**ENHANCING HOUSING STANDARDS THROUGH INTEGRATION OF SUSTAINABLE FEATURES**

**INTRODUCTION**

Green or sustainable building is one of the fastest movements in the housing industry today. It is responsible to the pressing environmental problems prevalent in our society and provides tangible environmental community and economic benefits, improving health and public spaces and lowering building energy cost.

A Green building, also called sustainable building is a structure that is designed, built, renovated, operated, or reused in an ecological and resource efficient manner. Green buildings are designed to meet certain objectives such as protecting occupant’s health, improve employee productivity using energy, water and other resources more efficiently and reducing the overall impact to the environment.

According to Durmus-Perdini and Ashuri (2010), Green building is not a matter of choice or luxury but a necessity for the environmentally conscious industry professionals, owners, developers, government officials and the rest of stakeholders. Growing awareness of environmental aspects and demand for green buildings Worldwide shows that the status-quo as it currently exists in the construction industry simply cannot continue. Nigeria industry professionals are yet to imbibe environmental consciousness in their practice, particularly with regard to property development. In the united states, buildings are responsible for 72% of electricity consumption, 39% of energy use, 35% of carbon dioxide emissions, 40% of raw material usage, 30% of waste output and 14% of portable water consumption (USGBC,2009) cited in Durmus-Perdini and Ashuri(2010). The situation may not be much different in Nigeria.

In the light of above, benefits of green buildings to organizations and individuals who inhabit them are the subject of increasing attention and research. Green building strategies have been linked to gains in occupant comfort, health and productivity, as well as the organizational success through improved quality of work life, enhanced community livability, and ability to market to pro-environmental consumers (Heerwagen, 2000). Generally speaking, green building is something that aids or promotes well being. Many countries now have standards for green building certification, an idea not even conceived in Nigeria. For instance, after, the launch of British Research Establishment Environmental Assessment Method (BREEAM) in the UK in 1990, US Green building council’s Leadership in Energy and Environmental Design (LEED) followed (BREEAM) in 1998. Many other green building standards started around the world such as Green star by Green Building Council of Australia (GBCA), Green globes by green building initiative ( Canada - US), and comprehensive assessment system for building environment efficiency( CASBEE- Japan). Another rating system in the US is energy star established by the US EPA in 1992 started with energy efficient product focus. Energy star transformed its energy rating to the buildings and over 83000 buildings in the US have been rated by Energy star in 2008. (www.energystar.gov), the whole world is becoming environmentally conscious considering the effect of human activities on climate change and its consequential damages. It will be proper to consider environmental and sustainability impact when designing new buildings in addition to when considering retrofitting of existing buildings to make them more environmentally friendly.

In consideration of the fact that much of environmental impact of buildings is determined at the design stage, it is critical that environmental impact is considered early in the design process (Bond 2011). In Nigeria, some buildings embody one of the various veritable characteristics of green design. Buildings with holistic approach are yet to be seen. Sustainable development is the challenge of meeting growing human needs for natural resources, industrial products, energy, food, transportation and effective waste management while conserving and protecting environmental quality and the natural resource base essential for future life and development. This concept recognizes that meeting long term human needs will be impossible unless we also conserve the earth’s natural, physical and chemical system (Gottfried, 1996). This is also in tandem with environmental sustainability. There is no doubt that sustainable development concepts, applied to the design, construction and operation of buildings can enhance both the economic welfare and environmental health of communities in Nigeria and other third world countries. This is more apt in this era of climate change. Sustainable development emerged most strongly in the environmental context. However, the evolution of the concept in the 1990’s to encompass the economic, social, and environmental points of view made the concept a driving force. The economic point deals with growth, efficiency and stability. The social aspect is concerned with poverty, cultural heritage and empowerment while the environmental aspect deals with biodiversity/ resilience natural resources and pollution (Nwafor, 2006), cited in (Otegbulu 2011).

