

Green Building for a Sustainable Society



Environment

KEYWORDS : Sustainability, Green Buildings, Eco-Friendly Construction

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ABSTRACT

The housing sector in India is growing at a rapid pace and contributing immensely to the growth of the economy. This augurs well for the country and now there is an imminent need to introduce green concepts and techniques in this sector, which can aid growth in a sustainable manner. A green building is one which uses less water, optimizes energy efficiency, conserves natural resources, generates less waste and provides healthier spaces for occupants, as compared to a conventional building".¹ According to USGBC and its Leadership in Energy and Environmental Design (LEED) program, green buildings reduce the negative impacts of buildings on occupants and the environment in five general categories: sustainable site planning, safeguarding water and water efficiency, energy efficiency and renewable energy, conservation of materials and resources, and indoor environmental quality.² Green concepts and techniques in the residential sector can help address national issues like handling of consumer waste, water efficiency, reduction in fossil fuel use in commuting, energy efficiency and conserving natural resources and has a carbon foot prints.³ Most importantly, these concepts can enhance occupant's health, happiness and wellbeing.

INTRODUCTION

Architecturally, a residence is a home, mansion, cottage or even grand castle and palaces.³ If the home is decorated it gives the illusion that our life is more interesting than it really is. Interior design is also more than a profession which creates an interior environment for the pleasure of its inhabitants. Color choices, styles of furniture, space planning, textures and lighting are just a few of the intricate details involved in designing an interior.² It is a multi-faceted profession in which creative and technical solutions are applied within a structure to achieve a built interior environment that solves the customer's problems and links space to business strategies and goals. The design process, at its best, integrates the aspirations of art, science, and culture.³

Architects main responsibility is not to pick and choose the "best" solution but to incorporate all options that might generate workable solutions. There are no single formulae of what and how much to use. There is an urgent need of a new way of thinking and designing to reduce ecological foot prints.⁴ Architect should focus on using durable, low-maintenance, recyclable and economical materials and technologies which constrain breakdown, wear-and-tear, and replacement of materials and technologies will make building sustainable.

The twentieth century saw a tremendous development of a materialized civilization and rapid urbanization all over the world including India.⁵ As a result, unfortunately there has been the emergence of various global problems, such as global warming, the destruction of the earth's eco system, over use of natural resources, and accumulation of waste. In this regard, we now have to recognize the urgent need to realize a sustainable society, by preserving the global environment while maintaining the health and safety of the human beings at the same time. Therefore, the basic objectives for the 21st century must be the endeavor to create architecture that must be based on longevity, harmony between the social and natural environments, conservation of energy and resources, cyclicity and succession.⁵ Green buildings have existed in many world cultures for centuries. It is not a new approach. It has existed since people first selected south facing cave rather than one facing north to achieve comfort in a temperate climate. Building materials like adobe clay or green roofs in European towns are models for the modern green building movement, which began in the late 1980s.

It is the practice of increasing the efficiency with which buildings and their sites use and harvest energy, water, and materials; reducing building impacts on human health and the environment, through better siting, design, construction, operation, maintenance, and the complete building life cycle. It requires a holistic approach that combines the best of building performance science by looking critically at how every part of a building interacts with other parts and maximizes efficiency,

durability, natural building, choosing healthy, beautiful, locally produced materials.

A green building is one which uses less water, optimizes energy efficiency, conserves natural resources, generates less waste and provides healthier spaces for occupants, as compared to a conventional building".¹ The USGBC (U.S. Green Building Council), created in 1993, is the leading authority in green building initiatives with its LEED accreditation and certification program. According to USGBC and its Leadership in Energy and Environmental Design (LEED) program, green buildings reduce the negative impacts of buildings on occupants and the environment in five general categories: sustainable site planning, safeguarding water and water efficiency, energy efficiency and renewable energy, conservation of materials and resources, and indoor environmental quality.

The housing sector in India is growing at a rapid pace and contributing immensely to the growth of the economy. This augurs well for the country and now there is an imminent need to introduce green concepts and techniques in this sector, which can aid growth in a sustainable manner. Green concepts and techniques in the residential sector can help address national issues like handling of consumer waste, water efficiency, reduction in fossil fuel use in commuting, energy efficiency and conserving natural resources. Most importantly, these concepts can enhance occupant's health, happiness and wellbeing. This triggered a keen interest to take up this Study on Green Building with the following objectives

AIM AND OBJECTIVES

- Elicit Information from interior designers and architects on green buildings.
- Determine the views of the users about green building and its impact.
- Find out the materials available in the market.
- Study the existing residential green buildings.
- Create awareness among target groups.
- Develop green building design for its application.

