Benefits of Green Buildings

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Abstract

The bitter experience of global warming has alarmed and compelled the mankind to change the way they operate on earth. Within the construction industry, the green building concept evolved and it is now gaining momentum rapidly across the world. Green Building involves a building which incorporates environmental considerations into every stage of the building construction with the objectives to protect occupant health, improve employee productivity, use wisely natural resources and reduce the environmental impact. This paper investigates the benefit of green buildings in Johannesburg using a detailed questionnaire. The study findings revealed that green buildings provide better health for building occupants due to the improved indoor quality, development of more energy efficient products and the use of less natural resources for the satisfaction and welfare of building tenants, also to protect the ecosystem. The outcome of this research shows that green building benefits should encourage clients, consultants and contractors invest in green buildings.

Keywords Benefits, Buildings, Conventional, Green, and Johannesburg

1. Introduction

Green Building Council South Africa website (2007) defines a green building as a “building that includes design, development and operational practices that essentially decrease or remove negative effect of growth on the environment and people. Green structures are energy effective, asset, productive and environmentally responsible.
This building has taken off in the previous quite a long while due in extensive part to the creation and activities of associations, for example, the United States green building council U.S. Green Building Council (USGBC) and worldwide green building associations. Under a1999 Presidential Executive request and through projects encouraged inside a large number of its key organizations, the U.S. national government focused on building green. In 1990 joined Kingdom built up a Building Research Establishment Environmental Assessment Method (BREEAM), Eight years after the fact United States built up the Leadership in Energy and Environmental Design (LEED). In 2003 Australia received the framework with "Green Star”. Singapore and Malaysia embraced the framework with "Green

Mark "and "Green Building Index" separately, (Isa et al, 2013).This study serves to evaluate in detail the benefits of Green Buildings.

2.1 Conventional Buildings versus Green Buildings

The most condemned issue about developing these manageable structures is the cost included. The advancements included in it tend to cost more than customary structures. Most green structures cost a premium of more than 2%, however, return 10 times more advantages over whole life cycle of building Kats et al. (2003).

Kats (2006) examined the setup and improvement cost of 30 green schools unconcerned spots in the United States and almost considered that green schools incline to cost around 2% more than standard ones.

In a later study, the same researcher Kats (2010) drove a review for more than 100 designers, building proprietors, counselors procure information about the green cost premium of more than 170 green structures in the United States and some diverse countries and assumed that most green structures cost fairly higher than conventional structures. The researcher found that the reported green cost premium for the whole illustration stretching out from 0% to 18%. Regardless, the battles that the cost premium of more than 75% of the researched green structures falls in the range from 0%to 4%. The researcher moreover battles that examining the incremental cost of green structures using particular procedures yields the same results. The dominant part of this expense is because of the utilization of premium materials, high-effectiveness apparatus, and extra layers of procedure work process.

In New Zealand, Rehm and Ade (2013) matched the real price of 17 green office structures, ensured as green by the New Zealand Green Building Council's evaluating device (Green Star NZ Version 1.0), against cost models created utilizing expense guides and handbooks for the same structures. The creators utilized non-parametric Wilcoxon coordinated sets marked positions test to figure out if the real cost is considerably greater than the demonstrated expense. They establish that green building's expenses were higher by and large when contrasted with displayed cost estimates, yet the distinction is not factually huge. In the same study, they audited 631 engineers to separate cost partition between customary advancement procedures and green structures. Of the engineers inspected, (a) 86% trusted green structure costs were more than conventional improvement, (b) 13% trusted cost refinement was Negligible and (c) only 1% trusted green advancement costs less (Rehm and Ade, 2013). Results from their data examination did not support the producers' announcement that using green building sharpens grows advancement costs.

Another study by Gregory and Kats (2003) finished a study which laid out that "Green structures are commonly seen to be essentially more excessive than ordinary structures and routinely not with regard the additional price charge. For instance, a mid 2003 article in the New York Times was authorized permission "Not Building Green Is Called a Matter of economics."In requesting to pick the expense of inserting green showed up distinctively in connection to the customary course of action, a few dozen building specialists and coordinators were come to secure the expense of 33 green structures from over the United States emerged from routine outlines.

The standard premium for these green structures is to some degree under 2%. The most prominent piece of this cost is an outcome of the great architectural and designing outline period, showing costs and time essential to join sensible building rehearses into projects. All things considered, the earlier green building parts are joined into the setup set up, the lower the cost.

Notwithstanding the above Yudelson (2009) conveyed an investigation on Cost drivers of Green Buildings.
Level of LEED confirmation looked for is obviously an issue. As you move to more elevated amounts of LEED confirmation, even with a coordinated configuration process, you are prone to include higher cost components, for example, green rooftops, photovoltaics, and guaranteed wood items. You are likewise prone to need a bigger number of studies in the configuration stage, including normal ventilation examinations, computational liquid element concentrates, more regular vitality demonstrating, and so forth. At times, in any case, we have cases of LEED Platinum being expert for zero or minimal effort premium, considering both outline and development costs.
In combination with Langdon, the U.S. Green Building Council (2009) surveyed the development expense of 107 extravagance private new development tasks and business venture inside to survey the green outline effect on the projects budget. They established that the expense per square foot amongst green and non-green structures is not fundamentally distinctive. A decent case of these counter perspectives is a study by Shrestha and Pushpala (2012) in which the creators dissected the development cost and time of completion of 30 green school structures and another 30 non-green school structures. As a consequence of measurable examination, the creators similarly reasoned that the green school structures expense is 46% higher than that of the traditional school structures, and the mean development cost per square foot of the green schools was altogether higher than that of the ordinary schools.

