Role of Ships and Harbours in Disasters

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Background of the presentation

High standard life, social system and infrastructures are fully established in Japan, especially in electrical ways. Once a disaster happens, we recognise how our life is standing on fragile “electric castle” like a sand castle in a beach.

Japanese people is sometimes assumed as “easy-to-forget” We should establish crisis management system against such as failures in nuclear plants, big oil spills by tanker, casualties, hostages in Japanese ambassador’s residence in Lima etc.

Ships and harbours are just an example. appreciated.

About the presenter

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Research filed . ship manoeuvrability and controllability, marine traffic system

Any discussions from such point of views are...
Other topics interesting

1) What is natural disasters in your country?

2) Can ships and harbours contribute in such disasters in your country?

3) How do you feel about ships and harbours in your country?

4) Further discussions, if you join.
Introduction

- Great Hanshin Earthquake statistics
- Estimate of damage of the Great Hanshin and Awaji Earthquake

Total damage is estimated as JPY 9,920 billion ($10^9) or equivalent to US$82.7 billion ($10^9).
Harbour facilities were suffered about double damage than highway damage and triple of railroad damage.
GREAT HANSHIN EARTHQUAKE STATISTICS

1. How it happened
   - Date: 3:46 a.m., January 17, 1995
   - Epicenter of the Earthquake: The Northern Part of Awaji Island (N 34° 6 E 135° 0)
   - Depth of Earthquake: 14 kilometers
   - Force: 7.2 on the Richter scale, 6 or 7 on the Japanese scale

2. Damage
   - Victims (as of March 9):
     - Dead: 3,852
     - Missing: 1
     - Injured: 14,679
   - Housing:
     - Total: 472,160 houses (before the quake)
     - Fully destroyed: 54,949
     - Half destroyed: 31,783
   - Fires:
     - Number: 176
     - Burned-down Area: 65.85 ha
     - Burned-down Buildings: 7,377
     - Fully burnt: 7,046
     - Half burnt: 331
   - Evacuees (as of March 19):
     - Temporary Shelters: 441
     - Evacuees: 114,679 people (max. 232,403 as of Jan. 26)
   - Rescue Personnel: 81,820
     - Police: 18,000
     - Fire Officials: 3,400
     - Fire Volunteers: 14,200
     - Self Defense Force: 25,700
   - Maritime Safety Agency: 1,900
   - Medical Staff: 1,520

Foreign Rescue... 5 Teams, 106 people
Foreign Medical Team... 8 Teams, 75 people

3. Establishment of the Kobe City Earthquake Relief Headquarters
   Established at 7:00 a.m. January 17, 1995
   Director... Mayor of Kobe
   Deputy Directors... Deputy Mayors of Kobe
   Members... Director Generals

4. Relief Supplies
   Kobe City has contracted wholesalers and shops to supply goods in case of disaster
   Initial Supplies: Blankets, rice balls, bread.
   In the first days after the earthquake, relief supplies were collected at ward offices, and then transported to evacuee shelters. Then, four big distribution centers were established at the beginning of February.
   64 organizations (including Governors) from 22 countries have sent relief supplies to Kobe as of March 14

5. Damage to Public Facilities
   = Utilities
     Power: 100% restored on Jan. 23
     Gas: 90.5% restored (as of March 24)
     Water: 94.9% restored (as of March 25)
   = Railways
     JR (Regular)
     The line between Sumiyoshi and Nada (both are in the eastern area of Kobe) is out of service. 65% of the usual operation has been restored. Full service is expected to resume on April 1st, so that Kobe and Osaka will be directly be connected.
     JR (Shinkansen)
     The line between Shin-Osaka and Himeji is out of service. Full service is expected to resume in April.
   Hankyu
     It is a private railway, and it connects Kobe with Osaka and Kyoto. It is now partially out of order between Kobe and Nishinomiya. The entire line will be operational by the end of August.
   Hanshin
     It is a private railway, and it connects Kobe with Osaka. It is now partially out of order in the eastern area of Kobe. The entire line will be operational by the end of September.
   Municipal Subway
     The operation of the entire line resumed on Feb. 16. Now all stations are in operation except for Kamisawa Station. Fully Operational on March 31.
   Port Liner
     It connects Port Island to the mainland. It is now completely out of service, and will be partially restored by the end of August.
   Rokko Liner
     It connects Rokko Island to the mainland. It is now completely out of service, and will be fully restored by the end of August.
   = Road
     The Kobe Line of the Hanshin Highway, which connects Kobe and Osaka, will be reopened by the end of 1996. (The sect on between Kyobashi and Naka will be partially reopened by March, 1996.)

