International Journal of Research in Management, Science & Technology (E-ISSN: 2321-3264)
Vol. 5, No. 1, Pages 18-32, April 17
Available at www.ijrmst.org

Evaluation of Expert's Perspective on Human Resources Training in the context of the 2011 Great East Japan Earthquake and Tsunami

Preeti Arora[#1], Rupa Gunaseelan[*2], Rajesh Arora[**3]

[#]*Bharathiar School of Management & Entrepreneur Development, Bharathiar University, Coimbatore-641046, India*

[**3]*Defence Research and Development Organization, Directorate General-Life Sciences, Rajaji Marg, New Delhi-110011, India*

[1]preeetisethiarora@gmail.com
[2]rupagunaseelan@gmail.com
[3]rajesharoradr@rediffmail.com

***Abstract*— This study has evaluated the expert's viewpoint on Human Resources Training in the wake of the Great East Japan Earthquake (GEJE) mega disasters, which are considered the costliest disaster in human history and which impacted Japan on a colossal scale. The study has examined the effectiveness of training strategies in position in Japan for mitigation of the impact of disasters and has identified specific areas that need improvement to effectively manage future disasters. The research was exploratory survey design and data was collected in Japan between 2011-2013, employing the following instruments: Questionnaire; Interviews with experts involved in disaster response planning and implementation of HR plans for employment post-disaster and Field Studies in disaster affected areas. Tools used for analysis included: i) Descriptive Statistics; ii) Cronbach's Alpha; iii) Factor Analysis; iv) One sample t-test; v) One-way ANOVA, followed by vi) post-hoc Tukey's HSD test and vii) Correlation. The purpose of the quantitative study was to investigate the relationship that existed between the availability of programs/ strategies and their implementation post-GEJE and the expert's perceptions of effectiveness of the disaster management strategies. Significant difference in the scores of the responses ($p<0.05$) was observed. ANOVA analysis: {Profession: $\alpha= 0.05$ [$F (2,205) = 1.97$, $p= 0.14$]; Qualification: $\alpha= 0.05$ [$F (2,205) = 1.40$, $p= 0.24$; Employment: $\alpha= 0.05$ [$F (2,205) = 0.11$, $p= 0.89$]}. It was concluded from the study that the training strategies were quite effective in reduction of the disaster impact, reconstruction work, handling new jobs/ additional jobs, securing and retaining the jobs, sufficient and effective for the changing nature of the job in the post-disaster disrupted scenario. Building databases, availability of qualified and trained HR was critical to ensure and facilitate proper implementation of disaster relief and response. Training given to the workers, engaged in post-disaster reconstruction was effective; and training given to the local people in different organizations was useful in reducing disaster impact; vocational training provided to young people acted as a safety net in securing/retaining employment; the "support system for job seekers" established was helpful in acquiring timely employment through vocational skill development and livelihood support to the job seekers who were unable to receive unemployment benefits. Community disaster training and mock drills were quite effective in reducing casualties resulting due to the mega disasters. It was evident from the responses that training was imparted to the employees to handle entirely new/additional jobs, in case they lost jobs post-disaster. Taken together, the results of the present study, carried out in the aftermath of the Great East Japan Earthquake, Tsunami and ensuing disasters (nuclear leakage etc.), has drawn attention to the need for proactive training, retraining and specialized training of the community, responders, professionals and other stakeholders for effective management of mega disasters so that precious lives can be saved in future.**

***Keywords*— Great East Japan Earthquake, Tsunami, Human Resource, Training, Disaster Management, Expert perspective, Societal perception**

I. INTRODUCTION

Disaster management training is aimed at building the technical skills and competencies of the disaster response teams and relief workers, including officially designated responders, volunteers and community- who are often the first responders. Training aims to improve the knowledge, skills and attitudes of all stakeholders with a view to improving disaster relief and response. Training of the responders and community in disaster-prone areas results in overall improved preparedness at all levels and short and efficient response time in

2321-3264/Copyright©2017, IJRMST, April 2017

terms of relief and rescue operations (Paton, 1994; Ogedegbe *et al*., 2012; NIDM, 2013; Nazli *et al*., 2014; Jacquet *et al*., 2014; Arora and Arora, 2013). A small investment in preparedness through training can save thousands of lives and vital economic assets, thereby reducing the cost and period of overall relief assistance.

In order to manage disasters efficiently, there is a need for disaster management agencies and the community to continually test the ability of teams to work together efficiently, and also to communicate and operate in mock drills and joint exercises nationally and internationally in order to make the responder teams more effective (Jones, 2005; Hosie, 2006; Reilly, 2008; Crandall *et al*., 2014).

Training can be done through conducting drills, which can go a long way by: i) reducing anxiety and fear in event of a disaster; reducing losses that accompany disasters; iii) creating awareness in the community; iv) hazards vulnerability capacity analysis; v) establishing emergency communication channels and systems within the community and with volunteers, which can be activated during disasters, vi) forming and training response teams; vii) establishing evacuation routes; viii) training professionals in disaster victim identification; and ix) preparing a community crisis management plan and inclusive strategy that is implicit.