Embracing green or sustainable concept in design is aimed at reducing energy costs, operation and maintenance cost, reduced building related illness, increase the productivity and comfort of building occupants, reduce waste and pollution, and increase building and component durability and flexibility. It is important that the focus of green concept be embraced from early stages of building design, planning and construction. According to Gottfried (1996), the decision made at the first phase of the design and construction can significantly affect the costs and efficiencies of other phases as studies have shown that green building measures taken during construction or renovation can result in significant building operational savings, as well as increases in employee productivity. In essence, building related costs are best revealed and understood when they are analyzed over the life span of the building. In Nigeria, green concept, sustainability and environmental issues are hardly put into consideration when designing a new building or renovating an old one. These results in a short fall in user satisfaction, functional space planning and service type. In addition, sustainable building components are often neglected during design and construction (Otegbulu 2011).

**A SHORT HISTORY OF SUSTAINABILITY**

Sustainability is not a recent creation. The modern movement began in the US in the 1960s and 1970s, when pollution problems and the rapidly rising cost of oil, coupled with oil embargo caused many organisations to reassess their energy usage and methods of obtaining energy and reconsider their impact on their budget. Inspite of the modern movement, some elements of the green building go back to hundreds of years. The Anasazi Indians built their homes in the southwest region of the United States over a thousand years ago. These dwellings built underneath over hanging cliffs, were oriented to take advantage of solar heating in the winter and shading in the summer.

Frank Lloyd Wright (an Architect) was a pioneer in residential construction and introduced some startlinghing modern ideas between 1900 and 1910, such as long, low, one storey houses, low pitched roof with protecting eaves, construction bands of windows, open interior plans, poured concrete and concrete block. Wrights philosophy in architecture promoted harmony between the buildings its inhabitant and nature. His homes became part of their surroundings. He revolutionalized modern architecture with the essentials of ecological design. Wrights design inspite its elements of sustainability content, was not strategically conceived towards that (sustainability).

In, line with the modern sustainability movement arising from the oil shortage of the 1970’s people began to convert from oil heat to gas heat, the price of gas trippled. Suddenly, it became not only chic but sensible to be energy conscious. Builders and architects started working at ways to build homes that were more energy efficient. Builders began to take a broader view in the 1970’s. They tried to look at a house as a whole system, and innovate better ways of that art healthier in terms of indoor air quality, more comfortable to live in and efficient in terms of both energy and cost. Builders were starting to think green but it was a slow and uneven process. Few guidelines were in place and research was spottily at best.

In 1972, the club of Rome published the outstanding limits of growth paper, which revealed the exponential growth of human population. This was followed by the release in 1987, by the Butland report titled our common future by the would communist in environmental development. This created the first global agenda for change. As more and more green products come into the market place, with no regulation nor restriction on what was called green or how to classify sustainable products, the US green council was formed in 1993. The memberships consisted of leaders from across the construction industry working to advance construction that is environmentally responsible, profitable and healthy including efficiency in capital and operating costs.

**BRIEF OVERVIEW OF SUSTAINABILITY**

Over the last decade, green buildings have come to be known as buildings that are designed and constructed with an emphasis given to environmental, social, and economic priorities.

Inevitably, the sustainability movement has entered the real estate industry. Since the Stern review in 2006, governments all over the world have been trying to reduce their most obvious ecological hazards responsible for climate change (Stern 2006). This is done in a bid to create a more sustainable human settlement.

In consequence, the sustainable movement has resulted in real estate researchers and professionals discussing phrases like green buildings, triple bottom line, and corporate social responsibility(CSR) ( J. Gllington 1994 in Leopoldsberger .G, Biernert. S, Braunauer .W, Bobsin .k, Schultzenhofer-2011).

It can therefore be deduced that green or sustainable housing have taken a centre stage in the world’s environmental discussion.

