

Impact of Sustainable Construction on Business Decisions

Ar. Aishwarya Sanap¹, Ar. Asawari Sohni², Er. Ananthraman Srinivasan³

¹Research Scholar, S.Y. M. Arch Dr. D.Y. Patil College of Architecture.

²Professor, Dr. D. Y. Patil College of Architecture, Akurdi Pune.

³Director, Proconvis Consultants, Pune.

Abstract – The concept of sustainability is becoming more widely understood, and green construction approaches are becoming more widely adopted. Both the public and private sectors are concerned about environmental sustainability, which is driving the rise. Some construction firms view the green building movement as a threat, while others see it as a significant chance to set themselves apart from other commercial builders and gain a competitive edge. His study examines how adopting green certification for projects influences developers', investors', and organizations' business decisions. And propose mitigation measures to overcome the unfavorable impact on business.

Key Words: Green Construction Management, Business Strategies, Integrated Design Process, Green Construction Economics.

1. INTRODUCTION

The importance and benefits of Green Building design and sustainable construction practices are gaining an audience in the Indian construction industry. Although the green building movement is a recent phenomenon in India and is gaining momentum it is not a part of the mainstream architectural and construction practices. In the upcoming time, green building designs and sustainable construction practices will be the new norm in the Indian construction industry.

Green-rated buildings consume fewer resources than conventional buildings for execution, but alternative resources, materials, and design strategies are adapted to make them economically beneficial for the operation of the facility. There is an increasing demand for green-rated buildings as green building design is beneficial for consumers and independent users in the long term with reduced operating costs for the structure. But it is also important to understand how green building design can be beneficial for construction companies, investors, and developers.

Although there is awareness among the architects and designers regarding sustainable designs, developers, investors, and many infrastructure construction firms yet are hesitant to make sustainable design or green building construction as a way of going further. This is due to the stigma created in the construction industry of green building execution being more expensive and difficult to execute. This study will help understand how green rating programs shall Impact the businesses, the sales decision, and the Technicalities and will provide an Evaluation Matrix of how the green rating programs shall govern the Overall Construction Business Decisions.

1.1 Need for the study

There have been a lot of studies conducted on sustainable construction practices and policies and their importance in the Indian construction industry. However, there are no studies done to understand how the sustainable construction or green rating programs have changed and added value to the business management of organizations.

Over the period with new technology and practices introduced construction industry is becoming increasingly complex. Sustainable construction is gaining a lot of importance and awareness in the Indian construction and real estate industry. With the obvious benefits of sustainable construction for the environment and clients in terms of reduction in operational costs and ease of usability, there is a high demand for sustainable buildings. Due to new methods, designs, and materials in sustainable construction, as well as business, legal and technical concerns, sustainable construction projects require professionals with the knowledge and skills to deliver the project on time in an optimal way

With such advancement in the construction industry, it is evident that sustainability Norms and suppliers/vendor spectrum are co-dependent in a deep symbiotic manner. It is important to study and understand how the interrelationship of sustainability and business was started and where is it headed to attain the growth.

The purpose of this research is to understand how and in which phases of the project green rating programs impact the business decisions and whether they affect positively or adversely. It is important to understand this to determine how project managers or construction managers can smoothly implement these decisions for the project execution without adversely affecting the

project timelines and costing. Since sustainability will be the new norm in upcoming years institutions need to include this study for project management and construction management.

1.2 Research Background

Preliminary research was conducted through a survey to understand the drivers and challenges of adapting sustainable construction practices for developers in India. The analysis of the current situation is concerning in reflecting that despite the obvious benefits of sustainable construction many organizations are still reluctant to adapt sustainable construction practices. This study intends to pull out facts and findings and put the same on a neutral platform, to enable the organizations to understand the Positive Impact, and the Value adds due to sustainable construction practices, and also provide answers to all the negative Myths regarding Green Building Practices on overall Business.

