



## A CASE STUDY AND COMPARATIVE STUDY OF TWO GREEN BUILDING

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### ABSTRACT

*The overall aim of this research is to study green/energy-efficient real estate from an economic perspective. The thesis summarizes the results from five different studies with a connection to green/energy-efficient real estate. These studies focus on three distinguishable research questions: Do green buildings have a superior indoor environment, Does energy efficiency add value. Green building technology is one of the most trending topics all over the world which is been put forward to reduce the significant impact of the construction industry on the environment, society and economy. The globe is in an urgent need of sustainable and a smart development as the problem of pollution and global warming is rapidly increasing all over the world. A drastic climatic changes also been noticed and being experienced all over the world due to increase in the Green House Gases (GHG)'s. Green building technology is one of the most trending topics all over the world which is been put forward to reduce the significant impact of the construction industry on the environment, society and economy. The globe is in an urgent need of sustainable and a smart development as the problem of pollution and global warming is rapidly increasing all over the world. Many problems have been noticed due to increase in the green house gases. In the developed and developing countries is recommends durable and eco friendly materials for making the sustainable constructions. This study discusses the importance of eco friendly materials and techniques to overcome the problems related to construction of the buildings. In this study, select the two green building in the national capital region (NCR) and comparative analysis by techniques, construction materials and sustainability of the buildings*

**Keywords:** *Green Buildings, Materials, Sustainability*

### I. INTRODUCTION

Buildings have a tremendous impact on the environment, using about 40% of natural resources extracted in industrialized nations consuming virtually 70% of electricity and 12% of potable water and producing between 45% and 65% of the waste disposed in our landfills. At the same time the construction industry has significant economic, environmental and social impacts on the society. These effects are to a great extent observed amid the lifecycle of the built structures. Likewise, there are certain and in addition negative effects of development exercises on the general public. A portion of the constructive effects incorporate furnishing structures and territories alongside the offices to fulfill the human prerequisites, giving work to the general population of the country lastly, contribute towards the economy of the country. There have been a considerable measure of research works did on the parts of the green working in various settings however they all need in orderly surveys of the current material of information. The precise research is essential to recognize the basic research issues and furthermore feature the future research technique. Mr. Jiau Zuo and Mr. Zhen Yu Zhao carried out their research work on the green building technology and also stated the current status and also the future agendas for the same. They presented a report on a critical review of the existing body of knowledge of researches related to green building. These effects are to a great extent observed amid the lifecycle of the built structures. Likewise, there are certain and in addition negative effects of development exercises on the general public. A portion of the constructive effects incorporate furnishing structures and territories alongside the offices to fulfill the human prerequisites, giving work to the general population of the country lastly, contribute towards the economy of the country. There have been a considerable measure of research works did on the parts of the green working in various settings however they all need in orderly surveys of the current material of information. The precise research is essential to recognize the basic research issues and furthermore feature the future research technique. Ries; Robert Bilec; Melissa M Gokhen; Nurvi Mehmet Needy and Kim Lascola had distributed a paper on the financial advantages of green structures which was an extensive report which was upheld with a contextual analysis .they expressed that in building plan and developments both the green building and standard development systems are considered for some, building venture. their exploration



researched the connection between the composite regular and green building highlights which would add to the advancement of the green building measurements.

## II. GREEN BUILDING DEFINITIONS

Public concerns about the effects of the development business on human wellbeing and vitality utilize, and worldwide environmental changes have made GB a mainstream field of research (US Green Building Council (USGBC) Research Committee, 2008). As per the literature, economical structures, superior structures, green development and ecofriendly materials and strength and age of the structure is high are been utilized as a part of the structures (Kats, Alevantis, Berman, Mills, & Perlman, 2003; Kibert, 2012). According to Kibert (2011), “the result of applying maintainable development ways to deal with making a mindful fabricated condition is most normally alluded to as superior green structures, or essentially, green structures. The GB approach, dissimilar to the regular (non-green) building approach, goes for planning, developing, and working a working with insignificant utilization of assets. According to the Hong kong green building council suggests that limit the troublesome effects of structure on the conditions with employments of productive assets, arranging of structures, utilizes waste and reduction of pollution. Green Buildings are designed to reduce the overall impact on human health and the natural environment by the following ways using energy, water and other resources efficiently. by reducing waste, pollution, and environmental degradation. Eco-Friendly-by least disturbance to eco system. Energy efficient-through the natural lighting ventilation and solar passive designs efficient use of water-through recycling and water harvesting use of renewable energy-through photo voltaic systems and solar system etc.non toxic material in door environment, use of recycle/recyclable materials, efficient waste utilization and disposal

## III. IGBC RATING SYSTEM

The Indian Green Building Council (IGBC) was formed in the year 2001 by Confederation of Indian Industry (CII). The aim of the council is to bring green building movement in India and facilitate India to become one of the global leaders in green buildings by 2015 IGBC has developed green building rating programmers to cover commercial, residential, factory buildings, etc as tabulated in Table 3.1. Each rating system divided into different levels of certification is as follows in Table 3.2.