In Europe, the European Energy of Building Directives (EEBD-2002/ GI/EC) was launched in 2002. In view of this directive, European Union member states had to develop specific measurable values that illustrate over-all energy-efficiency of a building (Leopoldsberger et.al 2011). Sustainability features have thus become critical in property valuation. An argument is advanced that success in achieving more sustainable development in property and construction largely depends on progress in integrating sustainability issues in property valuation theory and practice (Lovenz 2006) cited in (Babawale and Oyalowo 2011). This statement is reinforced by the view of Sayce and Ellbon (2003) and Myers, Reed, and Robinson (2007) that investors and occupiers need to know the extent to which sustainability design is impacting on property worth if they are to respond effectively to sustainability issues.

**TRIPPLE BOTTOM LINE ACCOUNTING IN SUSTAINABILITY.**

Sustainability is now a matter of three aspects; environmental, social and economic. In business jargon, reference is often made to triple bottom line (Zedek 2001, Savitz and Waber 2006, cited in Soderbaum 2008) as opposed to a single bottom line in monetary terms (Soderbaum 2008).

The triple bottom line accounting (3BL) which refers to analysis of not only economic factors, but also environmental and social impacts in decision making. The environmental aspect is often connected with the health biodiversity and natural resources as part of sustainable development, while monetary aspects are still very important and of interest. The newness with sustainable development is that of increased emphasis on non-monetary aspects of development and has the idea that non-monetary factors and impacts should be understood, assessed, and easily handled (Nwafor 2006, Soderbaum 2008). According to Cotts, Roper and Payant 2010, in line with many organizations attempt to bring corporate social responsibility to the forefront; 3BL is one methodology that has gained acceptance. Accountancy has even developed Social and Ethical Accounting, Auditing and Reporting (SEAAR).

However, the evolution of the concept in 1990’s to encompass the economic, social and environmental points of view made the concept a driving force. The economic point deals with growth, efficiency and stability, while the social aspect deals with poverty and empowerment (Nwafor 2006, Otegbulu 2011).

**GREEN AND SUSTAINABLE DESIGN.**

The term green and sustainable design is often used interchangeably. Inspite of the overwhelming similarity, there are shades of meaning implied by each green design which is intended to develop more environmentally benign products and processes. The application of green design involves a particular framework for considering environmental issues, the application of relevant analysis and synthesis methods and a challenge to traditional procedures for design and manufacturing. Green building measures can lead not only to lower building operating expense through reduced utility and waste disposal cost, but also to lower on-going building maintenance cost ranging from salaries to suppliers (Lehrer 2001, Otegbulu 2011, Hendrichson, Conway- Schempt, Lave and Michael, undated). On the other hand, sustainability is the challenge of meeting growing human needs for industrial product, energy, food, transportation and effective waste management while protecting and conserving environmental quality and natural resource base essential for future life and development (Gottfried1996, Otegbulu 2011). However, in view of the overwhelming similarities, both terms are used interchangeably in this study.

The challenge of green design is to alter conventional design and manufacturing procedures to incorporate environmental considerations systematically and effectively. Changing design procedure is particularly difficult because designers face conflicting objectives, uncertainties, and a work environment demanding speed and cost effectiveness. Environmental concerns must be introduced in practical and meaningful fashion into the design process. There is an urgent need to prepare consumers and designers to think proactively about the environment. (Hendrickson et.al undated, Hachler and Holdren 2008). The way we design and live have great impact on the environment and also impact on climate change. We must admit that what we are seeing across the world today is war, a war against life itself.

According to McDonough (2004), our present system of design has created a world that grows far beyond the capacity of the environment to sustain life into the future. The industrial idiom of design, failing to honor the principles of nature can only violate them, producing waste and harm, regardless of purported intention.

A green product or process is not defined in any absolute sense, but only in comparison with other alternatives of similar functions. For example, a product could be entirely made of renewable materials, use renewable energy, and decay completely at the end of its life. However, this product will not be green, if for example a substitute product uses fewer resources during production and use, or results in the release of few hazardous materials.

