Risk Management in Japan

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Profile of OYORMS

OYO

Japan’s leading geotechnical engineering firm※1

RMS

World’s leading risk management company※2

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OYO RMS

• Joint venture company established in May 1998.
• Co-development of Japan models integrating local expertise.
• Risk management service to the corporate markets
• Risk analysis service to the real estate markets.
• Advance application of RiskLink™ for site level risk analysis.
• Develops and markets risk management products in Japan.

※1: OYO Corporation started its business from the investigation of ground structures for public authorities. Now, it has sprung out to four major business domains, namely, Construction, Environment, Disaster Management, and, Future Energy/Natural Resources. OYO has three methods to work on these domains, namely, Engineering, Consultation, and very uniquely, Manufacturing of Measurement Instruments.

※2: Risk Management Solutions (RMS) is the world’s leading provider of products, services and expertise for the quantification and management of catastrophe risk. For 20 years RMS has applied models, analytics, data and multi-disciplinary knowledge to the management of insurance risk associated with perils such as earthquakes, hurricanes, windstorms and terrorist attacks. More than 400 leading insurers, reinsurers, trading companies and other financial institutions worldwide rely on RMS models' analytics to make better risk management decisions.
Contents

• What is Risk/Risk Management?

• Risk Control
  – Building code and aseismic retrofit
  – BCP/BCM

• Risk Finance
  – Insurance
  – Other risk finances

• Challenges of risk management for the future
What is Risk?

- Risk includes the following concepts.
  - Amount of negative impact: Damage, Loss, ....
    - “Pure risk” ⇔ “Speculative risk” (negative & positive impact)
  - Occurrence probability
  - Uncertainty: Variance

- In the following discussion, we focus on:
  - Catastrophe (CAT) Risk caused by natural hazard
  - Especially, Earthquake

CAT risk is low frequency but big impact
What is Risk Management?

Risk management is the process of protecting assets, earning, debt, and human resources of the company with maximum effects and minimum costs.

- **Risk Control**: Minimizing occurrences and aftereffects of damages and losses
- **Risk Avoidance**:
  - Relocation
  - Withdrawal
- **Risk Reduction**:
  - Aseismic retrofit
  - BCP/BCM
- **Risk Transfer**:
  - Insurance
  - Catastrophe bond
  - Earthquake derivative
  - Contingent Debt Facility
- **Risk Retention**:
  - Planned risk assumption
  - Self-insurance
  - Captive insurance company

Financial arrangements for covering losses
Risk Control
## History of Building Code in Japan

<table>
<thead>
<tr>
<th>Year</th>
<th>Damaging Earthquake</th>
<th>Building Codes and Others</th>
</tr>
</thead>
<tbody>
<tr>
<td>1923</td>
<td>The Great Kanto Earthquake</td>
<td></td>
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<tr>
<td>1924</td>
<td></td>
<td>Urban Area Building Act (Revision)</td>
</tr>
<tr>
<td>1948</td>
<td>Fukui Earthquake</td>
<td></td>
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<tr>
<td>1950</td>
<td></td>
<td>Building Standards Act</td>
</tr>
<tr>
<td>1968</td>
<td>Tokachi Offshore Earthquake</td>
<td></td>
</tr>
<tr>
<td>1971</td>
<td></td>
<td>Building Standards Act (Revision)</td>
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<tr>
<td>1978</td>
<td>Miyagi Offshore Earthquake</td>
<td></td>
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<tr>
<td>1981</td>
<td></td>
<td>Building Standards Act (Revision)</td>
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<tr>
<td></td>
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<td>New Seismic Design Standard</td>
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<tr>
<td>1995</td>
<td>The Great Hanshin-Awaji Earthquake</td>
<td>Act for Promotion of Renovation for Earthquake-Resistant Structures</td>
</tr>
<tr>
<td>2000</td>
<td></td>
<td>Building Standards Act (Revision)</td>
</tr>
<tr>
<td>2006</td>
<td></td>
<td>Act for Promotion (Revision)</td>
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<tr>
<td>2007</td>
<td>Niigata Offshore Earthquake</td>
<td>Building Standards Act (Revision)</td>
</tr>
<tr>
<td>2011</td>
<td>The Great East Japan Earthquake</td>
<td></td>
</tr>
</tbody>
</table>
Seismic Countermeasures for Buildings

• Buildings designed by “New Seismic Design Standard” showed higher aseismic performance than older building at the Hanshin Earthquake.

