ARCHITECTS AND EARTHQUAKE SAFE HABITATS – INDIAN EXPERIENCE OF CAPACITY BUILDING

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ABSTRACT:
Earthquake Engineering Education, so far, has been confined to Civil Engineers, whereas Architects, the prime movers and the pivot around which building industries' planning & design moves, is oblivion of the fact that they are not playing their role which the society expects them to play. It is in this context that India launched few Capacity Building Programs, especially focused towards Architects. The paper analyzes three such programs and brings out the lessons learnt in conducting these programs. It is hoped that the Architects from world over, especially from the developing world will get inspiration from Indian experience and build their capacities for the service to the mankind in making the habitats safe from earthquake disasters.

KEY WORDS:
Capacity Building, Architects and Planners, Resource Material

1. INTRODUCTION:

The world has experienced major damaging earthquakes during last decade which has caused enormous loss to life and property. Critical analysis of many damaging events and studies revealed that number of damaging earthquakes is increasing every year, though the actual events are more or less unchanged. Indian Sub-continent and its surroundings, including China, have more than 43 percent of entire global population whereas the land mass of this region is less than 10 percent. This part of the globe has witnessed, almost at regular interval, major earthquakes since 2001, starting with Bhuj earthquake in India, Sumatra earthquake followed by Tsunami, Pakistan earthquake and the recent earthquake in Chinese peninsula. The cumulative loss of human lives due to these earthquakes has been almost 0.5 million and the economic loss was enormous.

The focus of the economic development during last decade or so has been shifted to this region, where China and India are engines of development. The average growth rate of these two economies is to the tune of almost 10 percent per annum. There is direct correlation with economic development and the real estate activity. In the opinion of the experts, to achieve 8-10 percent annual growth rate, there has to be an annual real estate development at the rate of more than 15-20 percent. It is, therefore, no surprise that the major global resources are being channelized to this part of the world.

2. THE KEY PLAYERS

There are five key players for any real estate/ building activity. Owner of the activity is the mover of the project and most ignorant player, as far as the earthquake safety aspects of real estate development are concerned. The second set of players of the game of building activity, are the Consultants. The Consultants are comprised of Architects and Planners on one hand and Engineers of different expertise on the other hand. The Engineering experts are Geo-technical Engineers, Structural Engineers, Civil Engineers, Environmental Engineers, HVAC Engineers, Electrical & Instrumentation Engineers and Communication Engineers. This set of people, known as the Consultants are supposed to play the all important role of making the buildings and its activities safe from earthquake disasters. Third player of the team are the Statutory Bodies at local, State and National levels. Their role is confined to make the Acts, laws and bye-laws and ensure the implementation of appropriate codal provisions prevailing in the respective countries, with reference to the safety issues. Fourth key player are the contracting agencies, who are expected to execute the project as per the technical drawings and specifications, prepared by the Consultants in consultation with the owners and approved by the Statutory Bodies. The players in the third category have the similar background as in the Consultant's category, as far as the technical education is concerned, i.e. either they are Architects, Planners or Engineers. Regarding the fourth category, the Contracting Agency, the owner of the agency may or may not be from the technical background but the key players of this organization are with the same background, as the Consultants. Finally, the fifth player consists of suppliers of different materials needed for the execution of the project. These suppliers are from all over the world, including the local level suppliers, who may not be adequately technically qualified like the international suppliers, who are well versed with the product they are supplying.

Architect is the pivot around which all other players, discussed above, rotate. It is he who conceives the built form, be it a residential, commercial, industrial, institutional or any other type of building. It is he who decides the basic structural system of the building as well as the material specifications and other infrastructure facilities to be incorporated in the building to make it an effective functioning entity. It is again he who plans and designs the buildings based on the statutory norms of the region and is expected to follow the Codes of the country related to earthquake issues.

3. ARCHITECTURE EDUCATION

Five years of academic exercise is undertaken to prepare an architect, unlike an engineer who undergoes a 4 year program to get a Bachelor (Graduate) Degree. During these 5 years, the students of architecture are not exposed to any subject pertaining to Earthquake Disaster Mitigation and Management. In fact, even in the engineering fraternity, this subject is not taught in the universities and colleges of India. Although, there are few islands of excellence, spread all over the country, where earthquake engineering is taught at post graduate level. In few of these colleges, research facilities are also available, but there has not yet been any comprehensive policy to include the subject of earthquake engineering in the curriculum of architecture.

Currently, there are about 135 institutions of architecture in India, churning out almost 5000 architects every year. Only about 50 percent of these graduate architects actually join the mainstream profession. Besides these new entrants in the profession, there are about 40,000 architects registered with the Council of Architecture of India. It means, there is one architect for 30,000 persons in the country, which is very low in comparison to the demand of the society and

other developed countries. These architects are contributing their share to the national development, though majority of them are broadly ignorant about the safety issues, both structural and non-structural, with reference to earthquake disaster mitigation and management. The situation is more or less same elsewhere in the world, more so in the developing world, with little better understanding among the architects of the developed world. The primary reason for this state of affairs may be attributed to one fact that the subject of earthquake engineering, so far, has been confined to the Civil Engineers. Architects have seldom appreciated the significance and importance of this subject and the crucial role they can play in making Earthquake Safe Habitats.