Training need analysis (Nazli *et al*., 2014) is necessary for gaining specific skills and competencies to operate unconstrained by the circumstances that disaster emergencies might pose.

In addition to the disaster victims, the disaster responders too are at an increased risk as they may become "the other unrecognized victims" at the time of disaster (Raphael, *et al*., 1986). Damage due to disasters are known to result in physical as well as significant psychological effects (Wang *et al*., 2000). Responder teams caught up in large numbers in overseas disasters may need health assistance (Robertson *et al*., 2011). Health and safety of disaster management teams is an issue that needs to be given attention (Aitkena *et al*., 2009). There is, therefore, a need to better train the disaster responders also.

A recent study from Malaysia by Ahayalimudin and Osman (2016) utilised a cross-sectional study design to collect data from 194 emergency nursing and medical personnel (staff nurses, doctors and assistant medical officers) in terms of emergency medical personnel's knowledge, attitude and practice towards disaster management. Amongst the sociodemographic factors studied, gender and education level were significantly associated with increased knowledge and practice scores. Working experience, involvement in disaster response and prior disaster training had a significant association with higher practice scores. The authors concluded from the study that prior training, knowledge, attitude and practice studies could assist in the implementation of programmes relevant to disaster management to ensure their preparedness to assist the affected communities.

In the last few years, a plethora of researchers have directed their attention from a training and operational perspective covering issues such as: metamodel based knowledge sharing system (Othman, 2016); role of opinion leaders in crowd sourcing disaster management (Carley *et al*., 2016); multi-agency sensor information (Alamdar *et al*., 2016); satellite networking for interaction with emergency workers and citizens (Olalekan *et al*., 2016; Santos *et al*., 2016); sense making through cue utilization (Gacasan *et al*., 2016); use of high-resolution polarimetric stereo- stereo-synthetic aperture radar (SAR) (Koyama *et al*., 2016); modelling or coastal areas (Hese and Heyer, 2016); volunteered geographic information (Granell *et al*., 2016); smart wearable devices for virtual training (Kawai *et al*., 2015; Cheng *et al*., 2016); indigenous knowledge utilization as a tool (Syafwina, 2014); community-based risk reduction (Liu *et al*., 2016); perception management amongst students (Baytiyeh *et al*., 2016); education and management strategies (Alfred *et al*., 2016); online tools for simulation (Srivihok *et al*., 2014); good practices for disaster risk reduction and management (Hettiarachchi *et al*., 2014); role of local wisdom (Usman *et al*., 2014); decision support tool (Lorca *et al*., 2015); disaster medical assistance and field organization of responders (Arziman, 2015); decision support tool (Rakes *et al*., 2014; educational intervention for providing disaster survival kit (Jassempour *et al*., 2014); virtual reality training (Farra *et al*., 2015); analysis of training needs in disaster preparedness (Nazli *et* al., 2014); data mining techniques (Goswami et al., 2016) etc.

As alluded to earlier, disasters continue to cause unimaginable damage (Ferris et al., 2007; Alfred et al., 2016; Becker & Reusser, 2016). Japan was hit by multiple disasters in 2011 viz., earthquake, tsunami, nuclear reactor damage and consequent radiation leakage from Fukushima. The Great Eastern Japan Earthquake (GEJE) inflicted unprecedented damage across continents (Løvholt et al., 2014). As per World Bank Report, the GEJE is considered to be the costliest disaster in human history.

HR is crucial from a disaster management perspective (GOI-UNDP Disaster Management Programme, 2008; Goodman and Mann, 2008; Hutchins & Wang, 2008; Reilly, 2008; Wang et al., 2009; Anderson, 2012; Aoki, 2015). Since GEJE posed several questions in terms of preparedness,

2321-3264/Copyright©2017, IJRMST, April 2017

response, rescue, relief and rehabilitation (Arora, 2011, Cabinet Office, Japan, 2011a,b,c), it was considered imperative to study, analyze and evaluate the critical gaps vis-à-vis disaster-oriented human resource training from an expert perspective in the wake of the Great East Japan Earthquake and the ensuing multiple disasters.

II. METHODOLOGY

Data was collected on experts in Japan during the period 2011-2013. To achieve the objectives of the current study, the research method followed was survey method, which facilitated to successfully study/assess the effectiveness of various prevailing HR training strategies/ programs and document insights from experts (both disaster management and HR experts and other Professionals) in terms of preparedness and resilience to aid in the designing and integrating holistic training programmes in disaster management plans at national and international levels.

A. Research Instrument

Research instrument used for the study was the questionnaire. The questionnaire was developed to gather insights from experts (HR professionals, DM experts and Academicians) following the Great East Japan Earthquake. The mentioned tools were originally generated and relevant items were used to meet the objectives of the present study. The structured questionnaire was designed by me and further validated and standardized by the experts in the field to get appropriate answers to the targeted questions and achieve the desired outcome and meet the objectives of the present study. This questionnaire was designed in English and for the ease of understanding by experts based in Japan, it was translated in Japanese language. The questionnaire developed was administered to the target sample. In order to get additional inputs, face to face interviews in the form of informal conversations were also conducted in Japan with the policy makers, implementers, officers, academicians and students. The observations were recorded to supplement and elaborate upon the issues from the perspective of the targeted population (unpublished data). The questionnaire had a central construct specifically on training related issues vis-à-vis the GEJE mega disaster.

