

Examining the Technological Approach to Environmentally Sustainable Architecture in India

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Abstract--- *Sustainable architecture is a major issue in light of the environmental degradation that the world faces today. This paper argues that there is a need in India to extend the technological understanding of sustainable architecture to incorporate the socio-cultural aspects in its production.*

The need emerges from the fact that Indian architects have failed to recognize the significance of the social dimension in facilitating the development of sustainable agendas. On one end solutions have been developed to improve the energy efficiency of a building that need high initial investment and are based on technology. On the other end low cost technologies like mud architecture are being developed which do not fit in with the aspirations of the upwardly mobile urban population. Technology is thus seen as the only means of addressing environmental degradation.

The social role of people as consumers and decision makers about sustainable architecture has been ignored.

The results are significant as this issue is of particular relevance for developing countries such as India that are in the process of industrializing but are yet to confront the high costs of development. Both urbanization and suburban growth take a heavy toll on the environment and the lack of appropriate technologies and sustainable framework suggests that the architectural profession has failed to recognize the critical need for developing socially appropriate sustainable architectural practices for India.

Keywords--- *Sustainable Architecture, Energy Efficient Buildings, and Social Sustainability*

I. INTRODUCTION

SUSTAINABLE architecture in India is polarized into two approaches - the technology intensive 'green' architecture and low cost 'alternative' architecture. Both stress on development that is essentially technology based. This paper argues that there is a need to extend the technological understanding of sustainable architecture in India to incorporate the socio-cultural aspects in its production.

The dialectic in sustainable architecture is a legacy of India's independence period, generated through the diverging visions of the father of the nation, Mahatma Gandhi and India's first Prime Minister Jawaharlal Nehru. Although Gandhi's vision embraced ideas of modernity examining the

technological approach to environmentally sustainable architecture in India and nationhood, he believed that India's future lay in developing a network of villages. He wanted the villages to have all amenities, a democratic administrative structure and most importantly be self-reliant.¹ In contrast, Nehru visualized India as a modern nation state where industrialization and urbanization were key indicators of progress. He believed that technology had the ability to advance the cause of democracy.

Nehru's accession to power, following the assassination of Gandhi, led to science and technology being adopted as the backbone of development. Nehru initiated the project of modernizing India by constructing dams establishing institutes of technology and introducing industries, factories and mines. The State's endorsement of modern architecture and urban models was reflected in the building of new capitals such as Chandigarh, and Bhubaneswar. To Nehru, Chandigarh symbolized India's progress towards a technocratic future with a clean break from the past. The government was looking at constructing a secular national identity, unlike Pakistan that was bound by a common religion. In fact, Nehru being a staunch rationalist saw religion as a private affair and kept it separate from politics.

At the time of Independence, Nehru along with other western educated Indian elites adopted science as the way of progress. They saw universal reason as the only meeting ground with the west. And this formed the basis of new structure of knowledge. The authority of science became established in the newly independent country and it became a part of its identity. Science became the symbol of rationality and progress' in India. Not only was universal reason hailed as a way of reform, it was also the path to reorganize Indian culture and highlight Indian scientific traditions. Parallels of western science were sought in revived indigenous scientific traditions.

II. SUSTAINABLE ARCHITECTURE IN INDIA

Sustainable architecture posed a new challenge for Indian architecture. With the oil crisis of 1973, the Indian scientific community quickly responded to the issues of sustainable development heralded by the developed world. The emerging green architecture turned towards science and technology to provide solutions for environmental degradation. The western technology dependent solutions were adopted to solve India's environmental problems. In this approach energy efficiency was prioritized over all other concerns. It tended to be excessively quantitative in nature with the success of the building being measured by its energy consumption, material embodied energy, waste and resource consumption.

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This form of green architecture fitted easily into the existing power structures. Other approaches towards sustainability such as alternate modes of production, a decentralized approach to planning, emphasis on appropriate technology and need for contemporary regionalism were marginalized.

