

FACTORS INFLUENCING DEVELOPMENT OF SAFE HOUSING IN INDIA :: LESSONS FOR NEIGHBOURING ASIAN COUNTRIES

R. PRADEEP KUMAR¹ and C. V. R. MURTY²

¹ Director, CSIR-Central Building Research Institute, Roorkee, Uttarakhand, 247667, India,

² Professor, Department of Civil Engineering, IIT Madras, Chennai, India,

Correspond to R. Pradeep Kumar (ramancharla@cbri.res.in)

Keywords: Urban Safety, Mitigation, Earthquake, Housing, Retrofitting

1. INTRODUCTION

India has about 305 million houses as per 2011 Census 2011 of India [MHA, 2011]. The decadal increase in the housing stock over the last five decades is ~18–25%. India's Housing challenge today is larger than ever before. Two challenges that gaze at India today are: (a) Over 30 million houses need to be built to address the housing shortage, and (b) India needs to accommodate the rural to urban migration, projected to do a flip of Urban:Rural population ratio from 30:70 today to 70:30 by 2035. This rural to urban migration will seek the urban areas to grow by about 2.3 times in its housing requirement alone; many towns will grow into cities, and cities into mega polis. Thus, India needs a plan and diligent implementation of the same.

To begin with, India needs to put in place systems and processes that address not only the current shortage of housing, but also the likely behavioral changes in the people of India and the additional urban housing. Strategies of employing a purely contractor driven system without the engagement of the people of India may not suffice. In this regard, 5 inter-dependent actions are needed to strengthen India's housing development effort (**Figure 1**). These five actions are in the directions of Typologies, Safety, Human Resources, Practice and Policy.

2.1. Typologies

India's housing can be classified broadly under 3 Typologies, 11 Sub-Typologies and 30 broad Sub-Sub-Typologies within the 11 Sub-Typologies. But, the actual number of Sub-Sub-Typologies practiced in India is large – some place this number at ~800. A detailed analysis of these Sub-Sub-Typologies needs to be documented by a scientific methodology. Such a methodology should address factors that affect safety of *structural* and *non-structural elements* in the housing. The factors affecting *structural element safety* should account for *Life Threatening Factors (LTF)* and *Economic Loss Inducing Factors (ELIF)* of a house, each of which accounts for 5 aspects of the housing typology, namely *Siting Issues, Soil & Foundation Conditions, Architectural Features, Structural Aspects and Constructional Details*. And, the factors affecting *non-structural element safety* should account for *Acceleration Hazards* and *Displacement Hazards*.

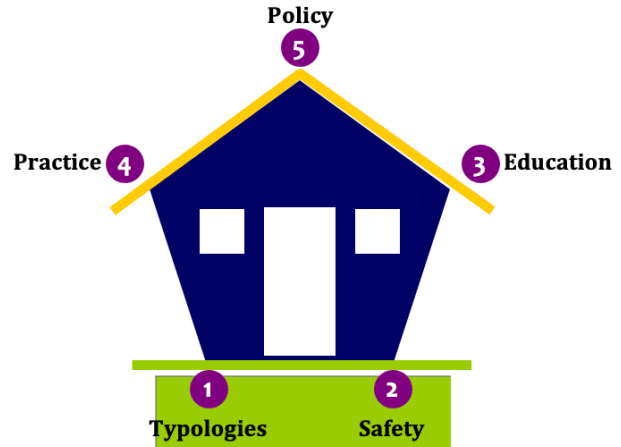


Figure 1: Five domains for strengthening Housing

2.2 Safety

A large number of housing sub-typologies is practiced in the country (some of which are supported by some Architects and Structural Engineers of the region). But, currently, structural safety assessment is not undertaken by ANY of the over 10,000 municipal authorities across the country. This leaves the country under a silent threat of the impending natural hazards (if not under that of the man-made hazards).

Adding to this crisis, *Housing for Masses* and *Mass Housing* projects are being implemented across the country with type designs repeated in a large number of small-sized houses. In such cases, it is even more essential to examine the technology employed to provide safety to the residents of the houses through structural safety tests on prototype houses. Hence, unless housing technologies are tested, they should not be adopted. Such technologies include precast, pre-engineered and prestressed slab constructions.

2.3 Education

Design and construction of only housing *components* (e.g., beams, columns, and footings) is part of the engineering curriculum at the undergraduate level in the country. But, it is time to bring housing *system* into the engineering curriculum at the undergraduate level. This needs to be integrated with the practical aspects sensitive to the context of the geographic region of the site, especially construction of houses in hilly areas and with local skills & construction materials. Since the repository of knowledge is not available in public domain on the spectrum of typologies and new technologies being flooded in to the market, the appreciation of graduate

engineers is relatively shallow on: (a) skills needed by masons, and (b) safety and quality standards related to new housing technologies.

2.4 Practice

The India is faced with a huge challenge of: (a) constructing new houses, (b) retrofitting of existing houses, especially in earthquake areas, and (c) repairing & rehabilitating many old buildings that now require to be upgraded (especially those that are 50 years or more after their construction). To address this vast work, specialist knowledge is required among the housing product vendors and task implementation contractors. This will enable undertaking the work within the time and money targets set for the proposed activities. Also, some new design standards are required specifically on structural safety of housing.

2.5 Policy

The country's housing development needs policy backbone to address the needs of the nation, which addresses:

- (1) Capacity Development for enhancing technical competence of associated human resources (architects, engineers and artisans),
- (2) Techno-legal regime that State Governments need to enforce (updatation of bye-laws, third party peer review of structural designs, and standards development), and
- (3) Technology validation of structural safety through full scale testing of prototypes of typical house designs.

The Union Government and the provincial State Governments need to play the role of integrator and facilitators, respectively, to bring synergies between the efforts of at least the adjoining states of India.

3. CONCLUSIONS

This paper attempts to bring to public eye the urgency of undertaking systematic efforts for evaluating housing technologies, assuring structural safety, and implementing sound practices; this will bring formalism to the housing challenge of India and provide needed encouragement and efficiency. The paper explains the experiences, challenges and possible steps to be taken in India.

Many countries in Asia with similar geological, geoclimatic, social and financial backgrounds will get a broad overview from this paper, which will help them begin similar work in their nations.

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