B. Scale of Measurement: The Likert Scale

Researchers attempting to quantify constructs that are not directly measurable often use multiple-item scales and summated ratings to quantify the construct(s) of interest. The Likert Scale- attributed to Rensis Likert (1931) is a psychometric response scale that is primarily used by social and management researchers in questionnaires to obtain participant's preferences or degree of agreement with a statement or set of statements (Likert, 1932). A number of researchers have highlighted its importance (Uebersax, 2006; McIver and Carmines, 1981; Spector, 1992; Nunnally and Bernstein, 1994; Blalock, 1970).

The Survey Instrument for the present study was designed with a 5-point Likert-type scale consisting of statements that measured the opinion level of respondents vis-a-vis the disaster on the following scale: 5-Strongly Agree (SA); 4-Agree (A); 3-Neutral/ No response (N); 2-Disagree (D) and 1-Strongly Disagree (SD). Adequate steps were taken to control biased response and exaggerated responding by way of the following: i) majority of the items included in the questionnaire were positively worded; and ii) the issues were presented in a generalized broader format rather than specifying the micro-level issues.

C. Pretesting, Validity & Reliability Testing of Questionnaire

Case processing summary indicated that the valid cases were 99% (n= 206) and only 1% (n=2) were excluded (list-wise deletion based on all variables in the procedure).

In the present study, the questionnaire was tested for content validity and all questions scored highly for importance, appropriateness and phrasing with mean scores above 8.0 for each question. Readability of questionnaire was evaluated online to determine the Flesch Reading Ease Score, Automated Readability Index and Flesch-Kincaid Grade Level. The questionnaire scored a Flesch Reading Ease Score of 62.53, indicating that the questionnaire was of a standard readability level (Flesch, 1948); while the Automated Readability Index was 76.66 and Flesch-Kincaid Grade Level was 12.6, indicating that the questionnaire was fit for the target respondent population. Face validity indicated that the questionnaire was quick to complete (3-7 min), easy to follow and comprehensible. Cronbach's alpha scores internal reliability) for questions ranged from 0.7 to 0.9, indicating good internal consistency.

D. Factor Analysis

A factor analysis was run in IBM SPSS Statistics with the Factor command (Analyze>Dimension Reduction>Factor). Measures of sampling adequacy were requested by checking the boxes for "KMO and Bartlett's test of sphericity" and "Anti-

image" in the Descriptives dialog of the Factor procedure. The values derived for the tests were as follows: Kaiser-Meyer-Olkin Measure of Sampling Adequacy: 0.841; Bartlett's Test of Sphericity: Approx. χ^2: 510.916; Df: 21; Sig. 0.00.

Anti-imaging covariance and correlation values for the training construct were 0.5 and 0.8 respectively. Component matrix: component extracted through Principal Component Analysis revealed a value of 0.7 for the training construct.

E. Pretesting the Questionnaire

The pretesting of the questionnaire was carried out to determine: i) whether the questions were worded appropriately to achieve the desired results; ii) whether the questions were placed in the best order; iii) whether the questions were understood by all classes of respondents; iv) whether additional or specifying questions were needed or whether some questions needed to be eliminated; and v) whether the instructions to interviewers were adequate.

A small number of respondents were selected for the pre-test. Questionnaire in English, as well as post-translated questionnaire in Japanese, was pretested by distributing to the respondents within JILPT and University of Tokyo and subsequently the same were distributed to the different categories of experts. The respondents selected for the pilot survey were broadly representative of the type of respondents to be interviewed in the main survey.

Grouping and sequencing of questions into an appropriate order, and inserting interviewer instructions was done prior to laying out and setting up the questionnaire in its final form.

The pilot survey addressed the following points, as have been delineated by the Market Research Society (MRS) Secretariat, UK: i) the questions were paraphrased to sound natural; ii) complicated wording in the question was avoided in order to make it comprehensible; iii) elimination of technical terminology and jargon from questions was ensured; iv) care was taken to exclude any ambiguous questions, double-barrelled questions, loaded or leading questions; v) it was ensured that that only such questions were asked from the respondents, which they were capable of answering; vi) in order to maintain the quality of the data and retain the respondent's interest, necessary changes were made in the questionnaire; vii) it was thoroughly checked that the routeing instructions were understood by the respondents; viii) the questionnaire was designed as if we were conducting a conversation with the respondent; ix) it was ensured that the answers that respondents gave to those questions were the responses to the questions that we were asking; x) the survey was designed to take minimum time to optimize time and resources, yet answer all intended key parameters; xi) the questionnaire was thoroughly checked to avoid any mistakes from creeping in.

