started in early 1990 due to world global warming and climate change. It is a union of councils from around the world that aims to accelerate global sustainable building practices, (Aminu, *et al.*, 2010).

A Green building (GB) is a high-performance property that considers and reduces its effect on the environment and human health. Usually, a green building is designed to use less energy and water and to reduce the lifecycle environmental effects of the materials used. Thus, it is achievable through better choice of site, design, material, selection, construction, operation, maintenance, removal, and possible recycling, (Yuldelson, 2008, Aminu, *et al.*, 2010). GB exhibit high levels of environmental, economic, and engineering performance that include energy efficiency and conservation; materials and resource efficiency; occupant health and

productivity; transportation efficiency; and improved environmental quality including water, air, land, limited resources and ecosystems, (Foster *et al*, 2007, Emuze, *et al.*, 2012).

The terms 'Green Building' and 'Green Architecture' are used interchangeably and are often used when referring to the whole process and life-cycle of a building from the design, site selection, materials sourcing, construction, operation and ultimately decommissioning of buildings. Another term commonly used is 'sustainable construction' and this usually addresses the ecological, social and economic issues of a building in terms of its community (Kibert, 2005). This revolution is part of a paradigm shift toward sustainability, a growing realization that current ways of living, made possible mainly due to cheap and abundant fossil fuels, are not sustainable in the long term, (Aminu, *et al*, 2010).

A research that provided a detailed review of the GB guidelines in the USA, UK and Japan and analysed their impact on Indian guidelines show that many developed countries have made substantial progress in embracing the GB movement (Potbhare *et al.*, 2009). The study further noted that there is a great need to promote the development and adoption of GB guidelines in developing countries. The basic goal of GB outlined by the Department of Environmental Affairs and Tourism (2009) is to create an attractive and comfortable shelter that does not harm the earth in its manufacture or use. It is further stated that this goal is motivated by other goals, which include:

- i. Creating more desirable human experience;
- ii. Reducing impacts that arise during occupancy;
- iii. Reducing impacts on the environment of construction related activities, and
- iv. Reducing the impact of the structure at the end of its life (demolition).

Therefore, increasing the awareness of GB benefits in Minna and Nigeria as a whole could lead to less harm to the already damaged environment, and buildings would also have more positive impacts on users in terms of improvements of indoor and outdoor climate from reduced productions of building materials in the environment. However, environmental impact, whether positive or negative, is the result of man's actions and it often leads to changes in the environment that affect the availability of resources.

Sustainable Development

According to the World Commission on Environment and Development - WECD, (1987), sustainable development is the development that meets the needs of the present without compromising the ability of future generations to meet their own needs. It further states that human activity is only environmentally sustainable when it can be performed or maintained indefinitely without depleting natural environment. Furthermore, cost efficiency is a prerequisite for sustainability and there

are a number of key aspects to the design of green buildings (Snelling, 2009);

- i. Conservation of energy and resource
- ii. Ecological foundations and minimal site intervention
- iii. Reduction of infrastructure; road pipes, lighting
- iv. Elimination/reduction of materials and resource wastage.
- v. Elimination/reduction of toxic materials and process.
- vi. Use of renewable/biological material energy.
- vii. Use of safe, recycled materials and products.
- viii. Vapour-diffusive-air and wind tight construction
- ix. Super insulation and ecological thermal energy storage
- x. Use of natural (passive) heating and cooling
- xi. Use of natural lighting (for heat and energy saving)
- xii. Minimization of electro-magnetic fields
- xiii. Long life, low-maintenance, robust design
- xiv. Adaptable, inclusive (access to all) design
- xv. Green surrounded-design with nature and climate

The Link between Buildings and Environmental Concerns

According to Oladokun (2016) commercial properties can be stated to be conceptualized, built big and occupied for trading and other office functions. This makes the sector a focus on large scale for foreign investors whose purpose is to take the benefits of stream of income from its use and occupation. Hence, the commercial and real estate sector plays an indispensable role in sustainable growth. Globally, buildings are purportedly known to take in nearly 32% of the world's natural resources (Bonde, et al, 2009) while about 50% of all the hazardous carbon dioxide emissions arising from buildings can be found in the world's most developed countries (Wilkinson and Reed, 2005). This, coupled with the with the growing realisation on the topics of environmental decline in quality and the increasing consensus regarding social responsibility, the concept of sustainability has gradually gained foothold within the construction and real estate sector (Eichholtz, et al, 2009).

