

To Identify and Analyse Market Opportunities and Challenges for Green Building

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Abstract- Sustainability has become a necessity in the building industry. In recent years, as the general public is more informed and aware of sustainability related issues, they are becoming major players in the decision making process regarding their built environment. However, there are still challenges with how sustainability is communicated to occupants and owners of buildings. As the global economic crisis is continuing, the marketing of green buildings needs to be refined to communicate the lifetime benefits of sustainability. One of the ways to develop effective marketing strategies, is to understand what the occupants value the most among many aspects of green buildings thus develop focused marketing solutions. Green building concept is an opportunity to use the resources efficiently while creating healthier buildings that improve human health, build a better environment, and provide cost savings.

Index Terms- Green building, Sustainable development, Renewable resources.

I. INTRODUCTION

The real-estate and construction sector has been identified as an energy-intensive sector, with a global share of 32% of total energy usage. As a result, 19% of global greenhouse gas emissions can be attributed to the sector. In Sweden, 28% of national energy usage and 20% of greenhouse gas emissions can be attributed to the Swedish real-estate and construction sector. Greenhouse gas emissions have an effect on global climate, resulting in increasing temperatures, higher sea levels, and shrinking arctic sea-ice. However, this process can be mitigated and the real-estate and construction sector can be a great contributor to this endeavor, as energy savings in the range of 50–90% are possible to achieve using today's best practices.

The “modern-day” green building movement was fueled by the oil crisis in the seventies, which spurred the development of energy-efficient technologies. However, its origin can be traced back to the late nineteenth century. A newfound interest in green building design can be observed in the real-estate sector, revealed by the increasing number of green-rated buildings. However, in order for this interest to endure, there must be an economic benefit. To date, several studies have examined the linkage between green building features i.e. improved energy efficiency, better indoor climate, etc. and financial factors i.e. rents, market values, transaction prices, etc.

It had been a challenge for many green building rating systems such as LEED to determine which aspect of a building's sustainability was more or less important. Most rating systems utilized the environmental impact of each aspect of a building or interview a panel of experts to determine importance levels for those aspects. As many developers were still struggling with perceptions that green buildings had higher initial costs, it became critical to identify what aspects of these buildings were considered more important, especially by the people who would be buying it or living in it.

Understanding the client and the occupants is the first step in the development of responsible, efficient, healthy, and functional projects. Leadership in Energy and Environment Development (LEED) certified buildings create less waste; use less energy, water and natural resources; and are overall healthier and more comfortable for occupants.

II. RESEARCH OBJECTIVES

1. To identify the factor influencing Construction of Green building through Literature review.
2. To conduct a Questionnaire Survey among the construction firms in Surat to identify the causes and rank them by Relative importance index (RII) method.

III. MAJOR FINDING FROM LITERATURE REVIEW

1. Top 5 challenges in managing green building construction projects and there are Increase of Project Cost, Lack of Communication and Interest among Project Team Members, High Implementation Cost of Green Practices, Lack of Credible Research on Benefits of Green Buildings, and Lack of Interest from Clients. (6)
2. A green building is one where the qualities of both indoor and outdoor environment have been considered and protected during its design construction, maintenance and use. (14)
3. Preference for the selection of green building rating system in following manner LEED, BREEAM, GRIHA and GREEN STAR. (20)
4. The payback period for existing green buildings range from two to seven years, depending upon their certification level. (7)
5. Through educating, making environmentally products more readily accessible and reliable, and by providing government incentives it is possible to encourage more people to adopt green building and all of the benefits that come along with it. (21)
6. The client and the occupants are the first step in the development of responsible, efficient, healthy, and functional projects. (16)

IV. QUESTIONNAIRE DESIGN

The questionnaire design took into the consideration the objectives of the study with the aim to answer the research question. The Research questions were referred from the literature, and finalized with the help of the most experienced professionals, helps to identify the right questions required and present them in a clear format and also Special care was done for phrasing the questions that are easily understood by the respondents. A content involved in the questionnaire was divided into two major sections.

The initial part is about general information about the respondent, such as (1) Name, (2) Designation of the respondent, (3) Year of experience, (4) Contact address, and furthermore respondents were asked about factor influencing adoption of Green building in a construction firm. A 5- point scale was used to understand the perception of practitioners as 1. representing No importance, 2. Less importance, 3 Average importance 4. High importance, 5. Very high importance as indicated by the degree.

V. RESEARCH METHODOLOGY

The research methodology for this study has adopted questionnaire survey to identify factors influencing the construction of Green building in Gujarat region. To identify Green building factors, literature reviews, discussion with experts were carried out. From the existing literature on the construction industry, it was possible to identify certain major effects. A questionnaire was then drawn up. As the outcome of the review 35 factors were identified. These questionnaires were distributed to Engineer, Project Manager, Architect, and developer of a construction firm. The data from the questionnaire was analyzed using Microsoft excel. The perspective of the respondent has been analyzed to rank the factors based on their Relative important index. Relative important index method was used for hierarchal assessment of factors and found out the top most significant factors.