F. Determination of Sample Size

Sample size was determined using the following formula:

$$n = t^2 \times p(1-p)/m^2$$

For this purpose, the sample size calculator of World Health Organization (WHO) was employed; where, n: minimum required sample size; t : confidence level at x% level of significance; p : estimate of the proportion of respondents people falling into the group of interest; m : margin of error (MOE). Since the initial n calculated above was 10% or more of the size of the majority of the age groups, then the Finite Population Correction (FPC) was applied. The final sample size determined in the present study was 208. As the maximum power of the tests achieved was 95.16, the sample size of 208 taken in this study was considered sufficient to meet the objectives.

G. Selection of the Sample

Judgmental sampling was done to gather insights from experts (HR, DM, Academicians) following the Great East Japan Earthquake for efficient Human Resource Management. Judgmental sampling was implied on the basis of the qualification, employment in the field of disaster management, human resource management and people having experience of the 2011 GEJE disasters. Judgmental sampling design is usually used when a limited number of individuals possess the characteristic of interest. As judgmental sampling technique is only practicable in obtaining information from a very specific group of people and the researcher knew trustworthy professionals or authorities, which were capable of assembling a representative sample, hence judgmental sampling was used to collect insights from experts (HR, DM, Academicians) in this study.

Procedure for Data Collection in Japan

Visits to various institutions in Japan following the disaster between 2011 and 2013 and meetings with senior officials and discussions (during the former author's visit to the disaster-affected regions of Japan between October 2011 and June 2013 under sponsorship from the Japanese Government) with the local community, on-ground responders, health care professionals, human resource professionals and disaster management expert groups, volunteer organizations, NGOs, International organizations and several other employees and members of the

2321-3264/Copyright©2017, IJRMST, April 2017

society, including foreign people living in Japan at the time of the disasters, highlighted the extreme nature of the earthquake and tsunami, which resulted in emergency rescues, displacement of thousands of residents from their homes for several months, employment issues, an unstable economy, and stress and health problems, including an impending radiation threat.

In order to collect the data, the Japan Institute for Labour Policy and Training, Tokyo, Japan facilitated the visits to different locations, NWEC and other Universities. The lead author personally met the respondents after seeking appointments telephonically or via emails. When contacted personally, after the initial rapport formation with the participants, the participants were informed about the purpose of the visit and the questionnaire was distributed. Thereafter, relevant instructions were given for filling up the questionnaire and the participants were requested to honestly and openly respond. They were assured that their personal identities with respect to the responses would not be revealed. After clarifying their doubts, if any, they were asked to start writing the responses. No fixed time limit was there to fill the questionnaire and the participants were asked to take their time to fill the questionnaire. The lead author (PA) was available amidst them to clarify any doubts, while the questionnaires were in the process of being filled. After the questionnaire filling was done, PA interacted with the participants for the semi-structured interviews in person and in some cases in groups. The responses to the questions were recorded down for the analysis and as a supplement to the questionnaire data. Once the required responses had been sought, the participants were debriefed and thanked for their cooperation. The data collected from all the places was clubbed and analysis was carried out. All efforts were made to maintain the objectivity in the analysis and avoid any possibility of bias during the analysis. For the purpose of report, combined analysis of the participant's response from the different fields was done.

Geographical Setting

The lead author of this study was based in Tokyo from where visits were carried out for the survey and data collection in various regions of Japan-Tokyo, Kobe, Sendai, including tsunami affected Tohoku region Tokyo, Kobe, Sendai, including tsunami affected Tohoku region was done by contacting experts from various agencies such as: Vocational Training Centre, Hello Work Department, Sendai, NGO/NPO, Field visits to the Tohoku Region, Academicians, Researchers and PhD (graduate) research students of various universities in Tokyo and employees of various organizations, National Women's Education Center (NWEC), Saitama, Japan.

Target Respondents & Key Informants

The sample comprised of experts who were directly or indirectly involved in disaster response planning and implementation of disaster management plans and policy makers. Key informants were mainly those who were experts in the domains of management in general, specifically human resource management, disaster management or academicians or students and also the domicile residents of Japan or non-residents who had resided in Japan during the 2011 disaster and immediately after for a minimum period of one year in Japan. These key informants provided valuable data regarding the position on ground since they had closely seen the disasters, the immediate rescue and relief operations from close quarters (data not included).

Field Visits

Field visits, mainly to the maximum disaster affected Tohoku region, were undertaken to see and assess the on-ground situation and meet with Hello Work officials, NGOs, professors, scientists, graduate students and academicians working in the disaster-affected Tohoku prefecture.

Questionnaire and Interviews

Data collection was done to gather insights from experts (HR professionals, DM experts and Academicians) following the Great East Japan Earthquake vis-a-vis effectiveness of training of Human Resource. The purpose of the quantitative study was to investigate what relationship, if any, existed between the availability of programs/ strategies and their implementation post 2011 Great Eastern Japan Earthquake and Tsunami and the experts perceptions of disaster management. In particular, the analysis examined the perceptions of experts in Japan who had the knowledge of the programs implemented, their success and failure in the affected region of Japan. A quantitative research method was appropriate when examining relationships between independent and dependent variables (Creswell, 2009; Vogt, 2007). Neuman (2007) has indicated quantitative research methods are particularly useful when collecting data in geographically dispersed populations and the study analysis moves from abstract ideas to as to concrete conclusions. Quantitative research was appropriate for the present study to investigate the

relationships between the variables in a population dispersed throughout the affected regions.