The government and Universities set up new research centers, for exploring non-conventional and renewable energy resources and simultaneously institutions researching adobe as low cost alternatives emerged. Government institutions promoted energy efficiency as a solution for achieving sustainable architecture. The salient features in this approach were increasing energy efficiency, reducing water consumption, using renewable energy and recycled products. The activists following Gandhi drew inspiration from his rustic ideal. In spite of its obvious ecological benefits, it did not appeal to the popular modernity of a rapidly urbanizing population. Adobe symbolized the *kuchha* (temporary) dwellings that the migrants and lower income group were trying to leave behind. Their aspirations were for the *pucca* (permanent) house made from bricks and steel, which signified progress to and upward mobility. The production of sustainable architecture reiterated the old Gandhi/ Nehru dialectic without finding less extreme or hybrid solutions.

Following liberalization in 1990, there was rapid economic reform, greater privatization and globalization. Nehru's socialist ideals of self-reliance and economic equality gave way to India's participation in the world economy. The rapidly expanding middle class that represented a large consumer market was responsible for projecting a new identity of India as a global superpower with a strong economic base. The booming IT industry created a new image of India in the technological field and a visible sector of urban India was ready to take advantage of its advancement in science. Multinationals returned to India with air-conditioned curtain glazed high-rise office blocks. Liberalization affected sustainable architecture too and it underwent considerable transformation with the adoption of global 'green rating systems'.

In order to understand the creation of a new Indian sustainable architecture through these green rated buildings, CII Green Building Centre (CII GBC) in Hyderabad is an interesting case. It made headlines in India when it was awarded the LEED (Leadership in Energy and Environmental Design) 'platinum' rating by the US Green Building Council. Platinum rating is considered the highest rating and it was the first time it was given to a building outside the US. With CII GBC being declared the 'greenest' building in the world by an internationally accredited organization, India gained a new global identity as one of the leaders in sustainable architecture movement. Reliance on science and technology had finally paid off.

CII GBC is a green building that has institutionalized green architecture. New markets are now being explored and created for green building materials through this institute. Several other buildings are being designed on principles laid out by the US Green Building council, all vying for the LEED awards. At present three buildings have already been awarded

LEED gold/platinum ratings and seven more are awaiting completion so that they can apply. All these buildings are corporate offices or IT parks. Being 'green' adds value to corporations who are competing globally for projects.

The President of India was present at the opening of CII GBC and award ceremony of Grundfos (the other building that was awarded gold rating). This has sent out the signal that green buildings now have official patronage. The belief that science can fix the world's problems is further reinforced by the President's endorsement, as he is the father of India's space program with dreams of making India a technical superpower.

III. LIMITATIONS OF GREEN BUILDINGS

A. *Examining the Technological Approach to Environmentally Sustainable Architecture in India*

These stand-alone green building overshadows critical issues of sustainability. The current, award-based production of sustainable architecture, while constructing an Indian identity as one addressing environmental concerns, skews the Indian sustainable debate by ignoring important social aspects in the production of sustainable architecture. In short the version of sustainability adopted by India exists outside familiar systems of social & cultural production.

Although the technology dependent green buildings have contributed in raising awareness and stimulating debate about sustainable architecture, they have several limitations. These buildings have 10-25 percent higher initial investment than traditional constructions. High initial costs and therefore dependence on corporate or government patronage has also restricted the adoption of this type of architecture to institutional building types with a few isolated exceptions of suburban residences. Almost 50% of all construction activity in India is in private housing. Efforts to make this large sector sustainable have been virtually negligible. Isolated buildings are judged, as 'sustainable' while their context is not considered at all. Ignorance of the social process, underlying the built object has isolated the building from its context.

Maximizing natural lighting and ventilation to achieve energy efficiency is often achieved at the cost of using large quantities of materials with high-embodied energy like glass, aluminum, etc. The large amount of energy that goes into extracting, processing and transporting materials used in these buildings (embodied energy) is usually neglected when calculating the building's energy efficiency. The claimed reduction in energy usage is therefore not an accurate picture of actual energy consumed.