1.3 Aim and Objectives

This research aims to study the beneficial and unfavorable effects of the green construction and certification for a facility on a business, in the different phases of the construction of the project and to understand the implementation of mitigation strategies for effective execution. This study will help understand how green certification for projects shall Impact the businesses, the sales decision, and the technical detailing and will provide an Evaluation Matrix of how the green rating programs shall govern the Overall Construction Business Decisions.

To achieve the aim of the paper the objectives defined are

- To identify different aspects that is affected by adapting green construction and the effects in different phases of the project.
- To determine whether green rating programs have beneficial or detrimental effects on business management.
- To identify mitigation strategies for the effects that are unfavorable for the business management.

1.4 Methodology

A construction project is a very complex task that is fragmented into multiple sub-tasks. The work practices within construction projects are highly distributed. Throughout the construction process, a great number of agencies: from a wide range of companies and local authorities and the vendors, enter and leave the project at different times. Considering these factors, a combination of qualitative and quantitative methods is used for the study.

This approach was implemented by a structured interview of different professionals from the industry involved in the project like the design team, Project manager, MEP consultants, procurement engineer, etc. to understand the effect of green rating programs a green-rated facility will be studied as a case study, to understand the process of implementation of green design and construction strategies in early stages of planning and scheduling of the project.

A comparative analysis will be carried out between a green-rated facility and a conventional facility to understand the effects of green rating programs on different aspects like design and planning, procurement, costing and finance, etc.



2. LITERATURE STUDY

The concept of sustainability is built upon the three pillars of environment, social, and economic factors. Investors and stakeholders have different perspectives on green buildings. Controlling and managing these attributes whilst incorporating green building practices is very crucial. Among the most significant challenges in business for green building is the cost factor. Other than the additional costs, green certification of the projects affects the business decisions throughout the life cycle of the project, to understand these data collection for the study has been framed based on the following factors:

- Green Project Requirements and Business Strategies
- Green Design and Construction Economics
- Material procurement and selection of the products
- Green Construction Management
- Green Construction Cost Analysis.

The questions for structured interviews to study the above-mentioned aspects and their impact on business are mentioned below:

Project Manager and Design Architects

- What drives the decision to have green certified facilities for clients?
- What was the preference for green certification program? Why?
- What was the green building design and delivery process?
- How do you structure an integrated multidisciplinary team for a project?
- What are the first steps in planning a green-rated construction project?
- How is project evaluation and analysis performed?
- How are contingencies managed for the project?
- How project is cost management performed?
- What are some additional risks to be considered for green rated facilities and how are they mitigated?
- How do Green certification regulations/guidelines influence your construction strategies?
- How do you prioritize tasks for project scheduling?

Procurement Managers

- What is your opinion on Materials selection: Natural versus Synthetic?
- How does Life-Cycle Assessment of Building Materials and Products affect the project budget?
- How do material and product selection and procurement affect the Costing for the project?
- How can the capital costs for costlier green rated materials be reduced?

3. GREEN PROJECT REQUIREMENTS AND BUSINESS STRATEGIES

There are several reasons why green building design and construction can be beneficial for building owners and developers.

In response to growing awareness about sustainable construction, many large companies are renting/building green-rated offices, etc. Companies like Rolls Royce, Amazon, and other large companies in the IT sector maintain green-rating policies for their offices and manufacturing/assembly plants as green buildings can enhance their corporate image.

Also, professionals in the industry believe that tenants will increasingly make the green features of a property an important consideration when choosing space over the next five years. Having this benefit, a higher valuation of the facility, and higher rental values, green-rated facilities are on the rise. The valuation for green-certified buildings is 72% higher and the rental values are 65% higher.

During a time of sharply rising energy costs, energy-efficient buildings tend to save on operating costs over time.

In addition to tax concessions and financial incentives, many government agencies provide additional incentives for green building, providing a compelling incentive for building owners and developers to take advantage of the "green" features of their development projects. Buildings that comply with green building guidelines will be much better suited to meet existing and future government regulations.