Data analysis was done for the data collected. The objective questionnaire data were analyzed quantitatively by distributing it to the respondents in the different groups i.e., HR professionals, academicians, disaster management (DM) experts. These included officers involved in policy making, academicians/graduate students, officials of NGOs, Vocational Training Center, Hello Work Offices etc. The average of the responses on the five point Likert scale was computed and the results plotted graphically.

The study also included personal discussions with University Professors, Disaster Management Professionals, and officials directly or indirectly involved in disaster response planning and implementation of plans for generation of HR plans for employment post-disaster, academicians, students and other departments (unpublished data). The face to face interaction in the form of semi-structured interview was carried out to find any uncovered aspect and for elaboration of the emerged issues. The unstructured and semi-structured interviews were taken to further validate the structured questionnaire.

In terms of age, the sample fell in the range of 22-73 years, with the average age of respondents being 43.41years.

Sources of Secondary Data

Secondary data was collected from published information in the form of white papers, research papers etc. from the following sources: i) Authentic websites of International Organizations like: Ministry of Health, Labour and Welfare (MHLW); Ministry of Education, Culture, Sports, Science and Technology (MEXT); United Nations (UN); Preventionweb; National Women's Education Center (NWEC); FAO etc; White papers and the published materials by the Ministries; Peer-reviewed international journals; Situation reports of various International Agencies (like UN, WHO etc.); In-house bulletins and other bulletins; Published views of significant officials and authorities in the Cabinet Office; Reputed International and National Newspapers and magazines; Manuals, Training and Development Calendars, Pamphlets etc.

Statistical Analysis

Statistical analysis was performed using SPSS statistical software (version 19.0; SPSS Inc., Chicago, IL, USA). Questionnaire data analysis used descriptive statistics. T-test, one-way analysis of variance (ANOVA) was used, followed by post-hoc Tukey's HSD test, wherever appropriate. Correlation analysis was also performed.

One-sample T-test

The one-sample t-test is used to determine whether a sample comes from a population with a specific mean. This population mean is not always known, but is sometimes hypothesized. One-sample t-test was used since the data passed four assumptions that are required for a one-sample t-test to give a valid result. Assumption #1: The dependent variable should be measured at the interval or ratio level (i.e., continuous). Assumption #2: The data are independent (i.e., not correlated/related), which means that there was no relationship between the observations. Assumption #3: There were no significant outliers. Outliers are data points within the data that do not follow the usual pattern. Assumption #4: The dependent variable should be approximately normally distributed. One-sample t-test only requires approximately normal data because it is quite "robust" to violations of normality, meaning that the assumption can be a little violated and still provide valid results.

One-way Analysis of Variance (ANOVA)

To examine the research question, an Analysis of Variance (one way ANOVA) was conducted to determine if there was a significant difference between dependent variable and independent variable. One way ANOVA is an appropriate statistical analysis when the purpose of research is to assess if mean differences exist on one continuous dependent variable by an independent variable with two or more discrete groups. The dependent variable in this analysis is dependent variable, and the discrete groups of independent variable (insert categories of groups). The ANOVA uses the F-test, a ratio of the two independent variance estimates of the same population variance. The F-test allows to make the overall comparisons on whether group means differ. If the obtained F statistic was larger than the critical F statistics, the null hypothesis was rejected.

Tukey's HSD

Tukey's multiple comparison test is one of several tests that can be used to determine which means amongst a set of means differ from the rest. Tukey's multiple comparison tests are also called Tukey's honestly significant difference test or Tukey's HSD. Tukey's HSD analysis was done after one-way analysis of variance (ANOVA) to evaluate whether there was any evidence that the

means of the populations differed. Since the ANOVA led to a conclusion that there was evidence that the group means differed, we were interested in investigating which of the means are different. This is why the Tukey multiple comparison test was used. The test compared the difference between each pair of means with appropriate adjustment for the multiple testing. The results are presented as a matrix showing the result for each pair as a P-value in the form of Tables in Analysis and Interpretation section of this thesis. The Tukey multiple comparison test, like both the t-test and ANOVA, assumes that the data from the different groups come from populations where the observations have a normal distribution and the standard deviation is the same for each group.

Guiding Principles & Ethical Considerations

All efforts were made to collect the data ethically and with authenticity, avoiding any kind of bias. Prior to the interviews, the aims and objective of the study were explained clearly and simply by the interviewer using written materials. The process of filling the form was clearly explained to all the participants in this study. It was understood that in the aftermath of the unprecedented multiple disasters, even the experts in Japan were psychologically affected to some extent and, therefore, all precautions were taken to ensure that the feelings of the participants were not hurt as a result of administration of the questionnaire or the interviews.

III. RESULTS

Responses were sought vis-a-vis the questions, categorized under the Training construct dimension. The survey data, obtained on a sample of two hundred and eight experts broadly categorized as academicians, disaster management experts and other professionals. Data was analyzed descriptively (Table 1).