**GOAL AND OBJECTIVES OF GREEN DESIGN**

The goal of green design is sustainable development which is development that meets the needs of the present without compromising the ability of future generation to meet their own needs. The Bruntland reports concept of sustainability allows us to avoid the true dangers implicit in the world’s population growth and increasing standard of living. Other terms used to describe ecological approaches to architectural design include “high performance design” and resource efficient design. Ecological design is any form of design that minimizes environmentally destructive impacts by integrating itself with living process, (Lehrer 2001, McDonough 2004)

The social goal of green design relates to ensuring a sustainable future for the society in regard to both resources and ecological health. The benefit of sustainable building can be categorized into environmental community and economic.

**ENVIRONMENTAL BENEFITS**

* Enhance and protect ecosystems
* Improve water supply quality
* Reduce soil pollution
* Reduce water consumption
* Reduce storm water run-off
* Reduce solid waste
* Conserve natural resources
* Improve indoor air quality
* Enhance occupants health and comfort
* Reduce heat …. Effect

**COMMUNITY BENEFITS**

* Improve the acoustic environment
* Provide more open space
* Protect natural habitants
* Improve conditions in public areas
* Minimize the strain in infrastructures
* Reduce carbon emissions from transformation
* Improve the overall quality of life

**ECONOMIC BENEFITS**

* Reduction of operating cost
* Reduction of maintenance cost
* Reduction of reserves for replacement
* Enhancement of asset values
* Improvement of the health of residents
* Optimization of life-cycle economic performance.

**DIMENSIONS OF GREEN DESIGN (GREEN FEATURES)**

According to (Otegbulu 2011 and Engel Yan, Kennedy, Saiz & Pressand 2005) dimensions of green design include energy efficiency, water efficiency waste reduction, building operation, construction, maintenance and maintainability, occupant health and productivity, storm water management, climate and environmental integration ( sustainable neighbourhood). The list is not exhaustive but it is important to note that green building features or characteristics overlap with many other neighbourhood elements like installation of water conserving features, recovery of non- sewage waste water and the use of pervious pavings around buildings.

This study will deal with aspects of green features as time and space constraints may not allow us to undertake a detailed evaluation of the impact of different dimensions of green features on residential property value.

In effect, the features under study are: energy efficiency, natural lighting, ventilation, water efficiency, waste management and balcony as health feature.

**ENERGY EFFICIENCY**

According to Eves and kippes (2010) during this last 20 years period, there has also been a growing awareness and focus on energy efficiency in residential house design, construction materials, efficient heating and cooling. It is doubtful if this is given any serious consideration in Nigeria as incandescent bulbs, are indiscriminately used in residential houses, while non-energy efficient materials are used in construction.

Gottfried (1996) cited in Otegbulu (2011) and Lehrer (2001) submits that 50% of energy used in buildings is devoted to producing an artificial indoor climate through heating and cooling, ventilation and lighting, According to the authors, a typical building energy’s bill constitutes approximately 20% of buildings total operating cost in the United States. However estimates indicate that the climate sensitive design with the use of appropriate and available technologies could cut heating and cooling energy consumption by 60%. The type of electrical appliances, device and fittings used in a building can enhance or constrain energy efficiency. For example, a typical incandescent bulb needs only 10% of the energy released to produce light while the remaining 90% produce heat which will create need for cooling. The efficiency in this situation is 10%. Energy efficiency of a device is therefore a comparison or ratio of the useful energy output.

As earlier mentioned, many homes in Nigeria are built without consideration for energy efficiency. Consideration of energy efficiency will bring down energy cost, reduce the quantum of energy or power stations required in the country and enhance environmental sustainability (Otegbulu 2011). This call for an urgent need to consider the range of factors that contributes to energy efficiency, some of which include:

* Materials used for the construction of the building
* Thermal insulation of the building fabric
* Ventilation characteristics of the dwelling and ventilation equipment
* Efficiency and control of heating system
* Solar gains through openings of the dwelling.
* The fuel used to provide space and water heating, ventilation and lighting
* Renewable energy technologies (Cantebury city Council, 2005 cited in Eves and Kippes 2010)

**NATURAL LIGHTING AND VENTILATION**.

Energy could be saved through provision of natural ventilation and lighting in building design; this could be achieved through proper positioning of windows and perforated walls in appropriate parts of the building. In some types of building, this can be achieved through roof ventilation using cold multi- functional ventilators. Energy saving through natural ventilation and lighting could further be enhanced through wide windows and external doors and good material choice in window design like glazed windows of different brands (Fullerton 1978, Hachler, Holderen 2008, Otegbulu 2011, and Lippiatt and Norris 1996).

