

East Japan earthquake and Tsunami: What has and has not been studied

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Introduction

The Institute of Social Safety Science, Japan (ISSS) formed an international platform for the 2011 East Japan Earthquake and Tsunami (EJET) disaster research a few days after the onset of the East Japan earthquake and Tsunami event and has since been actively communicating to and collaborating with its counterpart organizations such as EERI, Korean Society for Disaster Mitigation and Disaster Management Society of Taiwan. In June, 2011, ISSS hosted an international field study tour welcoming the above three partner associations and held research workshops in Iwate and Miyagi cities. The ISSS has also begun organizing annual EJET research workshops at disaster hit Tohoku cities and townships since 2012. The purpose of the annual workshop is to actively encourage academic exchanges on this topic as well as to help promote local business by arranging for fifty to sixty researchers to seek (and pay for) lodging and dining in disaster-hit communities. The first and second workshops were held at Iwaki, Fukushima in 2012 and at Ohfunato, Iwate in 2013. The 2014 EJET workshop is scheduled to be held at Miyako, Iwate in October. 59 papers were presented in the first two workshops and these papers represented multidisciplinary research activities on EJET in social and engineering orientations that employed both qualitative and quantitative research methodologies. It is the aim of this paper to review the EJET workshop papers and to provide a bird's eye view of the current state of research affairs and to stimulate dialogues with the US research community by identifying possible topical areas that merit future collaborations.

Method

All of 59 papers were carefully reviewed by the author. For each paper, 3 to 5 “characteristic words” that best described its nature/unique focus and descriptions of the paper's research methodology were generated. Starting with these “raw” characteristic word lists, a grounded theory type iterative open word coding/recoding continued until a manageable set/size of “keywords” that conceptually clustered a group of raw characteristic words were formed. Eventually, 48 keywords were obtained and each paper was examined by checking which of these 48 keywords appeared. This process led to form a 59 row (i.e., papers) by 48 column (i.e., keywords) matrix of dummy variables where 1 indicates a particular keyword appearing in a given paper while 0 indicates its non-appearance. This matrix was named a keyword concurrence matrix suggesting which keyword concurrently appeared in a given unit of observation (i.e., paper). The keyword concurrence matrix was then analyzed by SPSS correspondence analysis (also known as Dual Scaling or Optimal Scaling) program.