2.2 Benefits of Green buildings

As shown by Hwang and Tan (2010) green structures bring a significant amount of benefits and profitable rewards compared with normal/standard structures.
U.S. Life Cycle Inventory Database." (2012) is in contrast with the above declaration by considering energy effective as a benefit of green structures, he cleared up out that Green structure consolidate practices for lessening energy utilization. As superior structures use less working vitality in material frame vitality has expected much more prominent centrality and may make up as much as 30% of the general life cycle vitality use. The building materials, for example, wood shake and dull top have cut down encapsulated imperativeness when stood out from strong, squares and steel.
In a case study, exploration, Riesa (2006) claim that production, improved about 25%, and vitality lessened about 30% in a green precast concrete manufacturing facility certified by LEED green rating system.
Yudelson (2008) recorded 14 points of interest of green structures, among others, imperativeness and water saving, lessened upkeep cost, extended property estimation, residential development in productivity, 5% reduced non-appearance, nonetheless extra advantages recognized with comfort, hazard, attraction, and intensity.
Zuo and Zhao (2014) carried on examination to separate the purposes of interest that ran with green structures of which standard structures don't offer, such favored stance are warm warmth, naturally pleasing. These concentrations will be talked about in reason in purpose of enthusiasm for the going with sections.
Financial rewards: The expense endeavors are likewise associated with the enhanced building efficiency of working, for the most part from the life cycle point of view. Appropriately, the operation cost is advanced. Green structures are prepared for saving around 30% of essentialness reduction than customary structures and this was revealed by economist Zuo and Zhao (2014). On the other hand, the requesting cost of not turning out to be earth, practical is

remarkable too, in context of the carbon trade cost. The expense ventures for the span of the operation; setup and repairs stages will favorable position to alter the open cost major for green building geographies. The investigation coordinated by Zuo and Zhao (2014) showed that low energy houses with green structures are fit for saving more remote than 55% of the energy cost when contrasted with ordinary structures.

Notwithstanding the above opinion, the Article by Kats (2003) assumed that money related favorable circumstances of green structures are more than ten times the added expense connected with constructing green structures. The money related focal points are in lesser energy, surplus and water expense, bring down regular and releases costs, and lesser operating and encourage expenses and extended productivity and prosperity.

Thermal comfort: The advantage of building occupants is furthermore identified with warm extravagance which is made out of various interrelated parts of temperature also humidity. Zuo and Zhao (2014). This has included sweeping, thought from scholastics to put on and also survey the warm extravagance effort in green filling in as differentiated and ordinary structures

Environmentally friendly: Zuo and Zhao (2014) saw that it is known that green structures go with different benefits. From eco-accommodating point of view, green structures sponsorship to regain or extend the city biodiversity furthermore watch over the earth through a feasible range utilize, Henry and Frascaria-Lacoste (2012). As diverged from standard structures, green structures routinely are accountable for front line and more significant execution redirected from vitality save reserves, carbon release lessening and water saving. Zuo and Zhao (2014) Specified that an exceptional volume of carbon dioxide released may perhaps be decreased (Resulting from vitality sparing) if Leadership in Energy and Environmental Design (LEED) assessment realizes were executed in totally new advancement segments . The examination drove by Zuo and Zhao (2014) revealed that green structures will get purpose of intrigue furthermost from LEED accreditation in regards to nursery gasses lessen and the after taking after by standard structures.

Inward environment quality: A one of a kind genuine portion of human paybacks connected with green building is the internal natural quality. The inward environment quality, together with unreliable carbon-based composite releases furthermore other waste thing is an additional honest to goodness stress in structures (Yu and Kim, 2010).For that reason inside environment quality geographies in absolutely boss green building valuation realizes (Chuck and Kim, 2011).Wide-broadening investigates have progressive that green building can accomplish impelled level of inside environment quality than standard structures which points of interest to grow the flourishing and profitability of occupiers. In like way, the Level of fulfillment or comfort of building occupiers is improved and progressed.

2.3 Case studies

2.3.1. Green outdoor gyms in Joburg Johannesburg City Parks

This project began as a pilot in 2012 and is in line with the organization’s donation and sponsorship drive. It is a project with the potential to help promote healthy lifestyles in the City of Johannesburg (City of Johannesburg Case studies 2011-2012). The Green Outdoor Gyms were launched in 2012 in Petrus Molefe Eco-Park in Soweto as a

pilot project between Johannesburg City Parks Corporate Projects and young entrepreneur Tim Hogins of Green Outdoor Gyms. The outdoor gyms provide world-class equipment in a secure park setting.