TABLE 1. DESCRIPTIVE DATA OF RESPONSES OF EXPERTS.

Descriptives: Training								
	N	Mean	S.D.	S.E.	95% Confidence Interval for Mean		Min	Max
					Lower bound	Upper bound		
PhD	49	2.99	0.56	0.08	2.83	3.15	2.11	5.00
Post Grad	106	3.09	0.46	0.04	3.00	3.18	2.11	5.00
Grad	53	3.15	0.46	0.06	3.02	3.28	2.22	4.00
Total	208	3.08	0.49	0.03	3.02	3.15	2.11	5.00

One sample T-test was done which is depicted in Table 2 and Table 3 Data obtained on the subcategories was analyzed using one-way analysis of variance (ANOVA; Table 4).

TABLE. 2. T-TEST ANALYSIS OF RESPONSES OF EXPERTS

N	Mean	Std. Deviation	Std. Error Mean
208	3.0890	0.49037	0.03400

TABLE. 3. T-TEST (ONE-SAMPLE TEST)

Test Value = 0					
T	df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
				Lower	Upper
90.85	207	0.00	3.08	3.02	3.15

TABLE 4. DESCRIPTIVE TABLE FOR ANOVA ANALYSIS OF RESPONSES OF EXPERTS.

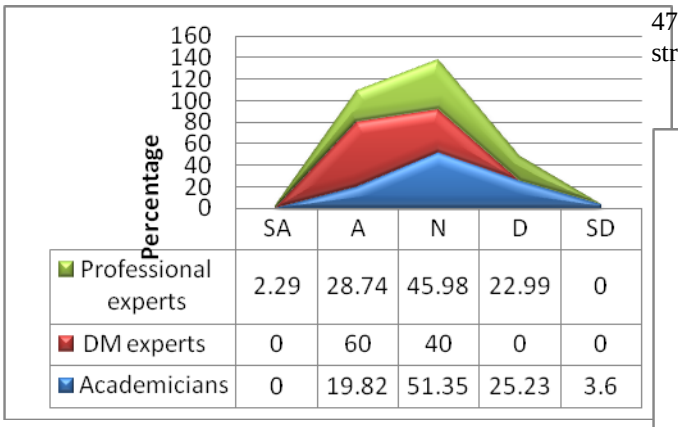
Descriptive Statistics: Training										
N	Range	Min.	Max.	Mean		S.D.	Skewness		Kurtosis	
Statistic	Statistic	Statistic	Statistic	Statistic	S.E.	Statistic	Statistic	S.E.	Statistic	S.E.
208	2.8	2.1	5.0	3.0	0.0	0.4	.3	0.1	1.1	0.3

Quantitative Analysis

Based on the analysis of the quantitative data collected from the respondents from different fields and locations, the obtained results have been explained in terms of percentage of respondents who responded on the Likert scale on each dimension. For better understanding, graphical representation of the results has been provided, along with a brief description.

The Training Construct

In response to the question whether the training imparted to the workers, engaged in post-disaster reconstruction, was effective 3.6% academicians strongly disagreed, while 25.23% disagreed, 51.35% were neutral and 19.82% of the academicians agreed.



	SA	A	N	D	SD
Professional experts	2.29	28.74	45.98	22.99	0
DM experts	0	60	40	0	0
Academicians	0	19.82	51.35	25.23	3.6

Fig. 1. Responses to the question: Training given to the workers, engaged in post-disaster reconstruction, was effective.

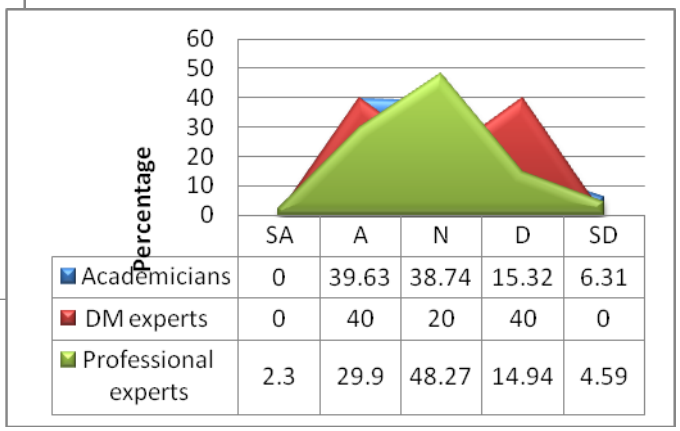
None of the Disaster Management (DM) experts on the other hand either strongly disagreed or disagreed, 40% were neutral, and 60% agreed. Other experts opined as follows: None strongly disagreed, 22.99% disagreed, 45.98% were neutral, 28.74% agreed and only 2.29% strongly agreed. When the data from all the experts was analyzed in totality, it emerged that 1.92% strongly disagreed, 23.08% disagreed, 48.56% were neutral in their response, 25.48% agreed, while only 0.96% strongly agreed (Fig. 1).

