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"Theoretical Prediction and Modeling of Sustainable Standards for Green Buildings towards Effective Economic Growth through Better Ecological Standards and Building Heat Transfer."

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Abstract. Generally, green building construction is based on designs that are environmentally sensitive, and that preserve our physical resources. The two terms sustainability and green buildings have since become main streams and both public and provide owners recognize the savings that can result from incorporating many of the environmentally friendly schemes into their building programs. Normally, it is predicted that the impact of construction on the environment is considerably more and it has to be governed through proper policies and economical modeling as well. Basically, "sustainability" refers to sustain "economic growth", while maintaining long term environmental health. When applied to construction, sustainability means creating designs that seeks to balance the short term goals of a project with the long term goals of efficient operating systems that protect the environment and the resources of nature. Therefore, a modest attempt was made for predicting the feasibility factors of sustainability standards in green buildings as a process involved in designing and building and environmentally friendly structure. In this context a kind of new approach of modeling the ecological standards of green building and influence of building heat transfer are suggested for better futuristic buildings.

Keywords: Sustainability, Green Buildings, Ecological Dynamics, Energy Cost, Economic Growth, Modeling of Building Hear Transfer, Building Structures, Computer Application, Project Management Softwares.

1. Impact of construction on the environment

It is noticed that commercial and industrial buildings are having huge impact on ecological standards because of the following reasons.

- Basically buildings consumes 13% of all the available water and it is predicated in such a way that it influences more impact over the environmental issues.

- It is also predicted that buildings are normally consuming 40% of our existing raw materials.
- It is investigated that normally buildings are responsible for 35% of all green house emissions.
- Buildings are producing 33% of our total waste output and it is approximately calculated as 142 million tons annually in developing as well developed countries.
- Normally buildings in all the developing countries consume 38% of our total energy and nearly 62% of all utilizes electrical consumption.

Therefore, a huge impact of construction on the environment is predicted on all the developing countries, and of course, a great deal of control over environment for reducing harmful emissions has to be fixed by properly maintaining equipments that uses fossil fuels.

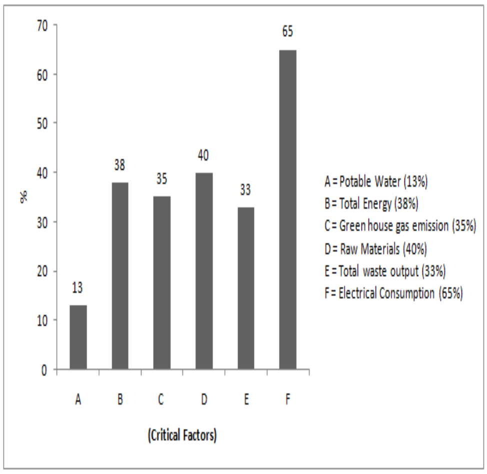

Fig. 1

2. Modeling of Impact of construction on the environment

Sr. No.	Critical Factors	Influencing Parameters	Percentage	Severity Index	Correlation Factor
1	A	Potable Water	13%	2	$\pm$ 0.002
2	B	Total Energy	38%	2	$\pm$ 0.003
3	C	Green house emission	35%	3	$\pm$ 0.004
4	D	Raw Materials	40%	4	$\pm$ 0.003
5	E	Total Waste Output	33%	3	$\pm$ 0.001
6	F	Electrical Consumption	65%	5	$\pm$ 0.004

The general modeling equation for the impact of construction on the environment implies that,

Feasibility Factor (S) =

$$\frac{(\text{\% of influencing parameter}) \times (\text{Severity Index})}{\text{Correlation Factors}}$$

Therefore,

$$(S)_A = \frac{13 \times 2}{\pm 0.002} = \pm 13{,}000$$

$$(S)_B = \frac{38 \times 2}{\pm 0.003} = \frac{76}{\pm 0.003} = \pm 25{,}333$$

$$(S)_C = \frac{35 \times 3}{\pm 0.004} = \frac{105}{\pm 0.004} = \pm 26{,}250$$

$$(S)_D = \frac{40 \times 4}{\pm 0.003} = \frac{160}{\pm 0.003} = \pm 53{,}333$$

$$(S)_E = \frac{33 \times 3}{\pm 0.001} = \frac{99}{\pm 0.001} = \pm 99{,}000$$

$$(S)_F = \frac{65 \times 5}{\pm 0.004} = \frac{325}{\pm 0.004} = \pm 81{,}250$$

Expected Impact Factor for construction on environment

$$EIF = \frac{(S)A + (S)B + (S)C + (S)D + (S)E + (S)F}{6}$$

$$EIF = \frac{13{,}000 + 25{,}333 + 26{,}250 + 53{,}333 + 99{,}000 + 81{,}250}{6}$$

EIF = + 49,694

[For fully developed / developing contrives)

Therefore,

EIF = + 49,694

[For fully developed countries]

EIF = - 49,694

[For under developed countries]

Therefore, it is necessary to incorporate these values in the context of ecological dynamics, governing equation by considering the change of climate over the building heat transfer, building structures and building materials for green buildings.

3. Influence of whole building design

It is considered as a process, wherein the building's structure, envelope, interior components, mechanical and electrical systems and even in site orientation are viewed holistically. The whole – building concept considers site, energy, materials, indoor air quality, acoustics, natural resources and their inter relationship with each other. In this context, new and proven technologies are introduced, weighed, debated and incorporated or discarded.

The main objectives of whole building design normally includes reducing energy costs, reducing both capital and maintenance costs recuing environmental impact of the building to the sites and ambience, increasing human/occupant comfort, health and safety measures, increasing employee productive etc.

<u>Modeling of the whole-building design: -</u>

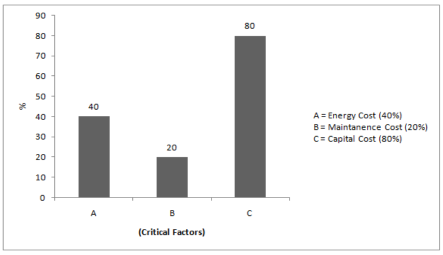

Fig. 2

Expected impact factor for whole-building design (EIF)

$= [\frac{2A+B+4C}{3}]^2$

$= [\frac{2 \text{ x } 40+20+4 \text{ x } 80}{3}]^2$

= 19,600

By considering the linearity in the strategies,

y = mx + c

Whereas, y = magnitude of EIF for building design

m = population of size of buildings

c = EIF for environment

x = correction factor ($\pm$ 0.003)

For a generic case,

y = mx + c

⇨ 19,600 = [X x + $(\text{EIF})_{\text{environment}}$]

19,600 = [X (0.003) + 49,694] (1)

19,600 = [X (0.003) - 49,694] (2)

Similarly, we can formulate the governing /modeling equation for different population size of buildings for different application.

4. Conclusion:

Generally it is predicted that green building structures of huge and massive loads are exhibiting eco-friendly approaches and energy savings are very high along with better utilization of the resources within the country itself. Hence a modest attempt has been made for modeling the green building affairs and suggested some of the essential standards for "Green Country" through green policies and procedures towards highest ecological standards and consistent sustainable development. Building information modeling plays a key role for optimizing the day to day requirements with user friendly and speedy operations with perfections. In general, normally two dimensional and three dimensional modeling are assisting the strategies for green structures, but time has come to implement four dimensional modeling also in all the best possible manners towards ease of operation and energy saving along with less environmental hazards.

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