As a result, numerous rating tools, certification systems, building codes and standards have been introduced during the past years as an attempt to facilitate the "greening" of the industry (Eichholtz *et al*, 2009). The instruments have been distinguished and accustomed due to prevailing differences between various property asset types and also due to various market participants (de Francesco and Levy, 2008). For example, certification systems such as Leadership in Energy and Environmental Design (LEED) and Building Research Establishment Environmental Assessment Method (BREEAM) have earned international recognition and

increasingly demand by investors operating on the international market (Bonde et al, 2009).

However, new buildings entering the market are comparatively high standard due to the issue of the different means such as industry standards and evaluation tools. The critical issue with concerns is how the concept of sustainability and a green way of thinking can be fully unfolded to the existing building stock where most construction activities take place. Wilkinson and Reed (2005) stated the need for equal priority to be given to both new and existing building stock as both have the potential of negative environmental impacts. This view aligned with that of Pivo and McNamara (2005), who observed the possibility of existing building inventory to more than meet the improved tone of new buildings just by undertaking minor improvement measures.

Kats (2003) however, consider it relatively easier and less expensive to implement new standards on new building projects. Therefore, sustainable practices such as increased energy efficiency and reduction of greenhouse gas emissions are easier and more inexpensive to assume within the building and real estate industry (Nelson, 2008). Meanwhile, another widespread definition of a green building known as sustainable or high performance building is relatively hard to delineate. Nevertheless, efforts to provide a general description consisting of frequently recurring fundamentals have been made by a few numbers of scholars and institutions. Kats (2003) however, defined green buildings as utilizing resources such as water, energy, raw materials and land more efficiently than conventional buildings. Fundamentally, the primary purpose of green buildings is to trigger investments which are profitable and based on proven technologies in the area of energy efficiency and renewable energy technologies for non-residential buildings.

RESEARCH METHOD

To achieve the aim of this paper, several steps were taken to collect relevant information. Firstly, a thorough literature study on the subject matter was conducted. Information concerning green buildings; in terms of the definition, associated benefits and certification systems, and corporate social responsibility was obtained from publications and websites. The second step was the design of a suitable questionnaire in order to survey and assemble available information regarding the commitment of the architects and developers involved in the design and construction of shopping complexes in sustainable issues within their organization. The principal idea is to obtain a full impression of the ambition towards green initiatives of shopping centres.

The methodology for the second step of this study involves the data collection, identification of the participants and the data analysis. The data collection took place over several months and consisted of two phases: the pilot and the actual survey. The first step of the data collection process

consisted of a pilot survey to evaluate the wordings of the questionnaire prior to the final administration of the study instrument.

The survey assessed the participants' educational level, length of years in architectural practice, number of shopping mall design/construction projects directly involved as a professional, level of understanding of eco-friendly design, level of integration of eco-friendliness in design of shopping mall, number of eco-friendly shopping complex project designed and constructed in past years, barriers to designing and implementing eco-friendly shopping mall building, key focus areas concentrated upon during the design of shopping mall and level of utilisation of eco-friendly features in professional practice with regards to shopping mall projects.

The survey was developed by the researchers while the participants were purposively selected as architects and developers. The participants were randomly selected because they had participated in the design and construction of shopping mall complexes. A structured questionnaire was administered to the participants between April and July 2016. Participants were asked questions on their level of agreement on the key focus area they concentrated on while designing a shopping mall based on 5-Likert type scale ranging from "1" for "Strongly Disagree" to 5 for Strongly Agree, so as to determine level of relevance of eco-friendliness to them. Another part of the questionnaire elicited responses from the participants on the level of utilisation of eco-friendly features in their professional practice with regards to shopping mall projects based on 5-Likert type scale of 'No Utilisation (NU)', 'Negligible Utilisation (N)', 'Limited Utilisation (LU)'; 'Adequate Utilisation (AU)' and 'High Utilisation (HU)'.

