Proposal of a Comprehensive Approach for Safer Non-engineered Houses

International Video Conference
Reconstruction of Safer Houses after Earthquake Disasters

February 22, 2012
at Tokyo Development Learning Center (TDLC), the World Bank, Chiyoda, Tokyo, Japan and 12 sub-venues in 9 countries

Tatsuo Narafu
Senior Advisor,
Japan International Cooperation Agency (JICA)

Background

- Earthquakes cause serious damages to human societies
Background
Serious Damages of Human Casualties

- Collapse of Houses and Buildings is the main cause of human casualties
- Most of them are non-engineered

Engineer community pays little attention to non-engineered houses stated by UNISDR

“It remains something of a paradox that the failure of non-engineered buildings that kill most people in earthquake attracts the least attention from the engineering profession.”

UNISDR (United Nations International Strategy for Disaster Reduction)
“Living with Risk” 2004 version
### Comparison of two types of structures

**Non-engineered and Engineered**

<table>
<thead>
<tr>
<th>Aspects/items</th>
<th>Conventional/non-engineered</th>
<th>Engineered</th>
</tr>
</thead>
<tbody>
<tr>
<td>Materials</td>
<td>Available in the area</td>
<td>Usually controlled in size, quality, etc.</td>
</tr>
<tr>
<td></td>
<td>No control</td>
<td></td>
</tr>
<tr>
<td>Construction workers</td>
<td>Non/semi-skilled workers</td>
<td>Skilled workers</td>
</tr>
<tr>
<td>Technical intervention</td>
<td>No/little intervention</td>
<td>Intervention in design, construction procedures, etc.</td>
</tr>
<tr>
<td>Users/residents</td>
<td>Low/middle income people</td>
<td>Middle/high income people</td>
</tr>
</tbody>
</table>

- Conventional/non-engineered constructions are completely different from engineered ones.
- Each type needs its own appropriate strategy both in Technical solution and Dissemination of technologies.

### Comparison of two types of structures

**Quality of Hoses**

- Good/Safe

**Non-engineered Houses**

- Non-skilled

**Engineered Houses**

- Quality of Workers
  - Skilled
  - Poor/Unsafe

- Required level of quality of houses
- Required level of workers' skills
Relations between stakeholders
<Engineered Houses>

Users/residents

Requirements of users

Houses

Requirements of users

Housing supply sector

Manu. of materials

Workers

Mutual feedbacks

Engineering on housing

Relations between stakeholders
<No-engineered Houses>

Stakeholders of non-engineered houses

Manu. of materials Users/residents Workers

Houses

Gap between Engineering and non-engineered houses

Engineering on Housing Usually applied to engineered houses
Comprehensive Approaches is needed

F International Platform
A Potential Risks of EQ
B Characteristics of HT
C Technical Solution
D Dissemination of Tec.
E Supports

G Environment for Sustainable Development and a Movement

Relations between items

<table>
<thead>
<tr>
<th>Inputs for other items</th>
</tr>
</thead>
<tbody>
<tr>
<td>1  Anticipated risks of earthquakes</td>
</tr>
<tr>
<td>2  Inputs for enhancing risk recognition</td>
</tr>
<tr>
<td>3  Inputs for enhancing risk recognition</td>
</tr>
<tr>
<td>4  Technical information for research</td>
</tr>
<tr>
<td>5  Technical information for dissemination activities</td>
</tr>
<tr>
<td>6  Technical information for designing encouragement</td>
</tr>
<tr>
<td>7  Technical contents to be disseminated</td>
</tr>
<tr>
<td>8  Inputs for designing encouragement</td>
</tr>
<tr>
<td>11 Information of vulnerability of each house type</td>
</tr>
<tr>
<td>12 Feedback for verification of technical solution</td>
</tr>
<tr>
<td>13 Feedback for verification of dissemination methods</td>
</tr>
<tr>
<td>14 Feedback for verification of encouragement</td>
</tr>
<tr>
<td>15 Feedback for verification of dissemination methods</td>
</tr>
<tr>
<td>16 Feedback for verification of encouragement</td>
</tr>
</tbody>
</table>
Conclusion

- Reduction of disasters of non-engineered houses is very urgent
- Difficulties: it contains technical and also social and economical aspects
- Several initiatives and many enthusiastic people are tackling the tough issue
- Collaboration to share knowledge and lessons is necessary
- Comprehensive approach is highly recommended

A paper on the comprehensive approach

- A paper was written by 10 co-authors from 5 countries and submitted to an international journal “Journal of Asian Architecture and Building Engineering (JAABE)”
- Title: “A Proposal for a Comprehensive Approach to Safer Non-engineered Houses”
- Available at: http://www.jstage.jst.go.jp/article/jaabe/9/2/315/_pdf