METHODOLOGY

Chennai formally known as madras, the capital city of the Indian State of Tamil Nadu was selected for the study. A survey was conducted among 25 Interior designers and Architects as well as 50 clients of high and upper middle income families residing, at

T- Nager Anna Nagar, puraisaivakkam and sowcarpet. An awareness was created among a selected group of 50 enthusiastic members to have an exposure on importance of green architects, green materials and cost effective green technologies. It was carried out with the development of course content on

Environment sanitation, given in Table – I

TABLE -I- COURSE CONTENT DEVELOPED

Topic	Course Content	Method used
Environmental sanitation	<ul style="list-style-type: none"> Types of pollution: air ,water, soil and noise Sources :Building construction ,demolition, building materials, mechanical devises 	Slide shows, lecture
Green buildings and its benefits	<ul style="list-style-type: none"> Green building- An Introduction Importance of green building Sustainability as an element Energy efficiency, Water Conservation, grey water utilization, enhanced air quality, excellent day lighting, health and safety benefits of people, and conservation of scarce national resources. 	Lecture , Slide show and group discussion
other Informations	<ul style="list-style-type: none"> Existing green buildings. Future green building projects. Various Green building consultant and builders. 	Photographs lecture, slide showing

Two case studies were done. One in which Viswa Syamalam and other is Isha mia villa. 'Viswa Syamalam' a residential building of 3,790 Sq Ft in Chennai, is amongst the first Green Homes, rated highest 'Platinum' by the Indian Green Building Council (IGBC) and the second case study on Isha Mia Villas was an eco-friendly gated community, which consists of 106 independent villas, set in over ten acres of lush greenery.

RESULTS AND DISCUSSION

The findings of the study on "Green Building For a Sustainable Society" are discussed under the following headings:

A) Information Obtained on Green Building

a) Architects and Interior designers/ Green builders.

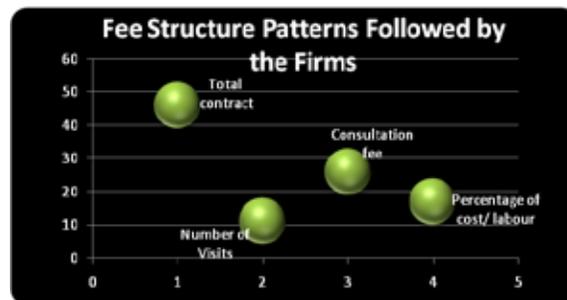
The general profile of Green Builders and Architects belonged to the age group of 24-45 and above 45(48 and 52 per cent). With reference to their educational status, 32 per cent and 30 per cent were B.E., Civil Engineering and B.Arch Nearly 50 per cent of them had 5-10 years of experience. Eighty three percent of selected interior designers and architects drafted the plans using Auto cad, 3ds Max, Archie Cad, Rivet etc (fig -I). The green materials were purchased locally on the basis of quality, quantity and the cost. All of them aspired to complete the project successfully, which could fetch good will and more clients in future .Seventy two percent of them obtained clients through advertisement. Nearly 99 percent of the employee of the firm were expected to have software skills(auto Cad, 3ds Max, Archie Cad, Rivet etc.) .Other than this practical knowledge in the field and tactfulness was also importantly considered.

Special features of the firm (fig -I) as expressed by Interior designers and Architects were, job satisfaction (100 percent), innovative ideas (92 percent) and client satisfaction (86 percent) . Cent percent maintained good marketing. Advertising in yellow pages was the major media followed to attract clients. Maximum of 46 percent of them, the fee structure was on total contract (fig -II). They also expressed that they will stick on to the contract at the maximum, sometimes might be changed according to the necessity.

FIGURE -I



FIGURE - II



a) Clients

The selected clients from high and upper middle income groups were well settled and had a good educational profile. Forty one percent of their houses were constructed with the total area of 2000-2500sqft. Thirty three percent were constructed during the year 2006-2010. Table-II includes information on materials used for construction by the selected clients and specification as shown in Table III.