Sample size

The sample size for this study is determined by the requirement of the study for obtaining accurate and authentic findings for reaching at ultimate conclusions (Fink, 1995). In the like manner, Bulmer and Warwick (1993) stated that "the size of the sample is more a thing of convenience", and a compromise among many genes (i.e. expenses and precision etc.) For this study, the sample size was determined from the formula adopted from Creative Research Systems (2003) and Czaja and Blair (1996) given as:

$$ss = \frac{Z^2 * (p) * (1-p)}{C^2}$$

Where:

Z = Z value (e.g. 1.96 for 95% confidence level)

P = percentage picking a choice, expressed as decimal
(.5 used for sample size needed)

C = confidence interval, expressed as decimal

Usually, in a study involving the use of surveys it is a common practice to seek a 95% confidence level or precision levels of 5%. Therefore, a confidence level of 95% was assumed with a confidence level (i.e. A significance level of $\alpha = 0.05$), $z = 1.96$ and a confidence interval (c) of $\pm 10\%$ deemed adequate. To determine the sample size for a given level of accuracy, Czaja and Blair (1996) suggested the worst case percentage picking a choice (p) should be assumed which is given as 50% or 0.5. On the basis of these assumptions, the sample size was calculated as follows:

$$ss = \frac{1.96^2 \times 0.5 (1 - 0.5)}{0.1^2}$$

$$ss = 96.04$$

The required sample size for the questionnaire survey was determined to be 96 professionals. Following this procedure of obtaining the sample size, a sample size of 100 participants was selected

DATA ANALYSIS

A total of 100 questionnaires were administered by hand to the participants through two research assistants who assisted in the data collection process. However, 74 valid questionnaires representing approximately 74% of the distributed questionnaires were retrieved. Data analysis was based on 74 total responses obtained from the survey. Reliability analysis (Table 1 and 2) was conducted to test the internal consistency and the scores on Cronbach's Alpha test for response indicated a score (i.e. 0.89 and 0.88) which exceed the accepted value for the alpha of the least of 0.60 for new scales (Nunnally, 1978).

Table 1: Reliability test on the key focus during the design of a shopping mall

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	Response scale	No. of Items
0.891	0.893	5	4

Table 2: Reliability test on the Level of utilisation

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	Response scale	No. of Items
0.884	0.884	5	13

The data were analysed with SPSS 20.0 using a number of descriptive and inferential statistics techniques to ascertain response consensus from the respondents. Relative importance index (RII) analysis was employed to analyse the responses in order to appropriately rank the responses of the respondents.

RESULTS AND DISCUSSION

Analysis was based on the researchers' survey data gathered. As previously pointed out, integration of eco-design features in existing shopping malls/buildings is a sustainable development, part of a social and technological system that provides for solutions for the tensions arising from disharmonious development. That is a development that meets the needs of the present without compromising the ability of future generations to meet their own needs (WCED, 1987). The results of the data collected through the survey are presented as follows:

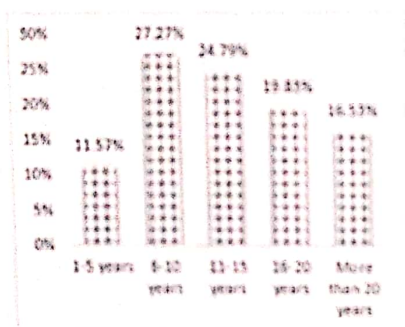


Figure1: Years in Architectural Practice

From figure 1 above, 11.57% of the Architects in Minna were in practice between 1 and 5years, while about 27.27% were in practice between 6 and 10years and 24.79% were in practice between 11 and 15 years. In addition, 19.83% of the architects were in practice between 16 and 20years, while 16.53% were in practice between 20years and above. This is an indication that number of architects in practice received commendable growth until last 6 years.

