

BARRIERS IN GREEN BUILDING CONSTRUCTION IN MADHYA PRADESHDr. Dinesh K. Swarnkar*¹,
Mohan Kantharia²¹Professor, Department of civil engineering
Modern Institute of Technology & Research Centre, Alwar (Raj.)
dineshswarnkar2010@gmail.com²Assistant professor, Civil Engineering, Amity School of Engineering and
Technology, Amity University Madhya Pradesh.
mkantharia@gwa.amity.edu**ABSTRACT**

Urbanization in India has increased from 26% in 1991 to 34% in 2015 and is expected to increase to 36% by 2020. Urban population in 1991 and 2015 are 218 million, 431 Million respectively. And expecting in 2020, 495 million people will be living in Urban India. Out of India's total urban housing shortage of 18.78 million, Madhya Pradesh having around 6% of it with 1.1 million urban housing shortage (census2011). Also urban population of Madhya Pradesh increases from 25.27% in 1991 to 32.63% in 2021 and expected 38.56% in 2031. Madhya Pradesh is the one of the states which have very low rank in green movement though having 27.63% urban population. (Source-Russell M. Smith(2015) Asian Geographer). That's insist to identified in an extensive survey & search, about information regarding barriers to green design and construction in Madhya Pradesh in India. This study was intended to document identification and degree of barriers for implementation of Green building design by builders & Developers, building contractors& Consultants(Architects and consulting engineers) .Results shows , Professionals engaged in building construction activities in Madhya Pradesh, identified "Availability of trades / sub-contractors with green experience"(49%) as most critical barrier, followed by "Lack of expressed interest from Clients" (46.7%),"Cost of green products/ technology"(40%) as the most critical barriers.

Keywords: - Green buildings**INTRODUCTION**

India is currently witnessing a construction boom owing to rapid urbanisation and the increased housing and infrastructure needs of a growing population. The urban population has grown by 3.35% a year since 2001, and 31% of the total population now live in urban India, 370 million people. The urban population is expected to increase to about 600 million by 2030 (Census of India, 2011). Currently, much of this urbanisation is occurring in small cities and towns, and the number of towns increased from 2,774 in 2001 to 7,935 in 2011(Census of India, 2011). According to a report by Pricewaterhouse Cooper (PwC), *Global Construction 2020*, India is poised to become the world's third-largest construction market by 2018. Major growth will be seen in residential and commercial construction. Figures shows the predicted increase of 4,972 million m² in residential area between 2005 and 2030. A similar trend is predicted for commercial buildings. Demand for commercial property has increased to meet the needs of businesses for offices, warehouses, factories and other industrial buildings. Construction activity in the residential market is driven by the growth in the number of nuclear families and the rising urbanisation rate, as well as government support and state investment in affordable housing schemes. The growth rates in hospitality and retail sector are also high although their total areas are relatively small (Parikh, 2011).

The energy used in building construction, and, the energy used by existing buildings is responsible for "40% of global energy use and 42% of the world's greenhouse gas emissions" (Majumdar, 2010).Shah (2001) in her report for Agenda 21 states "Considering the large volume of investment in public and private construction; polluting and energy intensive methods of building materials production and use; low levels of technology development; unorganized and untrained nature of work force and potential for environmental damage by unsustainable technologies, materials and practices, interest and awareness on sustainable construction are limited, efforts are marginal and symbolic and impact is negligible. Issues related to construction sector are many and complex. However, sustainable construction, as things stand today, is not seen as a priority concern or issue." The challenges faced for development of green buildings in India are the extra investment in an unstable real estate market scenario and difficulty in sourcing green building materials and sustainability consultants

(Roy & Gupta 2012). The need for Green construction is the must and consequential for achieving a better and healthy future.

THE IMPACTS OF CONVENTIONAL BUILDINGS

The negative environmental consequences of conventional building practices are well documented. According to the USGBC "Green Building Facts" (February 2009), in the United States, buildings account for 72 percent of electricity consumption, 38.9 percent of energy use, 38 percent of carbon dioxide emissions, 30 percent of raw materials use, 30 percent of waste output (136 million tons annually) and 13.6 percent of potable water consumption (equaling 15 trillion gallons per year). According to the Rocky Mountain Institute (RMI), a non-profit sustainability consulting organization, there is a "culture of inefficiency" in the way that buildings are designed and built that is extremely resource-intensive. This usage translates into deforestation, air and water pollution, stratospheric ozone depletion, and increases in the risk of global warming (Roodman and Lenssen, 1995).

GREEN BUILDINGS

A Green Building can be defined in various ways. But in its essence every definition of green building includes efficiency and conservation of the environment. The basic idea behind green building can be captured in the following definitions:

When buildings provide their own energy, purify their own wastes, participate in a cyclical flow of materials, and are flooded with natural light and fresh air, making people feel fully alive, there will be an improved balance between humans and nature and a much healthier planet and happier populace (Krasner, 1980).