Policy makers in the field of human resource development for architecture profession have also not displayed adequate sensitiveness towards the concerns of safety aspects of built form from earthquake disasters. This is reflected in the curriculum and syllabus of institutions imparting architecture education, especially in developing countries, including India and its neighboring countries.

4. THE BEGINNING OF PROGRAM

Bhuj earthquake in 2001 was a turning point in the history of Earthquake Engineering Education in India. The total tangible economic loss of one of the most enterprising state of India, Gujarat, was more than Rs.30,000.0 Crores (7,500 million US$). The impact of this loss may be gauged by the fact that the state's annual budget was about 1/5th of the total loss. This impact of the loss stirred the conscience of decision makers at higher ecolence of the academia and bureaucracy. Few far reaching initiatives were taken for building the capacities of technical fraternity of the country who are responsible for the building activities. First such initiative was National Program on Earthquake Engineering Education (NPEEE), initiated by Ministry of Human Resource Development, Government of India and executed by Indian Institutes of Technologies and Indian Institute of Science. The program addressed many issues, ranging from Training of Teachers (TOT), short and medium term training, laboratory development in national level resource institutes, library support, international training to those teachers who are pursuing Ph.D, international visitors and provision for participation in international conferences. The program was divided into two segments, one for the architecture fraternity and the other for the engineering fraternity. At the time of launching of the program in the year 2003, it was envisaged that about 350 teachers will undergo short-term one week training program, 100 teachers will undergo one semester certificate program, about 50 man-months of international training, 20 man-months of international visitors to resource institutes in India, library support to 100 colleges imparting architecture and civil engineering education and laboratory enhancement to 8 national resource institutes and 10 colleges. During the course of the execution of the program for teachers imparting architecture education, the program encountered a major hump. Besides non-availability of adequately sensitive and competent teachers, adequate resource material was not available.

To make the program a success, development of resource material became the priority. Scanning of material available internationally revealed that there is dearth of adequate and appropriate teaching and research material for architects. To meet the challenge, resource material was developed with international collaboration, which was subsequently used by the resource persons for TOT. The duration of the program was 3 years and at the end of the program, major milestones setforth were achieved.

5. SECOND PROGRAM

Another program by National Disaster Management Division of Ministry of Home Affairs, Government of India, was started within a year of the launching of NPEEE. It was "National Program for Capacity Building in Earthquake Risk Management (NPCBAERM)". The broad objectives of the program were the same like NPEEE. The target was to sensitize 4,000 architects through 40 orientation programs, to train 250 teachers during the project implementation period, train 10,000 practicing architects by the 250 faculty members already trained under this scheme. The whole program was broad based where it was envisaged to involve 110 institutes imparting architectural education.

Unlike in NPEEE, this program started with a detailed syllabus of the subjects to be taught for TOT, which was developed by team of experts from the field of Earthquake Engineering. There were different modules like national level TOT of one week duration, training of practicing architects of one week duration, sensitization and orientation program for architects through Continuing Education Program of one day duration and one week training module for 110 national level institutes. The strategy was to have a mix of theory and design in almost 2:1 ratio for TOT as well as training of architects.

The author was the key resource person to both the programs and constantly traversed the length and breadth of the country for 3 years for the Capacity Building of architecture fraternity, both in the academia and in practice. The major lessons learnt through these two national level programs are many. For example, it is important to understand that the vocabulary used by architects is different from the engineers. It is, therefore, necessary to prepare the resource material in a different format and manner when we want to communicate with architects or students of architecture, on the complex issue of Earthquake Engineering. Appreciation and understanding of the basic need of adequate resource material, appropriate resource person and effective delivery mechanism are the critical indicators on which the success or failure of the program depends. The earlier program i.e. NPEEE, realized it at an early stage and addressed the issue quite effectively, but in the second program, this issue was not appreciated and the entire program was more or less thrusted upon the target groups. This basic difference between the two programs was that while one was participatory in nature, whereas the other followed the "top down" approach.

6. FORMATION OF AUTHORITY

When these programs were being implemented, Government of India set up a national level authority, namely National Disaster Management Authority (NDMA), the formation of which was enacted by the Act of Parliament of India. The Hon'ble Prime Minister of the country is the Chairman of the Authority, who is supported by team of experts from various relevant disciplines. The Authority, within a short period of its formation, developed National Disaster Management Guidelines for Management of Earthquakes in July, 2007. It envisages capacity building of more than 30,000 Architects, 70,000 Civil Engineers and more than 350,000 Head Masons and Masons. This is an ambitious project, which has no parallel in the history of Capacity Building for Management of Earthquakes in the world. NDMA program is more broad based which, besides capacity building, also addresses the issues of appropriate research and adaptation and development of new technologies. It is no exaggeration to believe that future India will be designed by more sensitive, academically and technologically equipped Architects and Engineers to meet the challenges of earthquake related disasters and make the habitats of India safe from earthquake disasters.

The pool of human resource being developed in India will help other countries to address the issue of Management of Earthquakes in a more pragmatic manner. Cooperation between two nations or among the nations will further help in reducing the vulnerability of existing structures in different parts of the world and build new structures which are safe from earthquake disasters. Capacity building of Architects will ensure creation of Earthquake Safe Habitats.

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