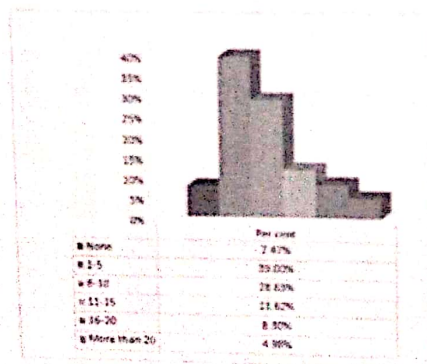


Figure2: Number of shopping mall design

From figure 2, shows that the architectural practitioners interviewed in Minna have been involved in the design of several numbers of shopping malls in Niger state. 7.47% of the practitioners have not involved in either shopping mall designs or construction. 39% have involved in shopping mall between 1 and 5, 28.63% have been involved in shopping mall design or construction between 6 and 10, while 11.62% have involved in design of shopping mall between 11 and 15. In addition, 8.30% practitioners administered questionnaire have been involved in shopping mall design up to 16 and 20, while about 4.98% have been involved in the design of shopping mall between 20 and above. Thus, it shows an assured growth and interest of the young architects in practice in the design of shopping mall till last 6years. It is also an indication of more interest in city beautification by the architects in practice.

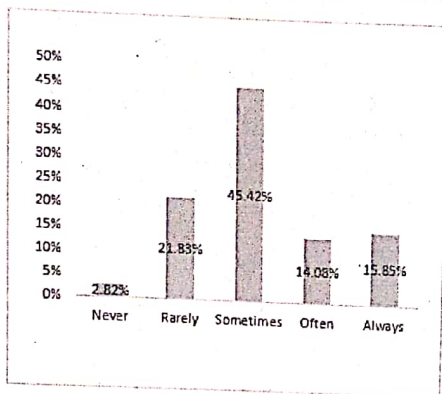


Figure3: Level of integration of eco-friendliness

From figure 3, the designers of shopping mall in Minna level of integration of eco-friendliness is in various degrees. The figure shows distribution and level of integration of eco-friendliness into the design of shopping malls in Minna by the practitioner Architects. 2.82% of the architects have never rarely designed shopping mall with integration of eco-friendliness, while 21.83% also found that 45.42% of the architects sometimes integrate eco-friendliness into the design of shopping malls, 14.08% often integrate eco-friendliness into the design of shopping malls, while 15.85% always integrate eco-friendliness into the design of shopping malls. It is obvious with the level of integration of eco-friendliness into design of shopping mall that majority of the shopping malls do not undertake green initiatives and that the idea is just gaining attention in recent time.

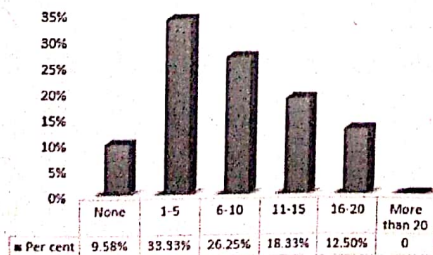


Figure 4: Number of eco-friendly shopping complex

Figure 4 above, shows that 9.58% of the Architects in Minna have never designed and be involved in the construction of eco-friendly shopping complex project. 33.33% of the Architects have been involved in the design and construction of eco-friendly shopping complex project in the past 1 to 5 years, while 26.25% of the Architects have been involved in design and construction of eco-friendly project in the past 6 to 10 years. Furthermore, 18.33% of the architects in Minna have been involved in both design and construction of shopping complex project in the past 11 to 15 years, 12.50% of the Architects have also been involved in its design and construction in the past 16 to 20 years, but non beyond 20 years. This revealed a steady growth in the awareness of eco-friendly design and construction of shopping complex project among the Architects in Minna until last 5 years.

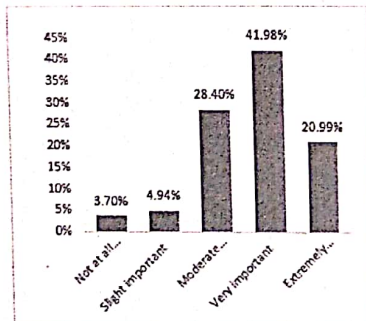


Figure 5: Relevant of eco friendliness

From figure 5 above, it shows that 3.7% of the Architects in Minna did not know the importance of eco-friendliness in design, 4.94% of the Architects claimed that eco-friendliness is slightly important to today's Nigerian society. About 28.40% affirm that eco-friendliness to today's Nigerian society is moderately important. In addition, 41.98% of the Architects in Minna agreed that eco-friendliness is very important to today's Nigerian society, while 20.99% of the Architects in Minna indicated that eco-friendliness to today's Nigerian society is extremely important. From the aforementioned varying positions of Architects in Minna, about 62% of the Architects in Minna can be said to know the relevance of eco-friendliness to Nigerian society. This indicates that eco-friendly design approach awareness is fairly high and promising.