The Indian Green Building Council (hereinafter referred to as IGBC) "*A green building is one which uses less water, optimises energy efficiency, conserves natural resources, generates less waste and provides healthier spaces for occupants, as compared to a conventional building.*"

The Energy and Resources Institute (hereinafter referred to as TERI), is an organization working in the area of sustainable development. According to this not-for-profit organization "*A Green building is designed, constructed and operated to minimize the total environmental impacts while enhancing user comfort and productivity.*"

Green buildings, both new and retrofitted, are designed for passive solar heating and cooling with efficient HVAC (Heating, Venting, and Air conditioning) systems. They offer abundant natural light and a harmony to seasonal rhythms. Generally, they produce their own renewable energy and store it. They use non-toxic, eco-friendly materials, furnishings, and finishes that greatly improve indoor air quality.

BARRIERS AND CHALLENGES IN IMPLEMENTATION OF GREEN BUILDING DESIGN

Retzlaff (2009) determined that cost was a major issue in implementing the LEED program as a standard for communities. Additionally, she found that a lack of expertise regarding the standards by local officials was a major impediment. Jain, Mital, and Syal (2013) found additional obstacles with the implementation of green standards (specifically the LEED-EB standard) in India including: lack of awareness among stakeholders, lack of technology in India, standards that were created specific to the USA and not applicable to India, lack of skilled professionals and high renovation costs associated with existing buildings. Jain, Mital, and Syal (2013) did find that an increase in the prestige of the project and reduced operating costs were catalysts motivating the greening of existing buildings. However, no research has attempted to explore the spatial distribution of LEED-India and GRIHA projects. The barriers associated with the adoption of green building are also enumerated by (Bondareva, 2005; Dalal-Clayton et al., 1994; Landman, 1999; Potbhare et al., 2009b) as follows :

- I. Lack of infrastructure, for example information related to green building guidelines at local or regional levels, availability of certifying agencies, and demonstration projects.
- II. High cost associated with the certification, "green" products and technology.
- III. Unclear information on the recovery of long-term savings on the adoption of "green" technology or products in the projects.
- IV. Unorganized nature of the construction industry.
- V. Lack of incentives such as tax relief or grants from the government.
- VI. Lack of financing from banks for adopting green building guidelines.
- VII. Lack of education or training in construction or sustainable design.
- VIII. Lack of expressed interest from clients such as owners or developers.

- IX. Lack of technical understanding on the part of subcontractors and product manufacturers related to “green” technology.

GREEN BUILDING RATING SYSTEM IN INDIA

In India, the two main rating systems are the Green Rating Integrated Habitat Assessment (GRIHA), developed by TERI and the Ministry of New and Renewable Energy, and Leadership in Energy and Environment Design (LEED), operated by the Indian Green Building Council (IGBC). As on 30 July 2007, total 950 green projects registered with GRIHA, out of which only 35 projects i.e. 3.68 percent are from Madhya Pradesh. Similarly by July 2017, 4164 Green Buildings projects coming up with the Indian Green Building Council (IGBC), out of which 1081 Green Building projects are certified and fully functional in India but again contribution of Madhya Pradesh is very low.

RESEARCH DESIGN AND METHODOLOGY

The study is based on both Primary and Secondary data. The primary data consists of information collected from journals, magazines, books and internet. The secondary data is collected by means transit walk & individual interaction, questionnaire. Questionnaires were prepared for builders & Developers, building contractors & Consultants (Architects and consulting engineers). The questionnaires were of structured non-disguised type. The research method also implemented is a phenomenological study for data collection, using unstructured telephonic interviews. The questionnaires are designed to produce information on respondent's views on issue of barriers and incentives required possible adoption of green building concepts in construction projects in Madhya Pradesh state in India. The study adopted random sampling techniques for questionnaire survey.

RESEARCH DESIGN OVERVIEW

Data collected from four cities (Gwalior, Bhopal, Indore, Jabalpur) from Madhya Pradesh in India. The sample was purposefully selected to include the all players in cities. Although the interview was unstructured, the following topics were addressed in each interview: perception of Green design, awareness of Green design, and perceived barriers to Green design and Construction 237 Professionals were contacted for questionnaire survey, out of them 124 was responded with response rate of 52.3%. as per Moser and Kalton (1971), with the response rate of 52.3% the result of a survey indicate an unbiased and higher value of survey.

Analysis Of Barriers In Green Building Design/ Construction In Madhya Pradesh

To analyze the barriers in acceptance of green building movement in Madhya Pradesh barriers identified from literature review and preliminary discussions with professionals engaged with building construction industries are listed in table number-1, Coding of barriers done for easiness in tabulation and figure formation.