- Port
  Almost all of the waterfront extending for 116 km was damaged. Only 9 out of 239 berths escaped damage. All the gantry cranes sustained. Every effort has been made to restore them, and 107 berths have been restored to operation as of Mar 16. Completion rehabilitation of repairs is expected in two years.

- Schools
  223 out of 345 public schools were damaged. 35 schools were completely destroyed and 38 were seriously damaged. Every effort has been made to restore them, and 243 schools have fully reopened as of March 5.

- Medical Establishments
  Two out of three municipal hospitals were damaged. Three of 112 hospitals in Kobe were totally destroyed. Another 9 hospitals were half destroyed and 88 were slightly damaged. As of Feb. 16, 105 hospitals, 988 clinics (72.5%) and 480 dental clinics (59.5%) are operating.

- Local businesses
  Synthetic leather shoes
  158 out of the 192 member companies of the Shoe Federation were seriously damaged

  Rice Wine (Sake)
  21 out of the 31 breweries were seriously damaged

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Table 1  Estimates of Damage of the Great Hanshin and Awaji Earthquake

<table>
<thead>
<tr>
<th>Items</th>
<th>Estimates of Damage (x10^{11} Yen)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Estimates of Damage</td>
<td>99.2</td>
</tr>
<tr>
<td>Main Items</td>
<td></td>
</tr>
<tr>
<td>Houses &amp; Buildings</td>
<td>58.0</td>
</tr>
<tr>
<td>Harbour Facilities</td>
<td>10.0</td>
</tr>
<tr>
<td>Commercial &amp; Industrial</td>
<td>6.3</td>
</tr>
<tr>
<td>Belongings</td>
<td></td>
</tr>
<tr>
<td>Highways</td>
<td>5.5</td>
</tr>
<tr>
<td>Gas, Electricity and Water</td>
<td>4.7</td>
</tr>
<tr>
<td>Railroads</td>
<td>3.4</td>
</tr>
<tr>
<td>Schools, Colleges etc.</td>
<td>3.4</td>
</tr>
<tr>
<td>Civil Facilities except</td>
<td>2.8</td>
</tr>
<tr>
<td>Highways</td>
<td></td>
</tr>
</tbody>
</table>
How did ships played at the quake?

- Traffic jam
- Histogram of ships used at the quake
- Helicopter and heliport usage
- Temporary sea traffic routes
- Merits of ships and expected applications

Some additional slides demonstrates how did ships play a role.
Merits of ships are tabulated in a slide.
支援活動・宿泊施設に船舶大活躍

神戸ヘリポートもフル稼働

緊急救援物資は交通渋滞を避けて海上輸送

Role of Ships and Harbours in Disasters
Merits of Ships

- Self Organization
- Electricity
- Food, Water
- Toilet, Air-conditioned
- Cooking Facility
- Hotel Accommodation

Expected Applications

- Housing for Evacuees
- Food, Water and Bath
- Housing for Restoration Support Personnel
- Temporary Managing Centre
- Managing Centre for Fire, Medical and Rescue Personnel

Replacement of Failed Land Transportation
- Mass-, Low-speed-, Low-frequent Transportation
- Small-amount-, High-speed-, Frequent Transportation

- Transportation of Rescue Personnel
- Relief Supplies
- Temporary Passengers
- Rescue Patients

Independent Function of Communication
- Satellite Communication
- TV, Radio
- Ship Telephone & FAX
- VHF Radio Communication

- Collection and Delivery of Information
- Control Centre

Fig. 1 Functions of Ships and Its Expected Applications
Proposal for ships role in disasters

- More effective usage of ships
- Usage of small boats

Obstacles
Social system, regulation and facilities

Usage of small boats

- Merit
  - not require special berthing facility
  - but only require fundamental one
- Size assumed
  - up to 100 ton, probably 50 ton
Usage of small boats

- What kind of boats are available?
  - Volunteer
    - Fishing boats or pleasure boats
    - Chartered by companies
  - Professional
    - Fireboat
    - Coast guard boat
    - Lighthouse maintenance boat

Small boats Usage: What kind of services are assumed?

- Foods etc. supply
- Information collection, men for goods-delivery transport
- Transit to large vessels offshore
- Emergency transport between artificial islands
- Alternative transport
- Transport workers and injured
How was Kobe Port affected by the quake?

- All gantry cranes were destroyed by liquefied ground
- Time schedule of reconstruction
- Temporary agreement of 24-hour service with union

Is full recovery of the port functions satisfied?