The project has enhanced the quality of lives of citizens. Several users have reported improved health conditions. Also linked to healthy lifestyle initiatives such as a food garden in previously disadvantaged areas.

2.3.2. Housing in Joburg Township (Tebogo Homes)

The townships south of Johannesburg were originally intended to be temporary accommodations for mine workers in South Africa during the apartheid period (Tessema et al., 2009). However, even today South African township is often characterized by lack of living space and infrastructure, unemployment, high rate of crime, among others.

The new buildings on Tebogo home display a good example of how to use green building methods in an urban surrounding recycling on mainly inexpensive and locally available building materials. It shows that local materials are an innovative building design, no outside energy is needed to provide a pleasant indoor climate. This project achieved crucial improvement of the thermal comfort.

3.0 Research Methodology

This study adopted a convenience sampling method. The questionnaires were administered to construction professionals who are at present or have taken a shot at a green building project in Johannesburg. This paper focus on the section for laying out the advantages of green structures. A five point Likert scale was utilized to rank the benefit of green buildings. The results were analyzed performing descriptive analysis

4.0 Survey results and Discussion

4.1 Section A. Background Information

Out of the questionnaires disseminated, 40 completed sets were received. The survey results were analyzed, performing descriptive as well as statistical analyses such as MIS. The respondents were from consultancy (39.48%), the government sector respondent rate is 50.84%, and Contractor respondent is 9.68%. The amount of green building projects that the respondents were involved in; 70% of the respondents were involved in 1-2 projects, 15% were involved in 3-4 projects, 8.53% were involved in 5-6projects and 6.45% were involved in 7-8 projects. The following section elaborates the analysis of the result.

4.2 Section B. Benefits of green buildings

The respondents were asked to rate the benefits of green buildings in Johannesburg ,Gauteng province , the following result were obtained; Green building provide better health for building occupants due to the improved indoor quality (MIS=4.50, R=1) ; lead to the development of more energy-efficient products and services (MIS=4.50, R=1); Green building improve comfort, satisfaction and well-being of building occupants

(MIS=4.43,R=2) ,the environmental and emissions costs of green buildings are lower (MIS=4.40,R=3) ; green buildings enjoy the support of climate change protocols (MIS=4.35,R=4) ; improve the quality of life for individuals (MIS=4.28,R=5) ; use less natural resources and so as to protect the ecosystem (MIS=4.23,R=6) ; Economic life of green building is extended since plant and equipment are more robust to alternative uses (MIS=4.19,R=7) ; lead to the reduction of annual water cost savings(MIS=4.03,R=8) ; Increase the occupant safety and security (MIS=4.03,R=8) ; lead lower operational and support costs (MIS=3.85,R=9) ; Waste disposal costs in the green buildings are lower (MIS=3.75,R=10); Make risk management manageable (economic, financial, market, etc.) (MIS=3.73, R=11) and the cost of maintenance in green building is greatly reduced (MIS=3.53, R=12).

Table 1 showed benefits of green buildings in ranking order. These results are in common contract with the researches done by Zuo and Zhao(2014) and Yudelson (2008) where Thermal comfort, Environmentally friendly, Financial advantages, Inward environment quality, cost of maintenance is low and use less natural resources were identified as the major benefits of green buildings

Table 1. Benefits of green buildings

BENEFITS OF GREEN BUILDINGS	**MIS**	**RANK (R)**
Provide better health for building occupants due to the improved indoor quality	4.50	1
Lead to the development of more energy-efficient products and services	4.50	1
Improve comfort, satisfaction and well-being of building occupants	4.43	2
The environmental and emissions costs are lower.	4.40	3
Enjoy the support of climate change protocols	4.35	4
Improve the quality of life for individuals	4.28	5
Use less natural resources and so as to protect the ecosystem.	4.23	6
Economic life of green building is extended since plant and equipment are more robust to alternative uses.	4.19	7
lead to the reduction of annual water cost savings.	4.03	8
Increase the occupant safety and security.	4.03	8
Lead lower operational and support costs.	3.85	9
Waste disposal costs in the green buildings are lower.	3.75	10

Make risk management manageable (economic, financial, market, etc.).	3.73	11
The cost of maintenance in green building is greatly reduced.	3.53	12

5. Conclusion

From the survey obtained from the respondents, literatures reviewed and the cas studies, green buildings provide better health for building occupants due to the improved indoor quality, lead to the development of more energy-efficient products and services increase luxury, satisfaction and welfare of building tenants ,improve the value of lifetime for individuals, the ecological and emissions costs are lower ,enjoy the support of climate change protocols and uses less natural resources and so as to protect the ecosystem, Economic life of green building is extended , to the reduction of annual water cost savings were identified as the top ten benefits of green buildings in Johannesburg. It can, therefore, be concluded that clients, contractors and consultants need to take consideration of the benefits of green buildings and start investing in green building construction. This study will bring more alertness to the public about the benefits of Green Buildings and why we need green buildings.

Despite data limitations and the need for additional research in various areas, the findings of this research point to a clear conclusion: building Green building is cost-effective and makes financial sense today.

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Biographies

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