• “Act for Promotion of Renovation for Earthquake-Resistant Structures” were established after the Hanshin Earthquake.
  • The purpose of this act is upgrading old buildings’ aseismic performance up to the level of new seismic design.
  • A seismic renovation has been completed 73% for public schools and 62% for hub hospitals as of 2010.

• At the Great East Japan Earthquake, there were relatively few structural damage but a lot of nonstructural damage.
  • Nonstructural components are ceilings, lights, windows, partitions, file cabinets, computers, air conditioning facilities etc.

• Building Code is intended to protect a human life in a building. Keeping the building code is insufficient for maintaining building function and business continuity.
  • Securing production equipments is essential for business continuity of factories.

• Base isolation structure becomes common for hospitals, IDCs, and other important facilities. There are 2,600 base isolated buildings as of 2009.
Nonstructural Damage at the Great East Japan Earthquake

- ALC exterior wall falling down
- Crack in a tile wall
- Ceiling damage
- Ceiling damage
Business Continuity Management (BCM)

- It is recognized that hard and soft measures are essential for disaster mitigation.
- Importance of BCP/BCM is recognized after 9.11 WTC.
- In Japan, around 2004, after Niigata-ken Chuetsu Earthquake, BCP/BCM came to be frequently discussed about.
  - “BC Guidelines” was published in 2005 by Ministry of Economy, Trade and Industry.
  - “BC Guidelines ver.1” was published in 2005 by Central Disaster Prevention Council.
  - Business Continuity Advancement Organization, NPO, was established in 2006.

CHECK
Monitor and Review BCP

ACTION
Maintain and Improve BCP

BCM System

PLAN
Establish BCP

DO
Implement and Operate BCP

• Policy, Objectives, Scope
• Mission Critical Business Identification
• Risk Assessment
• Business Impact Analysis (BIA)
• Recovery Time Objective (RTO)
• Recovery Specifications
• Solution Implementation
• Resource Provision
• Documentation

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Progress of BCP/BCM

note: targeted industries are Communication, Gas, Transportation, and Railway

- BCP/BCM is still developing stage both in penetration and effectiveness in Japan.
Challenges of BCP/BCM

• For the organizations which have already started BCP/BCM
  – It is important to establish a PDCA cycle of BCP as routine practice and improve their BCP continuously.
• For the organizations which cannot progress BCP/BCM
  – It is a start point to share the common image against their own risk.
  – Risk quantification is one effective way for it.

• Current major concern
  – Tsunami impact
  – Supply Chain Management (SCM)
    Japanese companies are painfully aware of the importance of SCM in the recent disasters.
    • Niigata-ken Chuetsu-oki Earthquake in 2007
    • The Great East Japan Earthquake in 2011
    • Flood in Thailand in 2011

• Standardization of BCM is discussed globally ↔ ISO
  • NFPA/ANSI, USA: NFPA1600 (2010)
  • Japanese Guidelines (see page 10)
Risk Finance
Insurance Condition in Japan

• Insurance deregulation and liberalization was done in 1998.

• Risk quantification by model was introduced for risk management of insurance company and insurance rating.

• Insurance coverage rate of the East Japan Earthquake is higher than of the Hanshin Earthquake. (see next page)

• However, insurance coverage rate in Japan is not so high as the another major overseas catastrophe events. (see next page)
## Claims Paid for Major Disasters