Table 3.1: Rating system divided into different levels of certification

Certification Level	Owner occupied buildings	Tenant buildings	Recognition
<b>Certified</b>	50-59	50-59	Good practices
<b>Silver</b>	60-69	60-69	Best
<b>Gold</b>	70-79	70-79	Outstanding performance
<b>Platinum</b>	80-89	80-89	National Excellence
<b>Super Platinum</b>	90-100	90-100	Global Leadership

Table 3.2: Rating system divided into different levels of certification

Sr. No.	Criteria Points	Points
1.	Sustainable Architecture and Design	5
2.	Site selection and planning	14
3.	Water conservation	18
4.	Energy efficiency	28
5.	Building materials and resources	16
6.	Indoor environmental quality	12
7.	Innovation and development	7

## IV. STUDY AREA

There are two building selected for the comparative analysis based on the quality of the materials, which type of material used, energy efficiency. The first building is situated in the gurugram and another second building (Vihan Shopping Plaza) situated in Ghaziabad.

Table 4.1: Details of the comparative study of the buildings

Sr. No.	Items	Green building (Patni Knowledge Center)	Conventional building (Vihan Shopping Plaza)	Profit of Green Building
1	cement	PPC	OPC	<ul style="list-style-type: none"> <li>• PPC is higher durability of concrete structure due to less permeability of water.</li> <li>• Better workability</li> <li>• Low heat of hydration</li> <li>• Better surface finish</li> </ul>
2	Brick	Fly ash brick	Clay brick	<ul style="list-style-type: none"> <li>• Specific gravity :-</li> </ul>
				i) fly ash brick:- 2.54 to 2.65gm/cc ii)clay brick:- 1.8 to 2.6gm/cc <ul style="list-style-type: none"> <li>• Bulk density:-</li> </ul> i) Fly ash brick:- 1.12gm/cc i) clay brick:-2.4gm/cc
3	Paints	Plastic non-VOC	Plastic VOC	Plastic VOC paint is a chemical process of painting it effects the environment and human health also. Plastic non-VOC is a eco friendly paint.
4	Plumbing Fixtures	Special Green Fixtures	Conventional fixtures	<ul style="list-style-type: none"> <li>• Green fixtures are environmental friendly.</li> <li>• Green plumbing fixtures includes:- Faucet discharge range between 5LPM to 8LPM Shower discharge range between 10LPM to 15LPM WC discharge range between 7LPM to 12LPM Each house saves 20% of water.</li> </ul>
5	Lighting Fixtures	Low watt LED tube lights and bulbs	Tube lights and CFL's	<ul style="list-style-type: none"> <li>• LED has long life</li> <li>• Energy efficient ( LED is about 80%-90% energy efficient)</li> <li>• Ecological friendly</li> <li>• Durable quality</li> <li>• Zero UV emissions</li> <li>• Design flexibility</li> <li>• Low voltage</li> </ul>
6	Windows and openings	Insulated glass	um paneled plain glasses	<ul style="list-style-type: none"> <li>• IG unit insulating glass is the most effective way to reduce air to air heat transfer through the glazing.</li> <li>• Nearly 15-20 % efficient then plain glass</li> </ul>
7	Installation rainwater harvesting	Provided	Not provided	<ul style="list-style-type: none"> <li>• Storage of rainwater on surface for future use</li> <li>• Recharge to groundwater</li> <li>• Water saving is about 444 liter/day</li> </ul>
8	Energy efficiency	Solar panel provided	Solar panel not provided	20% to 30% reduction in energy cost
9	Construction cost	\$ 38 million approx.	Rs. 130 crore approx.	Rs. 27, 05,285 approx. About 12.94% profit in green building.



## V. CONCLUSION

With increasing degradation of the environment because of increased energy consumption, environment, conscious building design has become urgent. The benefits of green design to society in general, and building owners and users in particular, are manifold. The construction of such buildings results in reduced destruction of natural habitats and bio-diversity, reduced air and water pollution, less water consumption, limited waste generation and increased user productivity. With increasing threat on our planet earth caused by depleting resources and increasing emissions it is absolutely pertinent that all our future buildings should be designed to function as “green buildings.

The conclusions that can be drawn from this comparative study of the green buildings situated at National Capitol Region which are as follows:-

- As per the study, initial cost of the green building is high but it gives benefits in energy consumption, low electricity bill and age of the structure.
- There is no facility in the conventional buildings for the green structures
- Mostly uses eco-friendly materials, cementitious wastages, recycles materials should be use to reduce the effect on the environment.

## VI. RECOMMENDATIONS

- Suitable control measures need to be adopted urgently in the city before it is too late. Here are some recommendations:
- The benefits of green design to society in general, and building owners and users in particular, are manifold. The construction of such buildings results in reduced destruction of natural habitats and bio-diversity, reduced air and water pollution, less water consumption, limited waste generation and increased user productivity.
- With increasing threat on our planet earth caused by depleting resources and increasing emissions it is absolutely pertinent that all our future buildings should be designed to function as “green buildings.

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