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SPACE
The SPA Journal of Planning and Architecture

Vol. 23, 1-2
2019

CONTENTS

SPACE
The SPA Journal of Planning and Architecture
Vol. 23, 1-2
2019

DESIGN PARAMETERS OF BUILDING ENVELOPE FOR ENERGY OPTIMIZATION IN PLOTTED RESIDENTIAL BUILDINGS: A REVIEW

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ABSTRACT

The building sector in India consumes over 30% of the total electricity consumed annually and is second only to the industrial sector as the largest emitter of greenhouse gases. Out of the total electricity expended by building sector, almost 75% is by the residential buildings (ECBC, 2018).The gross electricity consumption in residential buildings has been growing sharply over the years as amplified demand for air-conditioning with exponential growth in household incomes. Energy demand reduction, thus conservation in residential buildings has a significant role in accomplishing the energy efficiency targets. It is important as it allows energy efficiency without curtailing social welfare and serving the basic need of ever increasing population. The design of building elements like the envelope has a great potential in reducing cooling and heating loads, as such can play a significant a role in energy efficiency of buildings. This study comprehensively reviews the role of building envelope element in energy saving potential in residential buildings. The Eco Niwas Samhita: Part 1: Building Envelope is prescriptive guideline which is specially focused on the energy saving potential of the residential building envelope in urban areas for achieving energy targets. The emphasis of this paper is to understand and adjudicate various design parameters of elements of building envelope to reduce the consumption of energy in the existing plotted residential building built before the development of codes and prescriptive guidelines in India.

Keywords: *Energy Efficiency, Residential Building, Building Envelope Optimization, Passive Design and Prescriptive Guidelines*

SPACE
The SPA Journal of Planning and Architecture
Vol. 23, 1-2
2019

LAND POOLING POLICIES IN SELECTED INDIAN STATES & CITIES: A CRITICAL REVIEW

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1. INTRODUCTION

Government intervention and control in regulating demand for land and conversion/consolidation of rural land for urban usages has been justified on two grounds: first, greater efficiency in urban planning and second, equity and social justice through affordable access to land for housing low income communities. It is believed that while providing land for non remunerative uses like roads, basic infrastructure and public amenities, public agencies promote efficiency in urban planning by factoring in long term social benefits and environmental aspect. The private sector, in its relentless pursuit of profit maximization, does not adequately provide, thus, compromising both efficiency and excluding the poor. In practice, however, urban land policies adopted by various Indian states in the last few decades have only culminated in inefficient settlement patterns, achieving neither environmental quality nor social justice for the poor.

With an estimated nineteen million (18.78 million) households facing housing shortage (2012)[1], affordable housing is a formidable challenge in urban India,. A significant reason for this is rising land prices which have made formal housing unaffordable for a substantial number of urban dwellers, and forced them into informal housing options on marginal lands, typified by poor housing stock, congestion and obsolescence. This has been happening despite the efforts of State Governments to supply affordable public housing through State Housing Boards and Development Authorities. Public housing agencies have tried to make housing affordable by acquiring land under the land acquisition Act and reducing land costs. However, demand for housing has outstripped supply at lower levels of affordability. In the wake of liberalisation, weakening of public sector housing supply has been concomitant with a shift towards private sector involvement in housing. Unfortunately, private developers tend to focus on high-end and upper-middle income housing segments with

1. Government of India, Ministry of Housing & Urban Poverty Alleviation,(2012) Estimate of the Technical Group (TG-12) on Urban Housing Shortage (2012-17) .

SPACE
The SPA Journal of Planning and Architecture
Vol. 23, 1-2
2019

IMPACT ANALYSIS OF KNOWLEDGE NETWORKING AND CAPACITY DEVELOPMENT ON MUNICIPAL SERVICES – A COMPARATIVE STUDY OF INDIAN CITIES

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ABSTRACT

In aiming to understand and model urban local bodies (ULBs) service delivery mechanisms, it is vital to study the knowledge networking patterns and capacity development provisions within the institutions. By constitutional designs and norms, governance at this level draws more closely to the needs of the people. Effective dispensation of this responsibility not only depends on the capacity, knowledge and expertise of the existing institutional actors but other aspects like governance, implementation and monitoring local sustainability and the role of research within this. Nevertheless, at present, service delivery at this level of government is highly deficient because of lack of knowledge and capacity of the officials and staffs. However, recent studies have shown that there is a close link between knowledge networking, capacity development and efficient service delivery. If knowledge and capacity is strong then service delivery is better and vice versa. So, if there is lack in any one of the variables the process gets disturbed and therefore creates gaps in the form of bottlenecks in the smooth functioning of the system. And through studies and appraisals by the government, it is evident that there are certain knowledge gaps that exists within our urban local bodies that acts as bottlenecks. Therefore, it becomes important to understand the gaps that exists between the knowledge being applied and therefore, the impact on the service delivery mechanisms. For this purpose, the aim of the paper (which is a part of a doctoral research)