- How was Kobe Port in share of export and import in Japan?
- Report of Port of Kobe Reconstruction Committee
- Comparison of services of other Asian ports
- Statistics
Reconstruction OF PORT of Kobe

The Port of Kobe suffered heavy damage from the Great Hanshin and Awaji Earthquake. Discontinued functions of the Port of Kobe, Japan’s largest container port, are seriously affecting not only the local economy and community life of Kobe but also the entire economy and distribution system of Japan. In order to reconstruct the Port of Kobe at the earliest possible date, the national government, municipal government, industries and organizations related to the Port are working together and concentrating their efforts around the clock.

Resumption of Use of Gantry Cranes at the Container Terminal.

The reconstruction of the Port of Kobe is proceeding steadily at the fast pace. On the morning of March 20, the first of the gantry cranes to be repaired was able to load and unload the Gao He (a full container-type vessel, 2,760 TEU, 37,143 tons) owned by COSCO. Prior to this, loading/unloading operations were conducted by utilizing several other means: RO/RO boats, conventional ships, and container ships with cranes. By the end of April, six more berths will resume full service operation using gantry cranes, and by the end of June, two further berths will open. This will be helpful in the reconstruction of the Port of Kobe, which has been referred to as the largest container terminal in Japan.

Reconstruction Schedule.
Every effort will be made to completely reconstruct the functions of the Port of Kobe in approximately two years.

1. Berthing places

(1) Provisional service operation

<table>
<thead>
<tr>
<th>Container</th>
<th>Maya Piers, QR Quay Terminal (2 gantry cranes)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Port Island PC-2</td>
<td>March 20, 1995</td>
</tr>
<tr>
<td>Port Island PC-4</td>
<td>Around end of April, 1995</td>
</tr>
<tr>
<td>Port Island PC-7</td>
<td></td>
</tr>
<tr>
<td>Rokko Island PC-2</td>
<td></td>
</tr>
<tr>
<td>Rokko Island PC-4</td>
<td></td>
</tr>
<tr>
<td>Rokko Island PC-7</td>
<td></td>
</tr>
</tbody>
</table>

| Multipurpose Port Island Berth D terminal Rokko Island Berth X (capable of handling of containers) | Around end of June, 1995 |

(2) Full service operation (detail)

<table>
<thead>
<tr>
<th>Container Terminal</th>
<th>1/3 of whole Remaining 2/3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Within 1995</td>
<td>Within approx. 2 years</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Ferry Terminal at Higashi Kobe</th>
<th>2 berths each at Higashi Kobe Terminal and Rokko Island</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ferry Terminal (Public)</td>
<td>Within 1st half of '95.</td>
</tr>
</tbody>
</table>

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Remaining 3 berths  Within fiscal 1995
15 berths at Port Island  Within fiscal 1996
Terminal (Kobe Port Terminal Corporation)

2. Bridge and Elevated Roads
(1) Provisional service operation
Kobe Bridge: 2 lanes each for up and down lines Around April, 1995
Rokko Bridge: 2 lanes each for up and down lines at present

(2) Fully reopened to traffic
Harbor Highway Kobe Bridge, Shinko No. 4 Pier Ramp: Around autumn, 1996
Rokko Island - Takahama Ramp: Around autumn, 1995
Rokko Island - Maya Piers: Within 1995
Shinko - Maya Piers: Around autumn, 1996
Maya Bridge: Maya Bridge Around August, 1995

3. New Transportation System
(1) Partially reopened to traffic
Port Liner: C.I. Trade Center - Civic Square Late August, 1995
C.I. Trade Center - Minami Park

(2) Fully reopened to traffic
Rokko Liner: Late August, 1995

4. Breakwater and Coastal Protection works
Front breakwater Within 1st half of fiscal 1995
Coastal protection works By typhoon season 1995

Resumption of Liner Services
Kobe Ferry Center.
Reconstruction OF PORT of Kobe

[previous] [next]

Full-scale Operation Resumed at 6 Container Terminal Berths on April 30

On April 30 (Sun.), full-scale container handling will be resumed at three berths at Port Island (PC-2, 4, 7) and another three berths at Rokko Island (RC-2, 4, 7), using two gantry cranes at each berth. Container handling has already been resumed at Maya Container Terminal, using two gantry cranes. By mid-June, the third gantry crane will have been installed in four of the above-mentioned 6 berths at the two islands. By the end of June, full-scale container handling will have been resumed at two other berths (Port Island D berth and Rokko Island X berth).

Many Shipping Companies Resume Service!

Many shipping companies resumed service at container terminals that have been reconstructed for temporary use. Furthermore, in accordance with tentative mutual consent between port workers and operation companies of the Port of Kobe, container handling services will be provided around-the-clock.
Port Workers and Operation Companies of the Port of Kobe Temporarily Consent to 24-hour handling Services.