In response to the question whether the training given to local people in different organizations was useful in reducing disaster impact, 6.31% academicians strongly disagreed, while 15.32% disagreed, 38.74% were neutral and 39.63% of the academicians agreed.

None of the Disaster Management (DM) experts on the other hand strongly disagreed, 40% disagreed, 20% were neutral, and 40% agreed. Other experts opined as follows: 4.59% strongly disagreed, 14.94% disagreed, 48.27% were neutral, 29.9% agreed and 2.3% strongly agreed. When the data from all the experts was analyzed in totality, it emerged that 5.29% strongly disagreed, 16.35% disagreed, 41.83% were neutral in their response, 35.57% agreed, while only 0.96% strongly agreed (Fig. 2).

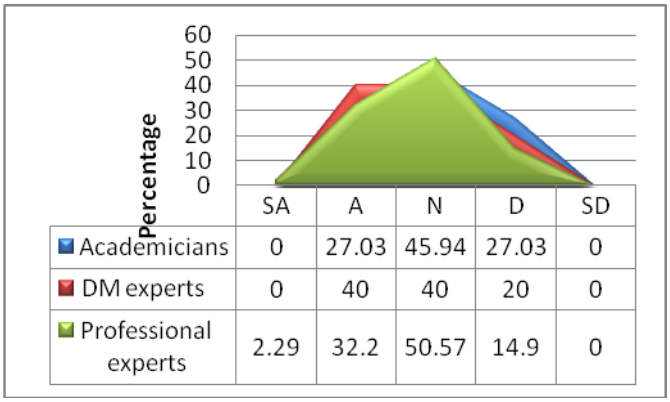
In response to the question whether training was imparted to the employees to handle entirely new/additional jobs, in case they lost jobs post-disaster, none of the academicians strongly disagreed, while 27.03% disagreed, 45.94% were neutral and 27.03% of the academicians agreed. None of the Disaster Management (DM) experts on the other hand strongly disagreed, 20% disagreed, 40% each were either neutral or they agreed.

While the other experts opined as follows: none strongly disagreed, 14.9% disagreed, 50.57% were neutral, 32.2% agreed and 2.29% strongly agreed. When the data from all the experts was analyzed in totality, it emerged that 21.63% disagreed, 47.6% were neutral, 29.81% agreed and 0.96% strongly agreed (Fig. 3).



	SA	A	N	D	SD
Academicians	0	39.63	38.74	15.32	6.31
DM experts	0	40	20	40	0
Professional experts	2.3	29.9	48.27	14.94	4.59

Fig. 2. Responses to the question: Training given to the local people in different organizations was useful in reducing disaster impact.



	SA	A	N	D	SD
Academicians	0	27.03	45.94	27.03	0
DM experts	0	40	40	20	0
Professional experts	2.29	32.2	50.57	14.9	0

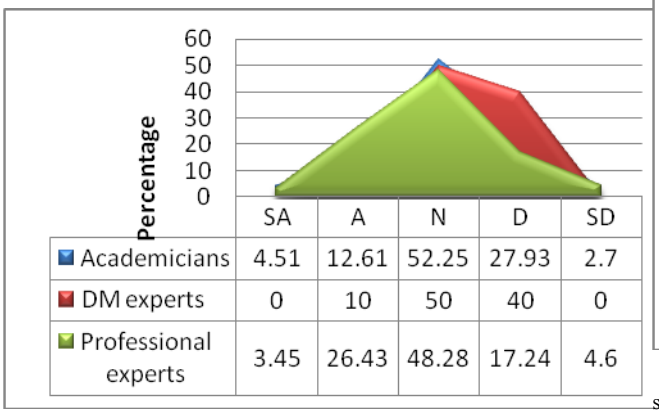
Fig. 3. Responses to the question: Training was imparted to the employees to handle entirely new/additional jobs, in case they lost jobs post-disaster.

In response to the question whether vocational training provided to young people acted as a safety net in securing/retaining employment, 2.7% of the academicians strongly disagreed, while 27.93% disagreed, 52.25% were neutral, 12.61% agreed, while only 4.51% of the academicians strongly agreed. None of the Disaster Management (DM) experts on the other hand strongly disagreed, 40% disagreed, 50% were neutral and 10% agreed. Other experts opined as follows: 4.6% strongly disagreed, 17.24% disagreed, 48.28% were neutral, 26.43% agreed and 3.45% strongly agreed. When the data from all the experts was analyzed in totality, it emerged that 3.37% strongly disagreed, 24.03% disagreed, 50.48% were neutral, 18.27% agreed and 3.85% strongly agreed (Fig. 4).

