A STRATEGIC SAFETY-RISK MANAGEMENT PLAN FOR RECOVERY AFTER DISASTER OPERATIONS

Presented by:

Mohammad Sadra Fardhosseini,
Behzad Esmaeili, Ph.D.
Richard Wood, Ph.D.
Agenda

- Problem Statement
- Background
- Research Objectives
- Research Methods
- Results and Discussion
- Practical Applications
The Impacts of disasters in our lives:

- Disasters cause approximately $24 billion worth of damage and affect the lives of 60 million people around the world every year.
- In 2010, an earthquake in Haiti destroyed over 250,000 houses.
- In the U.S.A. (1980-1999), 13 hurricanes caused $68 billion in damages and more than 400 deaths.

Recovery operations involve Construction Workers.
Available data from different agencies reveals that workers faced over **3000 injuries and illness** during recovery operations after hurricane Katrina.

- **11 workers** lost their lives during these operations.

- Among **2801** causalities in ground zero, **343** victims were firefighters.
Background

1. \url{http://www.bt.cdc.gov/disasters/floods/workersafety.asp}
2. \url{http://www.cdc.gov/niosh/topics/emres/flood.html}

Studies & Reports

There is no study to analyze safety risk of different hazards!
Research Objectives

1. Identifying common hazards in post-disaster recovery and reconstruction
2. Quantifying the safety risk of common hazards
3. Developing a safety guideline for workers involved in post-disaster recovery
4. Developing a mobile application to disseminate results of the study.
Research Method Overview

Literature Review

Hazards in Post-disaster

Results

Data Collection

- Developing a survey to collect severity and frequency of injuries associated with each hazard.

Dissemination

Safety Guidelines

Mobile Application

- Google Scholar
- FEMA
- ASCE
- NIOSH
- OSHA

ICSc15

SARMAD Research Group
Scenarios in Recovery after disasters

- De- Watering
- Cleaning up and Debris Removal
- Using Portable Generator
- Demolition and Rehabilitation
Risk Assessment

List of Hazards

Risk = Severity × Frequency
(Median) (Median)

14 Safety Managers

NDOR - Nebraska Department of Roads
ABC - Associated General Contractors of America

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Cronbach’s Alpha

**Cronbach's alpha** is a measure of *internal consistency*, that is, how closely related a set of items are as a group. It is considered to be a measure of scale reliability.

- A high value (> 0.90) of Cronbach alpha does not show that the measure is *unidimensional*.
- A high value (>0.90) shows *redundancies* and suggests that the test length should be shortened.

Cronbach alpha of Frequency = 0.984

Cronbach alpha of Severity = 0.992
## Results and Discussion

<table>
<thead>
<tr>
<th>#</th>
<th>Hazards</th>
<th>Frequency</th>
<th>Severity</th>
<th>Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>35</td>
<td>Working in cold or windy weather (Weather)</td>
<td>4.5</td>
<td>4</td>
<td>18</td>
</tr>
<tr>
<td>33</td>
<td>Working in a hot and humid outdoor condition for a long time (Weather)</td>
<td>4</td>
<td>3.5</td>
<td>14</td>
</tr>
<tr>
<td>40</td>
<td>Performing an activity frequently (Ergonomic)</td>
<td>4</td>
<td>3</td>
<td>12</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Caught-in/between a trench (Physical)</td>
<td>1</td>
<td>4.5</td>
<td>4.5</td>
</tr>
<tr>
<td>13</td>
<td>Electrocuted while using cranes or boomed vehicles near energized power line (Physical)</td>
<td>1</td>
<td>4.5</td>
<td>4.5</td>
</tr>
<tr>
<td>14</td>
<td>Electrocuted while using conductive materials, ladder, or scaffold, near energized power line (Physical)</td>
<td>1</td>
<td>4.5</td>
<td>4.5</td>
</tr>
<tr>
<td>15</td>
<td>Electrocuted while working on/near live wiring or energized circuit (Physical)</td>
<td>1</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Struck-by flying debris/objects (Physical)</td>
<td>2.5</td>
<td>3</td>
<td>7.5</td>
</tr>
<tr>
<td>18</td>
<td>Entering a confined place that has the probability of toxic gas emission (Chemical)</td>
<td>1</td>
<td>3.5</td>
<td>3.5</td>
</tr>
<tr>
<td>28-32</td>
<td>Biological Hazards</td>
<td>2</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td>41-43</td>
<td>Psychological Hazards</td>
<td>2</td>
<td>3</td>
<td>6</td>
</tr>
</tbody>
</table>
## Results and Discussion

### Frequency

<table>
<thead>
<tr>
<th>Risk Assessment</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>highly unlikely</td>
</tr>
<tr>
<td>Fatality</td>
<td>5</td>
</tr>
<tr>
<td>Major injuries</td>
<td>4</td>
</tr>
<tr>
<td>Moderate injuries</td>
<td>3</td>
</tr>
<tr>
<td>Minor injuries</td>
<td>2</td>
</tr>
<tr>
<td>Trivial injuries</td>
<td>1</td>
</tr>
</tbody>
</table>

**Legend**

- **RED**
  - Extremely risky. Emergency attention is required.
- **Yellow**
  - Hazardous. This risk should be taken into consideration.
- **Green**
  - Negligence risks. Minimum action is needed for prevention.
Post Disaster Recovery & Reconstruction
Questions

Thank you for your time.

Mohammad Sadra Fardhosseini,
M.S. Student
University of Nebraska- Lincoln
Email: sadra.fh@huskers.unl.edu

- Born in Tehran – Iran
- Power and Water University of Technology (Tehran)
  B.S. Civil Engineering (2009-2013)
- University of Nebraska Lincoln
  M.S. Construction Management (2014 - Present)