According to Chan, Yiu, and lee (2009), an abundance of past studies investigates the impact of building orientation, microclimate, environment and building design on occupants’ health. For example, Friedler (1991); Raja et.al (2001); Prianto and Depecker (2002), Oral et.al 2004, and Burnett et.al 2005, Otegbulu and Adewunmi (2009) showed the relationship between natural cross-ventilation and orientation with indoor air quality and thermal comfort. The use of vegetation in neighnbourhood design is also helpful as trees shade buildings and shield them from wind.

In summary good, natural ventilation and illumination will enhance energy efficiency in buildings improve indoor air quality and occupants health and productivity.

**WATER EFFICIENCY**

Water conservation and efficiency program have begun to lead to substantial decreases in the use of water within buildings. Water efficiency appliances and fixtures, behavioural changes can reduce consumption by up to 30% or more. Investments in such measure can yield payback in one to three years (Gottfried 1996, Otegbulu 2011). A mandatory use of water conserving plumbing fixtures (as in the United States) to reduce water use in residential, commercial and institutional buildings will help in achieving sustainability in water (Simmons 2010). As demand on water increases within urban growth, the economic impact of water conservation and efficiency will increase proportionally. Water efficiency not only can lead to substantial water savings. It can also reduce the requirement for expansion of water treatment facilities. If water is not properly billed, that where consumption have no connection with bills payable by consumers, there will be no incentive to conserve use of water or practice efficiency in water consumption among households.

**WASTE REDUCTION**

Green building measures can lead to reduction in waste disposal. In many buildings, maintenance staff collects waste on each floor or even at every employee’s desk, and carry the materials down to the basement for hard sorting. Recycling chutes, a viable green alternative allow direct discarding of materials from any floor in the building to the basement. The chute system, which ideally is installed during initial construction or renovation, can sort materials automatically, saving labour cost by eliminating the need to collect, transport, and sort recyclables. Other savings come in the form of lower waste hauling fees, less frequent cleaning by spills on carpets and floors, and less need for pest control (Gottfried 1996).

**BALCONY**

A balcony is one of the green features that could be incorporated into the design of buildings. It offers several advantages over traditional window designs. From users’ perspective, a balcony may provide a panoramic view of a more spacious indoor environment (Chau, Wong and Yiu 2004). From an environmental standpoint, Griffiths (1999) considers a balcony an integrated environmental filter. Its projected structure can enhance energy efficiency by acting as a sun shading device, providing planning space and mitigate air pollution and traffic noise, especially in the high rise and low density built environment of Ikoyi and Victoria Island. It can also shield dwelling from traffic noise. Studies in Hongkong show that provision of balcony in houses can impact significantly on their values (see Chau et.al 2004).