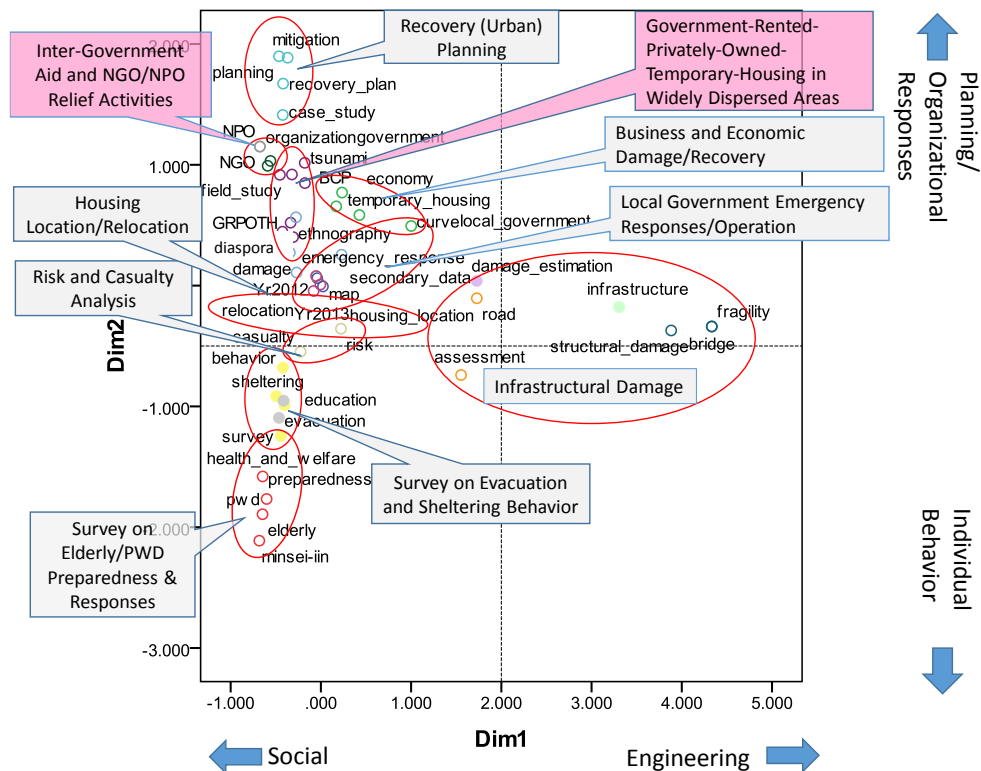


Figure 1. ISSS East Japan Earthquake and Tsunami Research Paper Keyword Concurrence (Correspondence) Analysis Results

Note: Gray- and pink-labeled clusters illustrates implementation and exploratory research topic areas, respectively.

Results and Discussion

Figure 1 illustrates the analysis results. 48 keywords were plotted to a two dimensional space where concurring words were situated in a close proximity while those words that did not concur were plotted placed in far distance. Eye-balling as well as additional hierarchical cluster analyses of the Figure 1 scatter plots suggested 10 different sets of keyword clusters, each of which represented types of research that ISSS members have been actively engaged. The horizontal dimension separated engineering research (on the right) that focused mainly on infrastructural damage caused by tsunami hazards and social science research (on the left). On the vertical dimension, planning and organizational response type research topics (on the top) were contrasted with survey research that focused on individual behavior (on the bottom). Among 10 categories of research topics, 8 were considered “implementation” (i.e., I-bet-this-would-happen) type of research agendas that have utilized already well-established sets of concepts, models, tools and analysis methods. Those included studies on 1) infrastructural damage caused by tsunami hazards, 2) recovery (urban)

planning, 3) business and economic damage/recovery, 4) local government emergency response/operation, 5) housing location/relocation, 6) risk and casualty analysis, 7) survey on evacuation and sheltering behavior and 8) survey on elderly/PWD preparedness and responses.

2 groupings emerged as “exploratory” (i.e., I-wonder-what-is-happening or I-wonder-what-would-happen) type of research agendas where new concepts, problems and hypotheses were generated and their particular problem solutions were sought out. Those included 9) organizational study of inter-government-aid as well as government and NGO/NPO collaboration and 10) Government-Rented-Privately-Owned-Temporary-Housing (GRPOTM) residents in widely dispersed areas. Please note that those two exploratory research topics appear in the upper left quadrant of Figure 1. That indicates these two keyword clusters represent social science research endeavors on organizational responses to newly emerging situations. One example is the Union of Western Japan (Kansai) Local Governments systematic initiatives to pair up Tohoku aid-receiving and Kansai aid-providing local governments, unprecedented number of well-financed Japan-based international NGOs/NPOs providing tangible and intangible relief aids to local disaster-hit communities and municipalities. Another is of the national government introducing a new policy that provides temporary housing units by renting out vacant privately-owned housing units.

Finally, Figure 1 also illustrates which research areas have not been extensively studied by the ISSS community. That may include 1) organizational responses to TEPCO Fukushima nuclear reactor disaster in the top left quadrant, 2) effects of tsunami warning and alert on individual behavior in the bottom left quadrant, and 3) housing as opposed to infrastructural damage assessment in the right center. It appears that ISSS communities has not had much connection in order to study organizational responses of TEPCO or national government representatives that are renowned for having formed “an iron triangle” with a closed group of nuclear scientists and engineers. Issues on tsunami warning and alert are currently or seem very likely to be brought to the courts for legal action so are therefore at present very difficult for the third party research community to access in order to explore how they worked or did not work. With regard to housing damage, tsunami hazards caused very clear distinctions between fully damaged and not damaged houses, which apparently did not lead to much research interest among corresponding structural engineers. There will be many more of these not-yet-studied topics. The rest of the discussion regarding what has not been studied and what is yet still worth examining for future collaborations remain to be seen during the DRC 50th year anniversary workshop.