TABLE -II - MATERIALS USED FOR CONSTRUCTION

Details*	Percentage (N=50)
Water installations without PVC	68
Materials with environmental certification	92
Foam materials are completely avoided or minimized	86
Gravel replacement crushed concrete	100
flooring materials -wood ,natural stone or ceramic tiles	100
Insulation materials of recycled organic origin	98
Low "not renewable" energy consumption materials	89
Special care to the local weather conditions	78
Use of glass and windows and cross ventilation	96
Thermal mass as a basis for storage of solar gains	100
Avoidance of air condition/cooling systems	98
Recycled bricks and tiles.	94
Designed with natural or hybrid ventilation.	

*multiple response

TABLE III - SPECIFICATIONS OF THE BUILDING

Details	Percentage (N=50)
Water ,Rainwater- Rainwater harvesting facilities	100
Use age of Rainwater(gardening &toilets)	90
Individual water meter	66
Utilization of Grey Water	54
Indoor Air Climate - Balanced ventilation	100
Cross ventilation	100
Indoor material with climate certification	96
Noise insulation (below 25db)	84

Energy Utilization - Natural energy utilized	100
Installed Individual consumption displays	82
Useage of solar water heaters	98
Hot water taps -limited (centrally placed)	92
Low-energy consumption lighting	100
User-activated specific lighting.	100
Waste Disposal - Proper provision for waste disposal.	100
(solid and waste) Treatment before disposal.	84

B. Awareness

The impact of the awareness program is given in Table IV. After the awareness cent percent of them expressed that they gained knowledge on green concept, cost effective green technique in green buildings, realized that green techniques are economical and not expensive, green building are essential for future world, healthy housing ensures healthy family living.

TABLE IV -IMPACT OF THE AWARENESS PROGRAMME

Details	Percentage (N=50)
Realized the need for sustainable architecture.	92
Gained knowledge on green concept	100
Cost effective green techniques in green buildings	100
Realized that green techniques are economical and not expensive.	100
Green buildings are essential for the future world	100
Realized-Healthy housing ensures healthy family living.	93
Reduces ecological foot prints and protect the environment	98
Green techniques must be mandatory in approval of the building plan	72

C. Presentation of Case Study

'Viswa Syamalam' a residential building of 3,790 Sq Ft in Chennai, is amongst the first Green Homes, rated highest 'Platinum' by the Indian Green Building Council (IGBC). The salient features of Viswa Syamalam which follows green trends starting from site selection, planning, structure design, water and energy efficiency, materials and indoor environment quality. Innovation, design process and operations and maintenance optimization, waste and toxics reduction are also included as a part of typical overall green building evaluation.

The second case study on Isha Mia Villas was an eco-friendly gated community, which consists of 106 independent villas, set in over ten acres of lush greenery. Green materials used were forest certified wood for doors, R.C.C. framed structure, fly ash solid blocks, Low VOC paint for interior and external wall, eco-friendly UPVC operable windows with single glazing low heat transferring glass with wall mounted M.S. Grill. Solar power, windmills, herb and kitchen garden, power for eco vehicles, bicycles, solar fencing, heat resistant roofs and windows, solar waste management are the other green elements and technologies implemented in Isha Mia Villas.

Recommendations:

Taking advantage of natural, renewable resources, recycling and reuse emphatic at Viswa Syamalam, for which the Architects had given the following key agenda for designing green buildings:

- Least carbon foot print and lowest energy loads and consumption
- Utilization of renewable energy
- Lowest operating and maintenance cost with positive life-cycle benefits
- 100 % self-sufficiency in water and to be a water positive home
- "No electric light" during daytime

Excellent ventilation for round-the clock freshness in the entire premises and to ensure that whenever ambient is less than 28°C there is no need to turn on air-conditioners.100% re-utilization of any refuse, waste material during construction and consider only eco-friendly materials and practices.To operate as a "zero waste" home.

Sustainable Site and Practices

In line with Green Buildings' requirement, soil preservation was given utmost importance – top soil was preserved and used back for horticulture purposes, steps taken to prevent soil and water runoff. Construction debris and refuse was used back in the premises.For local transport bicycles are used and for family commuting hybrid car being used and predominantly electric trains and public transport are relied upon. Materials with high solar reflectance and thermal emittance on the roof to meet Green Buildings' minimum requirement of 50% have been used in this building.

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