4. GREEN DESIGN AND CONSTRUCTION ECONOMICS

Integrated Design Process

Successfully implementing a sustainable building project requires an integrated design process with a clear and precise set of design objectives, which should be established early in the process and held consistently throughout. Designing and constructing a high-performance, green-certified building requires an integrated approach.

The construction team must be integrated into the project team. Ineffective construction practices can defeat or diminish many sustainable features. By engaging the construction team, including subcontractors and site workers, in the design and procurement process, such problems can be eliminated.

The majority of the success of developing a green-rated facility depends on the pre-construction phase of the project. With all the additional design parameters to be considered according to the green rating program guidelines, material selections are to be decided prior to the execution stage to make a project cost breakdown. The design process takes more time and is done with the integration of various agencies. The difference in timelines between green-rated and non-green-rated projects is 1.5 times.

Green Construction process

Although the construction process for green-certified and non-certified facilities is similar, there is a difference in the construction costs for both. Construction cost for a green-rated facility is 2% – 5% higher for industrial projects. And 10% higher on an average for any type of building (commercial/residential/institutional etc.)

The difference in the construction costs is due to the factors like selection of materials, the requirement for more skilled labor, etc. The cost of green buildings depends on various factors such as the building program, the demographic location, the rating being achieved (if at all) when green principles are applied in the project, and the competence of the designers with green concepts.

5. MATERIAL PROCUREMENT AND SELECTION OF THE PRODUCTS

The selection of materials is a major factor affecting the cost and timelines of the project. There has been a myth regarding natural and synthetic materials in green construction, of natural materials being more beneficial for the environment and synthetic materials being harmful. Although natural materials are environmentally beneficial, they have their limitations. There are numerous synthetic materials introduced which are not harmful to the environment.

Sometimes the use of natural materials can also affect adversely, for example, if we use natural clay bricks instead of AAC blocks for masonry construction, the dead load of the building can be higher resulting in a bulkier foundation design ultimately resulting in greater consumption of concrete.

The green certification programs like IGBC, LEED, and GRIHA have guidelines regarding the selection and usage of materials for construction which has its effects on business decisions. As per the guideline of green certification programs, it is advised to use green-rated materials and products. Use of Recyclable or reusable materials is suggested. The costs for these recyclable or reusable, green-rated materials are 5% - 10% higher.

The green certification program guidelines also require that construction materials be procured within a 5km radius of the site location. This reduces transportation costs for material, but due to less availability of green-rated vendors, some of the material must be procured from other locations, which can raise the cost.

As of now, due to the low demand for green-rated materials, their availability is somewhat lower, and they require longer lead times that must be incorporated into the project schedule.

6. GREEN CONSTRUCTION MANAGEMENT

The project manager is responsible for keeping up to date on the development of designs and providing advice to the integrated project team about costs as well as receiving feedback from the team. Continuous cost oversight is particularly useful for assessing individual decisions and is most useful on large and complex projects.

With most projects, deciding on building tactics early in the design phase and sticking to them can lead to the most cost-effective construction models. Lowering sustainable design construction costs can be achieved by holding a goal-setting session at the

start of each project to define acceptable techniques and levels of cost and time inputs. As previously said, many of these methods come at little or no additional expense, making green design an easy sell.

Typically, the best results are obtained when a project's operations and costs are linked. The integrated team should be engaged at an early stage of design using target costing, value management, and risk management. The time and costs overruns for green-rated facilities can be managed by effective project management by implementing the following:

- Financial management for the project.
- Efficient scheduling to consider tasks overlaps, delays, and lead time for material procurement
- Negotiations with contractors and vendors
- Inventory Management

The waste disposal of the construction site is also a part of construction management. The project must have a storage and collection of recyclables area to qualify for LEED certification. Its purpose is to reduce the amount of waste sent to landfills by encouraging the storage and collection of recyclables.

7. GREEN CONSTRUCTION COST ANALYSIS

Design costs

As an impact on the business, using a multidisciplinary project team is likely to take more time than a conventional design, which is reflected in project timeframes and costs. Hiring a green certification agency comes with an additional cost. Green-certified projects have design fees that are 70% higher than conventional projects.