<table>
<thead>
<tr>
<th>Category</th>
<th>Event Name (Year)</th>
<th>Total Loss</th>
<th>Claims Paid</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>EQ</td>
<td>The Great East Japan Earthquake (2011)</td>
<td>¥ 16,900 billion</td>
<td>personal ¥ 1,178 billion (insurance)</td>
<td>720 k claims (Nov. 9th)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>corporate ¥ 529 billion (mutual aid)</td>
<td>320 k claims (Jul. 15th)</td>
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<td></td>
<td></td>
<td></td>
<td>¥ 600 billion</td>
<td>¥ 400 billion covered by reinsurance etc. (May 19th, Nikkei)</td>
</tr>
<tr>
<td>Japan</td>
<td>The Great Hanshin-Awaji Earthquake (1995)</td>
<td>¥ 9,600 billion</td>
<td>personal ¥ 78 billion (insurance)</td>
<td>6.5 k claims</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>¥ 119 billion (mutual aid)</td>
<td>100 k claims</td>
</tr>
<tr>
<td></td>
<td>Geyo Earthquake (2001)</td>
<td>¥ 17 billion</td>
<td></td>
<td></td>
</tr>
<tr>
<td>WS&amp;FL</td>
<td>MIREILLE (1991 No.19)</td>
<td>¥ 568 billion</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>SONGDA (2004 No.18)</td>
<td>¥ 387 billion</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Worldwide</td>
<td>EQ Northridge Earthquake (1994)</td>
<td>$ 30 billion</td>
<td>$ 21 billion</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Hurricane Katrina (2005)</td>
<td>$ 96 billion</td>
<td>$ 72 billion</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Hurricane Andrew (1992)</td>
<td>$ 44 billion</td>
<td>$ 25 billion</td>
<td></td>
</tr>
<tr>
<td></td>
<td>9.11WTC (2001)</td>
<td>$ 83 billion</td>
<td>$ 23 billion</td>
<td></td>
</tr>
</tbody>
</table>

※1 Cabinet Office, Government Of Japan, ※2 National Land Agency, ※3 National Research Institute for Earth Science and Disaster Prevention, ※4 The General Insurance Association of Japan, ※5 JA mutual Aid, ※6 SwissRe, Sigma2011, No1
• Advantage and Disadvantage of Insurance
  – It takes some time before receiving insurance payment because investigation takes time.
  – It is difficult to buy insurance covering “Business Interruption (BI)” in Japan.
  – It is generally said that insurance capacity is insufficient in Japan.

• Alternative Risk Transfer (ART) can cover the disadvantage of insurance
  – CAT Bond, Earthquake Derivative, etc.
  – “Magnitude trigger” and “Seismic intensity trigger” are common for corporate risk finance.

• Contingent Debt Facility
  – Commitment line for CAT events
Challenges of risk management for the future
The East Japan Earthquake and Other Major Earthquakes

The Great East Japan Earthquake

The Great Kanto Earthquake 1923
Genroku Earthquake 1703

JMA Seismic Intensity for the 3 Coupled Earthquakes along Nankai-trough were evaluated by Central Disaster Prevention Council.
# Historical Earthquakes and Coming Earthquakes

<table>
<thead>
<tr>
<th>Event Name</th>
<th>Estimated Population in the Area (million)</th>
<th>Property Loss (trillion yen)</th>
<th>Remarks (Estimating Organization)</th>
</tr>
</thead>
<tbody>
<tr>
<td>The Great Hanshin-Awaji Earthquake (1995)</td>
<td>9</td>
<td>4</td>
<td>9.6 National Land Agency</td>
</tr>
<tr>
<td>The Great East Japan Earthquake (2011)</td>
<td>27</td>
<td>6</td>
<td>16.9 Cabinet Office, Government Of Japan</td>
</tr>
<tr>
<td>3 coupled Earthquakes along Nankai-trough (Tokai, To-Nankai, Nankai EQ)</td>
<td>41</td>
<td>15</td>
<td>40~60 Central Disaster Prevention Council</td>
</tr>
<tr>
<td>Tokyo Metropolitan Earthquake (North Tokyo Bay Earthquake)</td>
<td>36</td>
<td>27</td>
<td>Central Disaster Prevention Council</td>
</tr>
</tbody>
</table>
Challenges of risk management for the future

• Professional risk manager is required for the Japanese company.
  • Financial department buys insurance, maintenance department plans aseismic retrofit of buildings, administration department manages BCP/BCM, but there is no person who can control all of them.
  • Persons in charge are frequently changed by personnel rotation.

• Seismic Hazard Map/Model is used for not only governmental disaster mitigation but also insurance industry and risk management of other private sectors. Further improvement of the reliability and disclosure are requested.
Application and capability of Hazard Map

Hazard Map (Model)

Damage Function
(Fragility/Vulnerability)

Governmental disaster mitigation measures

Building code

Aseismic design

Aseismic inspection for existing buildings

Insurance Rating

Trigger analysis for ART

Damage prediction for risk management

Selecting best location for new facility, backup site, etc.

“What impact could be brought by hazard?” is the concern of people!
Thank you!

謝謝!

감사합니다!

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