An agreement was concluded concerning around-the-clock operation of container terminals and 24-hour service of container handling and gate operation on a two-shift basis (including Sundays and national holidays) between the Hyogo Prefecture Port Terminal Operators Association, the Conference of Kobe Port and Harbor Labor Union, and the Japan Labor Union of Port and Harbor Transportation (Hyogo Head office).

The implementation of this 24-hour service will provide out-of-work port workers with jobs and will consequently fuel reconstruction of the Port of Kobe. The 24-hour operation will begin, in principle, with the temporary resumption of the container terminals, and will terminate with the completion of their reconstruction. The details of the arrangement will be discussed by the concerned parties as the need arises. The tentative agreement is expected to improve operating efficiency and to encourage the shipping companies that are now temporarily using other ports back to Kobe.

Wed 26, Jul, 1995

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Reconstruction OF PORT of Kobe

Port of Kobe Reconstruction Committee Report Prepared

on Friday, April 28, the Port of Kobe Reconstruction Committee report was approved at the Committee's second meeting. The report contains the following chapters:

1. the principles of the "Port of Kobe Reconstruction Plan",
2. present situation and problems,
3. visions for the 21st century,
4. construction of a durable port resistant to natural disaster,
5. development based on examination of present situation and
6. facility reconstruction plans.

The construction of a durable port, resistant to natural disaster, is aimed not only at improving the durability of port facilities, but at enhancing various functions of the city that may be of benefit of citizens, should natural occur.

To improve the durability of port facilities, the emphasis will be on earthquake measures, as well as flood-tide and tidal-wave measures. For example, the Port intends to construct improved earthquake-resistant facilities, particularly quays. At present, three berths have already been improved in a public wharf. Although the Port Development Plan includes the construction of three additional berths, several more berths will be constructed.
<table>
<thead>
<tr>
<th>Name of Port</th>
<th>Kobe</th>
<th>Singapore</th>
<th>Bangkok</th>
<th>Hong Kong</th>
<th>Kaohsiung</th>
<th>Pusan</th>
</tr>
</thead>
<tbody>
<tr>
<td>Running Days/year</td>
<td>307</td>
<td>365</td>
<td>365</td>
<td>362</td>
<td>357.5</td>
<td>363</td>
</tr>
<tr>
<td>Holidays</td>
<td>58 days Sundays, End and Start of a Year</td>
<td>Nil</td>
<td>Nil</td>
<td>3 days Chinese New Year Days</td>
<td>7.5 days Chinese New Year's Days and Chinese Midautumn Day</td>
<td>days Chinese New Year's Day and Chinese Midautumn Day</td>
</tr>
<tr>
<td>Limitation of Entering Port</td>
<td>24 hours with partially limited</td>
<td>Nil</td>
<td>Nil</td>
<td>Nil except typhoon climate</td>
<td>Nil</td>
<td>Dangerous goods only in daytime</td>
</tr>
<tr>
<td>Limitation of Berthing</td>
<td>24 hours with partially limited</td>
<td>Nil</td>
<td>Nil</td>
<td>Nil</td>
<td>Nil</td>
<td>Nil</td>
</tr>
<tr>
<td>Working Hour of Terminal</td>
<td>Mon. - Sat. 8:00-12:00, 13:00-18:00, 19:00-24:00, 1:00-4:00</td>
<td>24 hours (normally 8:00-16:30)</td>
<td>24 hours</td>
<td>24 hours</td>
<td>24 hours (20 hours for Onboarding)</td>
<td></td>
</tr>
<tr>
<td>Custom Service</td>
<td>During working hour (9:30-17:00) exception allowed</td>
<td>Tax products are limited</td>
<td>During working hour (8:00-16:30) Tax products are limited</td>
<td>During working hour (8:30-17:00) informed application available for fresh goods</td>
<td>During working hour (8:30-17:00) informed application available</td>
<td>During working hour (8:30-17:00) informed application available</td>
</tr>
<tr>
<td>Animal and Plants Inspection</td>
<td>During working hour (8:30-17:00)</td>
<td>24 hours</td>
<td>24 hours</td>
<td>24 hours</td>
<td>24 hours</td>
<td></td>
</tr>
</tbody>
</table>

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How does the reborn Kobe Port should be?

- Asian hub port or national hub port
- Air and sea cargo port
- Discussions with all of you

Kobe is the biggest port in Japan.
Kobe is the 6th biggest port in the world.
Can it maintain her position in Japan and in the world?

Concluding remarks

- Establishment of crisis management system
- Port should be constructed under national policy
- Should rely on volunteer, or not
- Next disaster may cause us software problems, but not hardware ones