**NEED TO CREATE AWARENESS OF IMPORTANCE OF GREEN FEATURES IN BUILDINGS**

Climate change and sustainability issues have garnered increased attention globally. Since the United Nations framework convention on climate change (2007) brought the issue to the attention of Government. Consequently, in the past few years, more stringent environmental laws and soaring energy prices has increased the need for real estate to start and participate in overall energy reduction and housing sustainability through efficient house construction and design, as well as upgrading the existing housing stock to be more energy efficient and environmentally suitable. This environmental sustainability relates to the maximization of energy efficiency for specific housing markets and the weather conditions they experience (Qian, and Chan, 2010, Eves and Kippes 2010). The problems associated with climate change constitute a formidable threat to global environmental sustainability. In addition, the building industry uses a substantial amount of resources, and accordingly, has a large impact on the environment (Chan and Bau 2005, Qian and Chan 2010). In Nigeria government policy on sustainability seems unclear and uncommunicated to the citizenry. One thing is certain, there are no local sustainability standards nor is there an incentive for investors in property development to embrace sustainability. Currently, a number of internationally recognized assessment systems, such as Leadership in Energy and Environmental Design (LEED) in the USA. The BRE Environmental Assessment Method (BREEAM) in the UK and internationally, the Hongkong Building Environmental Assessment Method (HK-BEAM), and the Energy Guide in Canada, have attempted to develop objective BEE standard, (Qian and Chan 2010). Many developed countries have set up good examples for the promotion of the need to integrate green features in buildings and Nigeria will do well to draw on these examples. There is need for a standard to measure compliance; this is to be executed with well equipped and funded regulatory body that will ensure strict implementation of sustainable policy. Creating awareness to all stakeholders is critical to rhe successful implementation of any sustainable policy.

International Sustainability Guideline Sources.

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| Guideline/Standard | Country | National or International |
| U.S. Green Building Council’s Leadership In Energy & Environmental Design –LEED | United States | 41 International Countries |
| Building Research Establishment’s Environmental Assessment Model-BREEAM | United Kingdom | 15+ International Countries |
| Green Building- GB Tool From International Initiative For A Sustainable Built Environment- iiSBE | Housed In  Canada | International Focus |
| Green Globes | Canada | North America |
| Comprehensive Assessment System For Building Environmental Efficiency-CASBEE | Japan | National |
| Green Building Council Of Australia’s Green Star Rating Tools. | Australia | National |
| Deustchen Gesellschaft für Nachhltiges Bauen | Germany | National |
| Other National/Local Standards And Guidelines |  | Country Specific |

**FINANCIAL BENEFIT**

There is a considerable body of commentary that suggests that buildings with superior environmental performance deliver a bundle of benefits to occupiers and investors. Owners and occupiers may benefit from subsidies and tax benefits that have emerged in some markets. Occupiers benefit may include: reduced operating costs of the building (mainly associated with energy and other utility savings), improved productivity of the occupying business (associated with among other things, reduced staff turnover and absenteeism) and other competitive advantages linked to marketing and usuage benefit. It is expected that these benefits will drive increased rental bids from potential occupiers. In addition to possible rental premiums, investors may also benefit from reduced holding costs (due to lower vacancy rates and higher tenant retention), reduced operational costs (due to energy and other utility savings), reduced depreciation (linked to the use of latest technologies) and reduced regulatory risks. Other benefits include lower health related costs such as insurance premiums, lower litigation risks due to increased indoor air quality, staying ahead of regulations, and longer economic life of the facility among others (Durmus- Perdini and Ashuri 2010, Fnerst, McAllister, Wetering and Wyatt 2011). Reduction in life cycle cost of buildings is a major incentive to invest in Green building. Such reduction could be beneficial to both landowners and tenants by way of savings in operational and replacement costs. Incorporation of sustainable features will also reduce service charge payments by occupiers of multi-tenanted properties and good publicity. For tenants, benefits cover more reduced operating costs, reduced usability risk and community recognition. We need to address the problem of climate change through integration of sustainable features.

**CONCLUSION**

The need to enhance housing standards through the introduction of green certification standards in construction industry is an idea whose time has come. This will promote efficiency in housing provision. A building ‘life’ spans its planning, its design, construction and operations, and operations, and its ultimate re-use or demolition. Often the entity responsible for design, construction and initial financing of a building is different from those operating the building, meting its expenses, and paying employers salaries and benefits. However, the decision made at the earliest phase of building design and construction can significantly affect the cost and efficiencies of later phases. Both building owners and building tenant/employers can benefit in many ways through the introduction of green certification standards. For owners, it can result in higher property values, longer tenant occupancy and lease renewals, reduced insurance and operating cost, reduced usability risks, extended equipment life.

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