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Cost Comparison Between Normal Building and Green Building Considering Its Construction and Maintenance Phase

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Abstract:

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). In the developed countries like United States of America, Russia, Australia, United Kingdom, there are already strict measures been taken to achieve a sustainable development and also rules and regulations are been made by their respective governments to support and achieve a sustainable and an eco-friendly development of their nations. However, in the developing countries like India, China, Priyanka, Pakistan, etc., they are far behind in achieving a sustainable development and eco-friendly constructions. Also, there is a lack of awareness amongst the people about this global issue in these developing countries. The studies and the research work in these countries is also way far behind as compared to the developed nations in the world. This paper suggest some methods to opt the concept of green building without with minimum changes in cost needed for construction as compared to the conventional building. Also, it includes the sustainable and economic studies with references to the Indian contexts with a supporting live recent case study of a newly designed and constructed luxurious residential bungalow in a small town in India. The case study is specially selected as a residential building which is designed and constructed as a sustainable and a green structure. Increase efficiency in life cycle cost of building with the help of green building materials is the main motive of this research. This research study is related to selection of materials, which take less cost with same material properties after analysis of materials with the help of Revit software. This research study compares normal building and green building in construction and operational phase. This research will also helpful to find out how much extra cost required to construct green building and how much cost saves in energy consumption in life cycle period of green building.

Keywords- Green building technology, greenhouse gases.

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I. INTRODUCTION

There have been a lot of research works carried out on the aspects of the green building in different contexts but they all lack in systematic reviews of the existing material of knowledge. The main aspect to be considered while constructing a green building is the capital needed. This capital is potentially larger than that of the conventional building. But this cost can be covered throughout the life span of the building making it economical over time as compared to conventional building. Also systematic research is very important to identify the common research problems and also

highlight the future research methodology. There are many factors that an engineer must acknowledge when going into designing a new building. Some of the most important design philosophies one must consider is the safety, serviceability, and cost effectiveness of the structure... Due to the negative impact that construction industries have on the environment, the demand for green buildings is increasing. Green buildings emerged as a way of making the activities and operations of the construction industry sustainable to the environment and human health. When comparing a green building to a conventional one, a green building refers to a building that minimizes its impact on human health and the environment, uses less water and energy than a non-green building, has higher levels of indoor air quality, and accounts some measure of the lifecycle impact of choices amongst different kinds of building materials, furnishings, and furniture. Green buildings offer a variety of environmental, economic and social benefits when compared to a standard conventional building and for that reason, the demand for buildings to become "greener" has increased. Buildings, being the largest primary energy consumers are responsible for 33% of all energy-related carbon dioxide emissions worldwide. Energy consumption in buildings are mainly due to the use of lighting, heating and cooling, power and overall poor insulation. Multiple researchers have come to the conclusion that the demand for operating energy reduction appears to be the most important aspect for the design of energy efficient buildings, on the other hand, an energy efficient building requires more materials and, consequently, the environmental impact of the building in its construction and demolition phases is likely to increase significantly

II. METHODOLOGY

The This study is aimed at research, study and development of the green building construction techniques so as its construction and maintenance cost is as close or as economical as that of conventional building. Also, it aims at spreading awareness among the people all over the world, about the advantages and also the long term cost savings from green buildings.

Further, the structural methodology is structured as below:

1. Introduction
2. Literature survey
3. Study of the research topic in detail
4. To study the research papers, articles and magazines related to the topic of study.
5. Data collection from the proposed areas of study which includes large, medium and small scale construction projects.
6. Collection of information with the help of web surveys.
7. Finding out new ways and techniques for development of green construction.
8. Choosing a case study
9. Carrying out calculations
10. Drawing results based on calculations.

III. RESULT

Table 1.Personnel use Energy Calculation

Energy calculations			
Sr. No.		**Units**	**Cost**
1	**Total Consumption**	**32867.50**	**₹ 1,68,838.17**
2	**Public Use**	**3806.12**	**₹ 19,601.52**
3	**Remaining**	**29061.38**	**₹ 1,49,236.65**
4	**Per Flat**	**3632.67**	**₹ 18,654.58**
5	**Per Flat Per Month**	**302.72**	**₹ 1554.55**

Table 2. Cost comparison of materials

Cost Comparison			
Materials	**Cost(₹)**	**Green Material**	**Changed cost(₹)**
Red Bricks	800275.00	Porothorn Bricks	894960.00
Steel	887235.69	Reduced Steel	754150.34
Plaster	38252.80	Envo Plast	56272
C+S+A	513992.00	C+RHA+S+A	534996
Ceiling	0.00	Ceiling Acoustic Tiles	328066
Energy Generation Equipment	0.00	Solar Panels and Wind Turbine	357112
Total Cost	24,65,805.49		32,97,411.07

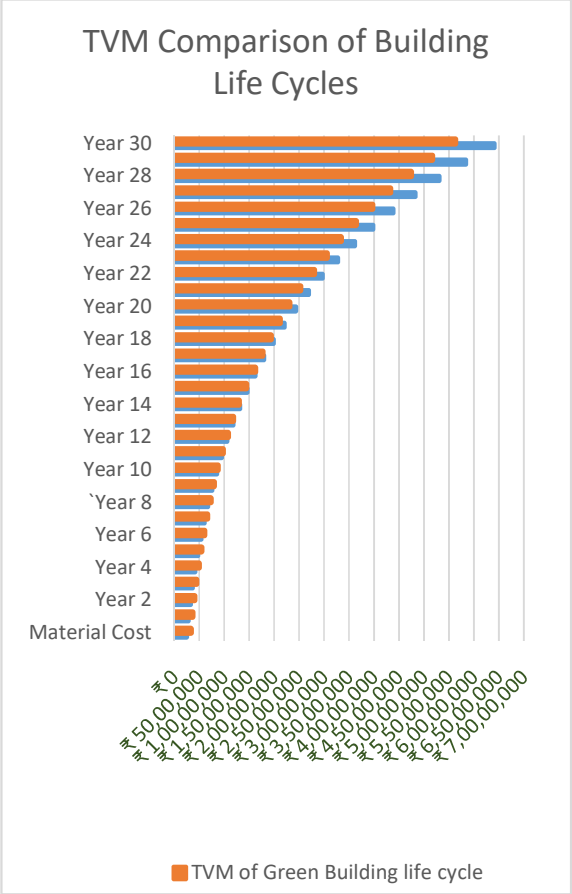

Fig 1. TVM of building Life Cycle

IV. CONCLUSIONS

The construction industry have been through tremendous changes in the way of construction. Over last 30 years, a lot of new techniques and trends are being opted to construct buildings. This paper stresses on the much-needed change in the method of traditional construction and shifting the focus on green building construction. The analysis conducted in this paper show that even though the initial construction cost of a green building is higher than that of traditional building, this extra cost can be covered over a span of few years i.e. in the operational phase of the building.

Also the most important benefit of the green building is the use of natural and eco-friendly materials over normal materials. This ensures that lesser pollution and concepts such as sustainable

construction can be obtained in construction industry. Green building can also save up to 40% of energy as compared to normal building since the use of more and more use of renewable energy sources. Lastly, green building also helps to reduce carbon emission thus helping in reduction of global warming

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