Additional costs borne for green certification of a facility are a one-time registration fee of INR 20k – 25k and approximately 4lakh Rs. for 1lakh Sq ft of Built-up area (for industrial facilities).

Construction costs

The construction costs is affected by various factors like location of site, site conditions and features, selection of material and availability of materials and labor. The construction cost for a green-rated facility is 2% – 5% higher for industrial projects. And up to 10% higher on an average for any type of building (commercial/residential/institutional etc.)

Operation and Maintenance costs

It has been documented that green buildings save money through reduced energy and water consumption as well as lower long-term operation and maintenance costs. Typically, their energy savings alone will offset any costs associated with their design and construction within a reasonable period of time. The difference in the operating costs is 20% - 25%.

The operation costs are studied based on 3 factors:

reduction in costs for water consumption is approximately 22%

reduction in costs for HVAC or ventilation systems is approximately 25%

reduction in costs for electrical consumption is approximately 15% - 20%

The operation costs of a facility also include Operating staff, Labor and material for maintenance and repairs, Periodic renovations, Insurance and Taxes, and Utilities. Although the need for maintenance and repairs could be lesser in the green-certified facilities, depending on the selection of materials, the costs for repairs for labor and material are higher.

Depending on the project's type, size, location, management organization, and other factors, each of these cost elements has a different effect. The owner's ultimate goal is to achieve the lowest overall project cost while meeting the specified quality and investment objectives.

8. CONCLUSION

- Although the capital costs for green-rated facilities are higher currently, the return on investment for the green-rated facilities is much faster (1.5 Years) as compared to non-rated facilities (3 Years)
- With the current growth in the market and competition for green-rated products the gap in the construction costs can be minimized over time with increased demand for green-rated products and materials. The fact that the cost of green

design has decreased dramatically in recent years as the number of green buildings has increased has aided green development. The tendency of decreasing costs as experience with green building development grows has presented itself.

- The green-rated buildings generally have better financial performance in terms of lower operation costs due to less energy and water consumption and faster pay back period. It also has financial benefit of higher valuation, higher rental values, greater return on investment and higher occupancy rates.
- Green certification not only has financial advantages, but also demonstrates an organization's commitment to the environment and contributes to building its reputation, which is an additional benefit for marketing and networking.

When analyzing the costs and advantages of sustainable design and how they relate to construction costs, a holistic approach is required. This entails, among other things, financial analysis of operations and maintenance expenses, user productivity and health, and design and documentation fees. This is partly due to the fact that empirical evidence continues to show that the construction cost implications have the biggest influence on sustainable design decisions. Providing a framework that allows teams to effectively manage the actual construction costs of real green projects can go a long way toward assisting a team's capacity to go past the question of whether going green is the right choice.

9. ACKNOWLEDGEMENT

I would like to thank my guide Er. Ananthraman Shrinivasan sir for his valuable insight on the topic as a working professional of the industry and director of a company and his guidance on the framing of objectives and refining of my project. I would also like to extend thanks to the project managers of the facilities of whom the case studies were done.

I would also like to thank my faculty Er. Asawari Sohni, Assistant professor, Department of Architecture, Dr. D. Y. Patil College of Architecture, for her guidance.

REFERENCES

- [1] Mr. Prithviraj Dilip Mane. "Green buildings and sustainable construction"
- [2] A Suchith Reddy¹, Dr. P. Rathish Kumar², Dr. P. Anand Raj³ "Sustainable construction- an Indian perspective"
- [3] Devarshi Tathagat, Dr. Ramesh D. Dod. "Role of green buildings in sustainable construction- Need, Challenges, and Scope in the Indian Scenario"
- [4] Mohammed Arif and Charles Egbu - Abid Haleem - Dennis Kulonda - Malik Khalfan. "State of green construction in India: Drivers and challenges"
- [5] Sam Kubba. "Green Construction Project Management and Cost Oversight"