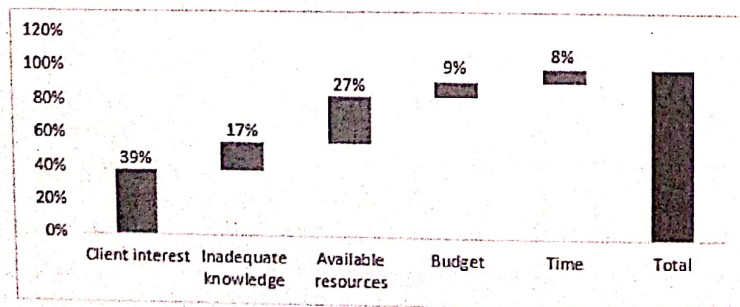


Figure 6: Factor preventing designing and implementing eco-friendly shopping mall

Figure 6 above, indicated that 39% of the factors preventing designing and implementing eco-friendly shopping mall is the client interest, 17% of the factors was due to inadequate knowledge, while 27% of the factors was due to available resources. In addition, 9% of the factors that hinders design and implementation of eco-friendly shopping mall is budget, while 8% was as a result of time. This is an indication that client interest, available resources and inadequate knowledge are the three top most significant factors preventing designing and implementing eco-friendly shopping mall, while budget and time are the less significant factors.

Key Focus during the Design of a Shopping Mall

i. Harness the use of natural light for the interior: Table 3 revealed that among the key focus of Architects during the design of a shopping mall is to harness the use of natural light for the interior. This is the highest ranking factor among the four factors under consideration, with RII as 0.662. It has a high rating with the Mean test as significant. In the same vein, to integrate a comprehensive range of innovative energy and water efficient features also ranked second, with high rating, Mean test as significant and RII as 0.636. Furthermore, to build a prototype of an eco-friendly and community-friendly shopping mall, and to design a shopping mall with environmental sustainability in mind were ranked third and fourth respectively.

The two factors had low rating with Mean test as not significant. The earlier factor's RII is 0.598; while the later factor's RII is 0.572.

ii. Level of utilisation of eco-friendly features: Table 4 shows the top four main findings emerging from the level of utilisation of eco-friendly features by professionals in their professional practice with significance of the mean test. By ranking these are "have green planting environment" (ranked 1st); "have bright, airy and spacious surrounding" (ranked 2nd); "have effective energy-saving systems" (ranked 3rd) and "create green environment".

Table 3: Key focus areas concentrated upon by the architects during the design of a shopping mall

	SA	A	N	D	SD	Σf	Σfx	\bar{x}	RII	Rank	Rating	Mean test
	5	4	3	2	1							
Design a shopping mall with environmental sustainability in mind	14	26	20	10	29	99	283	2.859	0.572	4	Low	Not significant
Build a prototype of an eco-friendly and community-friendly shopping mall	10	30	19	25	13	97	290	2.99	0.598	3	Low	Not significant
Integrate a comprehensive range of innovative	17	33	14	12	19	95	302	3.179	0.636	2	High	Significant

energy and water efficient features

Harness the use of natural light for the interior	25	28	9	15	17	94	311	3.309	0.662	1	High	Significant
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Table 4: The level of utilisation of eco-friendly features by professionals in their professional practice with regards to shopping mall projects design.