SPACE
The SPA Journal of Planning and Architecture
Vol. 23, 1-2
2019

EFFECTIVENESS OF STUDIO BASED LEARNING FOR STRUCTURES COURSES IN ARCHITECTURAL EDUCATION

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ABSTRACT

Most of the alternative teaching practices for structures courses in the context of architectural education partly or whollyincorporate attributes of studio based learning. However, the effectiveness of these alternative teaching practices need to be scientifically evaluated. Taking path of psycho-analytics, this research begins with review of past studies on teaching-learning using Structural Equation modelling (SEM) and, theories on studio based learning to identify variables and create a model for series of Hypothesis testing between these variables.A pretesting on sample data and review by experts further refines the model. The final model, based on Lueth's work on studio based learning, has three exogenous variables-Teacher student interaction, Student-student interaction and Student interest that affect Learning outcomes (endogenous variables). Likert scale customized to this study is applied for items of each variable to gatherStudent feedback data from architecture students across first four years of two architecture schools. The model results are further statistically validated by new sample. Findings reveal that all three exogenous variables positively affect learning outcomes of students.

1. INTRODUCTION

Teaching 'What' and 'How' of structures subject to architecture students remains an elusive question since the inception of modern architectural education(Uihlein, 2013). Such teaching practices range from traditional watered-down approach of ones used in engineering schools (Vassigh (2005) in (Emami & Buelow, 2016))to primarily studio based learning and other approaches (Black & Duff, 1994; Ching et al., 2014; Engel, 1967; Muttoni, 2011; Salvadori & Heller, 1986) and vary by school orientations on preferences for design vs technical courses (Stevens, 2017). These alternative teaching practices for structures courses can be attributed to thecontext of largely and

SPACE
The SPA Journal of Planning and Architecture
Vol. 23, 1-2
2019

REIMAGINING OFFICE BUILDING'S FACADE POST COVID -A VERTICAL GREEN SYSTEM WAY

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ABSTRACT

In the wake of COVID-19 a paradigm shift shall be observed in the designing of office spaces, the occupancy rates may come down to people required for important tasks, thereby creating large personal spaces. In such a situation it is of importance to rethink the building's façade design more sustainably, as the façade is a mediator between the inside and the outside environment. The vertical green facade is one such technique that has multiple benefits in terms of environmental, energy, and social aspects. This paper aims to assess the impact of vertical green façade on thermal, visual, IAQ, and psychological comfort. A questionnaire survey was circulatedto the occupants of the KMC Corporate Office building situated at Hyderabad. The USP of this building is the presence of a green façade on all the four orientations. The assessment showed that ~45% of occupants were comfortable with the thermal conditions of the indoor environment. 70% of the occupants were comfortable with the lighting levels in the building. 64% were satisfied with the air quality and 71% occupants felt healthy in the indoor built environment. Overall, the comfort level shows that adopting a vertical green system is a promising solution in view of occupant comfort in office buildings.

Keywords: *Office Buildings, Vertical Green Façade, Occupant Comfort*

2. VERTICAL GREEN SYSTEMS CLASSIFICATION

Vertical green systems can be categorized into two main systems one the green facades and second the green living walls. The appearance of these systems shows a notable difference between green facades, which are generally self-climbing plants growing and covering the surface and the technologically driven concept of living walls, with a package of materials supplied for plant growth allowing an array of species of plants in one stage.

2.1 Green facades

In this type, the plants climb or suspend along with the vertical building envelope. Traditionally, plants were grown against the wall in an upward direction, or they grew downwards over the vertical surface from the point of suspension(Manso and Castro-Gomes 2015). Green facades are categorized into two as direct facades and indirect facades (see Fig. 2).

2.1.1 Direct & Indirect Green Facades

In direct facades, the plants attach themselves directly to the vertical building envelope. Example- ground rooted climbers grow clinging to the wall. Whereas in indirect façade a vertical support system assists the growth of plants. Continuous screen guides that assist the development of plants along the vertical surface, which is dependent on a single support structure. (Roehr and Laurenz 2008)

2.2 Living Wall System (LWS)

In high rise structures, the growth of direct green facades is restricted to a certain height. Living walls have turned out as a solution to integrate plantations in high buildings. With the ability to cover a large surface area and with a uniform growth pattern, the living walls can reach higher areas and can adapt to any building form or shape. According to the method of construction, the living walls can be categorized as continuous systems or modular systems (see fig 3). In Continuous living walls, the growth of plants over the vertical surface is based on the application of lightweight and permeable screens in which plants are inserted individually (Manso and Castro-Gomes 2015). A modular living wall system consists of modules in form of vessels, trays planter tiles, or flexible bags, contained with growing media to support plant growth. Each module is then fixed on a support structure or is directly fixed to the vertical surface of the envelope.