The questionnaire was designed so that it is easy to read and responses are easy to fill in. A scale of measurement will be applied for data measurement in the questionnaire survey. These sections were designed to obtain the responses on a scale that indicates the relative importance of various factors. Ordinal scale use in this study involve Very high importance (V.H), High importance (H.I), Average importance (A.I) ,Less importance (L.I), No importance (N.I) . However, abbreviation replaces with numbers i.e 1 for No importance; 2 for Less importance; 3 for Average importance; 4 for High importance and 5 for Very high importance. This will be adopted to understand the perception of personnel of the respondent involved in construction projects. The questionnaire has been given personally to the respondents and communicated to fill without hesitation or with no bias. In the study Relative

Important index (RII) have been employed and calculated for ranking of factor affecting Green building in the construction project. The RII is used to rank the different factors. These rankings make it possible to cross-compare the relative importance of the factors as perceived by the two groups of respondents. All the numerical scores of each of the identified factors were transformed to relative importance indices to determine the relative ranking of the factors. Higher the value of RII, more important is the factor affecting Green building construction in the Surat.

VII. DATA COLLECTION

Engineer, Project manager, Architect and developers of this Gujarat region were targeted for the survey. The details of various firms and their contacts were obtained through the internet and personal references. 62 samples of responses were to be collected from Engineer, Architect, Project manager, and Contractors. As the response rate is very low, the questionnaire was distributed to the various parties more than the sample size requirement. A total of 80 questionnaires were distributed to different respondents in Surat. The response rate was slow and timely reminders were also required. This study has received 64 responses. This was more than the required sample size. The Table-1 and figure-1 shows a stakeholder wise response rate as follows

Table-1 Stakeholder Wise Response Rate

| Stakeholder | Targeted | Response | No | Response |
|------------------|----------|----------|----|----------|
| Developers | 18 | 16 | 2 | 88.89 |
| Project Managers | 12 | 08 | 4 | 66.67 |
| Architects | 23 | 20 | 3 | 86.96 |
| Engineers | 27 | 20 | 7 | 74.07 |
| Total | 80 | 64 | 16 | 80.00 |

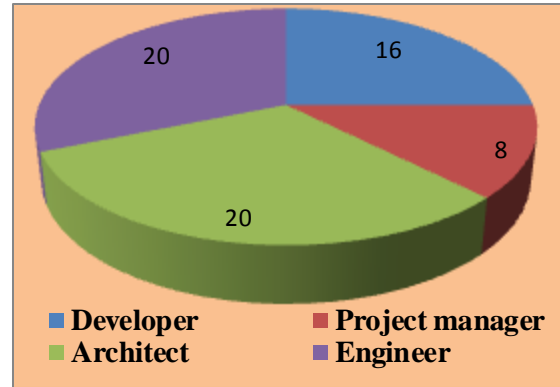


Figure-1 Stakeholder wise response rate

VIII. DATA ANALYSIS

Relative Importance Index Technique

Relative Importance Index method to determine the relative importance of the various factors among various parties. The Five-point Likert scale was adopted and it ranged from 1 (No importance) to 5 (Very high importance). This was transformed to Relative Importance Indices (RII) for each factor as follows:

$$RII = \frac{\sum W}{A \times N} \tag{eq.1}$$

Where W is the weighting given to each factor by the respondents (ranging from 1 to 5), A is the highest weight (i.e, 5 in this case), and N is the total number of respondents. The RII value had a range from 1 to 5 and higher the value of RII, more important was the cause of delays. The RII rankings made it possible to cross compare the relative importance of the factors as perceived by the four groups of respondents (i.e., Engineer, Architect, Project manager, and Developers). Each individual cause's RII perceived by all respondents should be used to assess the general and overall rankings in order to give an overall picture of the factor affecting Green building in Surat.

The ranking of factors has been done based on the relative important index (RII) value calculated for each group of respondent i.e. Engineer, Architect, Project manager and Developer) and also the overall respondents. Appendix-1 shows RII ranking of factors provided from Developer, Architect, Project manager and Engineers. The table 2 shows the top most significant factor influencing Green building, their RII value and rank obtain from overall respondents.

Table-2 The top most significant factor of Green building ranked by overall respondents

| Id.no | Factor | RII | Rank |
|-------|--------------------------------|------|------|
| 12 | Lack of awareness in adoption | 0.93 | 1 |
| 35 | Incentives provided by govt. | 0.91 | 2 |
| 27 | Local availability of material | 0.90 | 3 |
| 1 | Sales rate | 0.88 | 4 |
| 34 | Easy government clearance | 0.88 | 5 |
| 23 | Proper knowledge about GB | 0.86 | 6 |
| 28 | Skilled supervision | 0.86 | 7 |
| 5 | Amount of capital required | 0.85 | 8 |
| 4 | Unavailability of great demand | 0.83 | 9 |
| 13 | Appropriate sustainable design | 0.83 | 10 |

From the analysis of results, it was found that Lack of awareness in adoption, incentives provided by government, local availability of material, sales rate and easy government clearance, Proper knowledge about Green building, Skilled supervision, Amount of capital required, Unavailability of great demand and Appropriate sustainable design are ranked high by respondent. These most significant factors discuss in more detail as follows provided by the Engineer, Project manager, Architect and Developer.

IX. CONCLUSION

The present study distinguished and analyzed factor influencing Green building in the construction sector in Surat region. It was observed from the factor for Green building are Lack of awareness in adoption, incentives provided by government, local availability of material, sales rate and easy government clearance, Proper knowledge about Green building, Skilled supervision, Amount of capital required, Unavailability of great demand and Appropriate sustainable design. For the effective and proficient development of Green building projects, the author recommends that Government participation in such projects, proper knowledge about Green building, Stakeholder's keen interest in development and financial subsidies for such project may be adopted.

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