	HU 5	AU 4	LU 3	N 2	NU 1	Σf	Σfx	\bar{x}	RII	Rank	Rating	Mean test
Use of renewable energy for power generation	7	15	29	16	31	98	245	2.5	0.5	13	Low	Not significant
Resident needs	5	35	24	15	14	93	281	3.022	0.604	10	High	Significant
Low carbon design	6	21	26	18	20	91	248	2.725	0.545	12	Low	Not significant
Well connected with transportation network	14	32	19	16	14	95	301	3.168	0.634	8	High	Significant
Easy accessibility and convenient to approach	19	20	25	22	8	94	302	3.213	0.643	7	High	Significant
Make adequate provision for specialty shops	12	18	37	15	11	93	284	3.054	0.611	9	High	Significant
Satisfied user's preference	16	34	15	18	9	92	306	3.326	0.665	5	High	Significant
Increase public awareness of environmental protection	12	27	23	18	16	96	289	3.01	0.602	11	High	Significant
Create green environment	19	31	22	14	7	93	320	3.441	0.688	4	High	Significant
Enhance sustainable urban development	18	25	28	14	11	96	313	3.26	0.652	6	High	Significant
Have effective energy-saving systems	20	36	17	8	11	92	322	3.5	0.7	3	High	Significant
Have bright, airy and spacious surrounding	24	36	22	5	7	94	347	3.691	0.738	2	High	Significant
Have green planting environment	40	17	24	7	6	94	360	3.83	0.766	1	High	Significant

From the findings in this study, it could be argued that to effectively integrate and implement eco-design features into commercial facilities it must constitute the dominance and the most prioritised during the design. To achieve this, client interest, available resources and adequate knowledge of energy efficiency must be effectively embedded at the pre and during design stage. Although analysis of the findings accounts for about 62% of the Architects in Minna understood the relevance of eco-friendliness to Nigerian society; unfortunately, only about 30% of them often integrates this into their design.

In particular, this limits energy-efficiency projects in commercial facilities known to be largely driven mostly by profit making. This is problematic as most commercial facilities are huge energy consumers. Professionals are key role-players in eco-friendly projects as such, they must be empowered with the right levels of expertise, decision-making ability along with energy-efficiency targets and sustainability issues embedded in their projects to ensure sustainable built environment in Nigeria.

The study also revealed that non-integration of eco-friendliness into the design and construction of shopping mall is partly depended on the ownership type, underlying investment objectives, resource capacity and the available capital (client interest) perceived to influence environmental sustainability initiatives of the project. The ownership type was said to depend on the client, either as individual, private organization or government/public ownership. The ownership type is equally strongly related to the investment objectives. The two aforementioned factors are also directly influenced by the client resource capacity. The available capital perceived to influence environmental sustainability initiatives of the project often serves as hindrance to the Architects to integrate eco-friendliness into the design of shopping malls in full; instead it was done partly and at varying degrees.

CONCLUSION

The study investigated GB related challenges in terms of integration of eco-friendly and energy efficiency in shopping malls design in Minna, Nigeria. The findings indicate that there is a lack of knowledge and understanding of 'what the GB approach' entails in Minna, especially among the respondents of the study. There appears that the majority of the shopping centre owners do not undertake green initiatives such as reducing energy consumption, although at a varying degree. This can partly be explained by the ownership type of the owner and their underlying investment objective (client interest). In other words, the extent of their environmental commitment depends on whether or not the owner has a long-term or short-term interest in the building. Moreover, organizational factors such as the resource capacity and available capital are believed to influence the initiatives. Also, the shopping centre as an asset implies comparatively complex management due to for instance the number of tenants and most often the big size and volume of the building. Consequently, these issues need to be addressed in order to gain insight and knowledge on how to green the shopping centres as well.

RECOMMENDATIONS

Eco-design requires the designer to use green materials and assemblies of materials, and components that facilitate reuse, recycling and reintegration for temporal integration with the ecological systems. Others may include,

- i. Massive public enlightenment campaign as well as creating a behavioural awareness on the issue of energy conservation should be encouraged by built environment professionals and Government.
- ii. Emphases should be laid on training and re-training of Architects on eco-friendly designs.
- iii. Curriculum on sustainability should be included in schools of environmental studies.
- iv. Legislative laws should be in place, both at local and National levels on Green building guidelines.
- v. A ministry on green technology should be created in order to fill the gap on the issue of sustainability and scale up level of adaptability.

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