Table No. 1 – List Identified Barriers

Code	Barriers	Code	Barriers
B 1	Lack of green building movement at local levels	B 8	Lack of communication between contractor, subcontractors, suppliers, manufacturers
B 2	lack of infrastructure at local level	B 9	Unreliable "green" technology
B 3	Unorganized nature of construction industry	B 10	Availability of trades / sub-contractors with green experience
B 4	Not sure where to find information related to green building	B 11	Suppliers' knowledge of green products
B 5	Lack incentives (tax relief, grants, etc)	B 12	Availability of green products
B 6	Lack of training / education in green design / construction	B 13	Reliability of green products
B 7	Lack of expressed interest from clients	B 14	Cost of green products/ technology

SUMMARY OF RESULTS FROM SURVEY

we are trying to identify city wise barriers, to facilitate acceptance of green building as a whole of Madhya Pradesh by adoption of regional level guidelines in light of barriers identified.

Gwalior – In Gwalior , the most critical barriers as identified are related to public awareness, cost of technology, workmanship and nature of construction industry. “Cost of green products/ technology” find as the most critical barrier with 62%, followed by “Availability of trades / sub-contractors with green experience”(52%) and “Lack of expressed interest from Clients” (52%) are second the most critical barriers;” Unorganized nature of construction industry”(38%) is third most critical barrier.

Bhopal – In Bhopal , the most critical barriers as identified are related to public awareness, cost of technology, workmanship, suppliers, and availability of local infra structure. “Lack of expressed interest from Clients” (43%), “Availability of trades / sub-contractors with green experience”(43%) and “Suppliers' knowledge of green products“(43%) are the most critical barriers as identified from analysis of data, followed by “Cost of green products/ technology”(37%) and “Lack of infrastructure at local level”(26%) are second and third the most critical barriers”.

Indore –“Lack of expressed interest from Clients”(43%) identified as most important barrier in adoption of green building in Indore. , other three barriers are related to government; “Lack of incentives”(43%) by the government, as tax relief, grants, governmental subsidies, “lack of infra sturcture at local level” (39%) i.e. local disincentives, “Lack of green building movement at local levels”(39%)

Jabalpur – Analysis of data shows that responses from Jabalpur follow more or less same trend as followed by Gwalior and Bhopal. “Availability of trades / sub-contractors with green experience“(75%), “Lack of expressed interest from Clients” (42%) “Availability of green products “(37%) , “Lack of training / education in green design / construction “(25%) and “Unorganized nature of construction industry “(25%) are identified as the most critical barriers in descending order.

Madhya Pradesh - as a whole, Professionals engaged in building construction activities, identified “Availability of trades / sub-contractors with green experience“(49%) as most critical barrier, followed by “Lack of expressed interest from Clients” (46.7%),“Cost of green products/ technology”(40%) as the most critical barriers.

INTERPRETATION

Based on the analysis of the questionnaire survey, following are the final consolidated key findings

- ★ 49% of the professionals in Madhya Pradesh are found to be reluctant in using green building technology because of shortage of skilled manpower to execute green building..
- ★ 46% of the respondents from Madhya Pradesh do not opt for green building technology because of lack interest from client.
- ★ 40% of the respondents from Madhya Pradesh are reluctant in using green building technology because of higher cost of green products/technology at construction stage.
- ★ 62% of the respondents from Gwalior do not engage in green building development because of the higher initial investment which is associated with green building.
- ★ More than 95% of the respondents from Indore think the Government and City Administration should take steps to facilitate green development by improving infra structure at local level, providing incentives and initiating green building movement at local levels.
- ★ 75% respondents from Jabalpur find non-availability of trades / sub-contractors with green experience most critical barrier for green building adoption.
- ★ More than 40% of the respondents in Madhya Pradesh, agreed that “availability of better information about financial aspects of green buildings” motivate the adoption of green building.
- ★ 34% of the respondents from Madhya Pradesh suggested, to conduct Educational programs for professionals, are very important incentive for green movement incitation.

RECOMMENDATIONS

Based on the Analysis and Interpretation, following is a set of recommendations in order to make green building development feasible in the Madhya Pradesh :

- ★ In order to generate awareness among the public regarding green building development, an effective promotional campaign should be designed to targets the majority of potential buyers.
- ★ The Government of Madhya Pradesh should engage in organising training programs for developers and engineers, as well as for technician, in which they are trained for green technology and other issues associated with green building construction.
- ★ A need of make efforts to facilitate availability of green building material with adequate standardization to develop trust on green products.

- ★ The Government should also encourage partial funding of green building projects so that the developers can easily develop green projects and the potential buyers develop a sense of trust in the green projects because of the Government intervention.

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