The intent of technology-oriented sustainable architecture in India has been to produce spectacular buildings. Building like CII GBC and Grundfos are an example of that. As "conspicuous technology" has been the goal of science in India since independence, these buildings are an extension of that. Indian middle classes depend upon 'spectacular technology' to deliver them from social problems. With CII GBC winning accolades internationally, it has come to symbolize all that sustainable architecture stands for in India. It has become synonymous with green rating systems and

green technology such as solar heater and photovoltaic.

Environmental agendas in India, and green buildings are often based on the precedents from developed countries. The 2004 draft National Environmental Policy of India came under heavy criticism for this reason. It laid down environmental challenges for India in general terms as lifted from Agenda without making them relevant to India or her concerns. Similarly, the issue of energy efficiency is more relevant for developed countries where one-third of the total energy is utilized for heating or cooling of buildings. In adopting energy efficiency as the main criteria for green buildings in India, several more critical issues have been ignored. In India the issues of water and sanitation are more critical than energy efficiency. Studies indicate that at current rates of population growth and per capita consumption of water, there will be a shortage of drinking water in urban centers.

The 60's environmental movement grew out of concern for the environment and as a critique of modernization and capitalism. The current form of green architecture in India embodies all that that the earlier movement critiqued. It had emerged as a social movement essentially seeking structural changes in the society. Its imported form in India slowly moved away from the social aspects of the movement and restricted itself to the technological aspects. In a country where population, urbanization and poverty constitute its most pressing problems, a technology that is ignorant of these issues is untenable.

IV. NEED FOR SOCIAL SUSTAINABILITY

The debate on sustainable architecture cannot be restricted to quantitative environmental sustainability and it is essential that relationship between social, economic and environmental sustainability should become a critical consideration for the design of India's built environment. The 'green building' as an isolated object does not integrate with India's socio-cultural fabric any more than say an adobe house does. Additionally, sustainable architecture in India needs to account for the changing social and environmental conditions because rapid population growth, modernization and urbanization have directly impacted the environment.

Nearly 30% of India's population lives in urban areas that population is estimated to increase to 50% in the next fifteen years. Between 1947 and 2000, the total population of India increased two and a half times while the urban population increased five fold. On the one hand the present form of urban development in India is comparable to worldwide urban development and clearly unsustainable. On the other hand it is impossible to envisage a future not rooted in urban living. This means that it is impossible to solve the problem of sustainable architecture without addressing the issue of urban living.

The growing urban population with its changing lifestyle is straining the supply of natural resources. The post industrialist, capitalist nature of society that India is fast acquiring is one of the main sources of environmental degradation. The elite and the middle class consumption patterns resemble those of developed countries. This attitude affects the environment as the use or abuse of nature in a

society is directly related to its social structure, its technological capabilities and its worldviews.

The western consumption culture has a vast influence or 'cultural footprint'. Western culture and lifestyle are circulated by the media far beyond the boundaries of Western nations and penetrates the developing world. Consequently medium-sized cities in India have been overcome by western forms of consumerism. Large air-conditioned shopping malls have sprung in these cities and are attracting people keen on experiencing this new lifestyle. There is no concern of the strain it will place on the environment.

Sustainable architecture has become limited to stand-alone technological feats without attempting to be a part of everyday life of the people. For architecture to be sustainable the process of its production, consumption and its context must be considered. In technology based sustainable architecture, only the process of production is emphasized. As technological reliance gains singular importance, the social role of people as consumers of and decision makers about sustainable architecture is ignored. As Paul Newman points out it is the people and communities that pollute and consume, the suburbs that are car dependent and the poor that are marginalized. Environmental problems that are social in nature cannot be solved through technological solutions only.

V. CONCLUSION

By limiting itself to sustainability that is dependent on technology for solutions, sustainable architecture in India fails to incorporate the critical dimension of social and cultural sustainability without which it may not work in the Indian context. To be environmentally sustainable, architecture would need to also register the social, political, economical and cultural context of India and offer solutions that are sensitive to its particularities. This precludes universal technological solutions in the form of models of environmental sustainability derived directly from the West.

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