In response to the question whether vocational training helped the young graduates find suitable jobs, 2.7% of the academicians strongly disagreed, while 39.64% disagreed, 37.84% were neutral,

2321-3264/Copyright©2017, IJRMST, April 2017

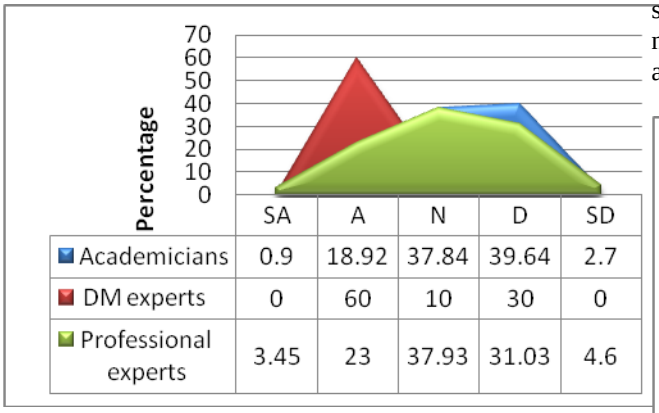
18.92% agreed, while only 0.90% of the academicians strongly agreed. None of the Disaster Management (DM) experts on the other hand strongly disagreed, 30% disagreed, 10% were neutral and 60% agreed, while none strongly agreed. Other experts opined as follows: 4.6% strongly disagreed, 31.03% disagreed, 37.93% were neutral, 23% agreed and 3.45% strongly agreed.



	SA	A	N	D	SD
Academicians	4.51	12.61	52.25	27.93	2.7
DM experts	0	10	50	40	0
Professional experts	3.45	26.43	48.28	17.24	4.6

Fig. 4. Responses to the question: Vocational training provided to young people acted as a safety net in securing/retaining employment.

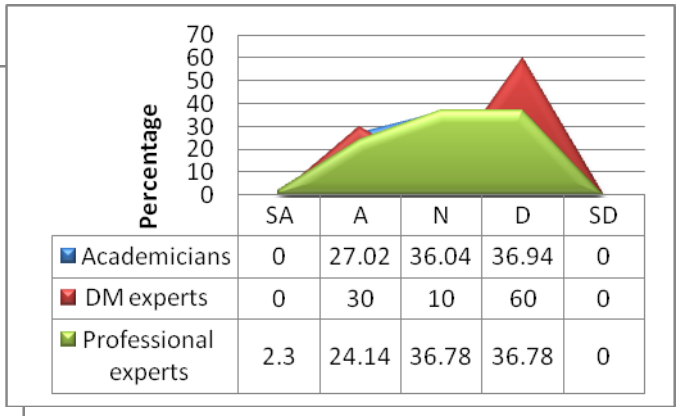
When the data from all the experts was analyzed in totality, it emerged that 3.37% strongly disagreed, 35.58% disagreed, 36.54% were neutral, 22.59% agreed and 1.92% strongly agreed (Fig. 5).



	SA	A	N	D	SD
Academicians	0.9	18.92	37.84	39.64	2.7
DM experts	0	60	10	30	0
Professional experts	3.45	23	37.93	31.03	4.6

Fig. 5. Responses to the question: The vocational training helped the young graduates find suitable jobs.

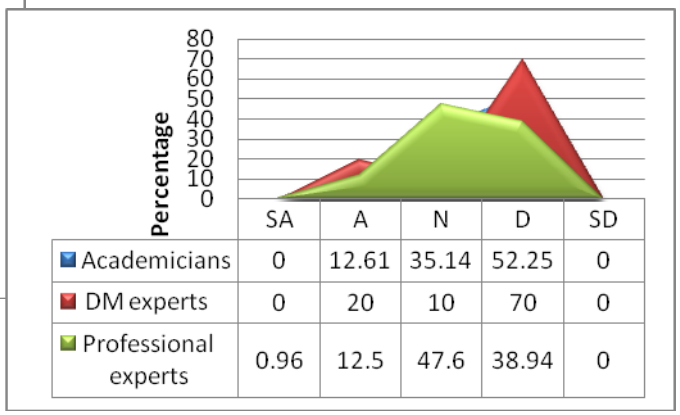
In response to the question whether the "support system for job seekers" established were helpful in acquiring early employment through vocational skill development and livelihood support to the job seekers who are unable to receive unemployment benefits, 36.94% of the academicians disagreed, while 36.04% were neutral, while 27.02% of the academicians agreed. None of the Disaster Management (DM) experts on the other hand strongly disagreed, 60% disagreed, 10% were neutral and 30% agreed, while none strongly agreed. Other experts opined as follows: 36.78% disagreed or were neutral, 24% agreed and 2.3% strongly agreed. When the data from all the experts was analyzed in totality, it emerged that none strongly disagreed, 37.98% disagreed, 35.1% were neutral, 25.96% agreed and 0.96% strongly agreed (Fig. 6).



	SA	A	N	D	SD
Academicians	0	27.02	36.04	36.94	0
DM experts	0	30	10	60	0
Professional experts	2.3	24.14	36.78	36.78	0

Fig. 6. Responses to the question: The "support system for job seekers" established were helpful in acquiring early employment through vocational skill development and livelihood support to the job seekers who are unable to receive unemployment benefits.

In response to the question whether the training to adapt to the changing nature of work was sufficient, 52.25% of the academicians disagreed, while 35.14% were neutral, while 12.61% of the academicians agreed. None of the Disaster Management (DM) experts on the other hand strongly disagreed, 70% disagreed, 10% were neutral and 20% agreed, while none strongly agreed.



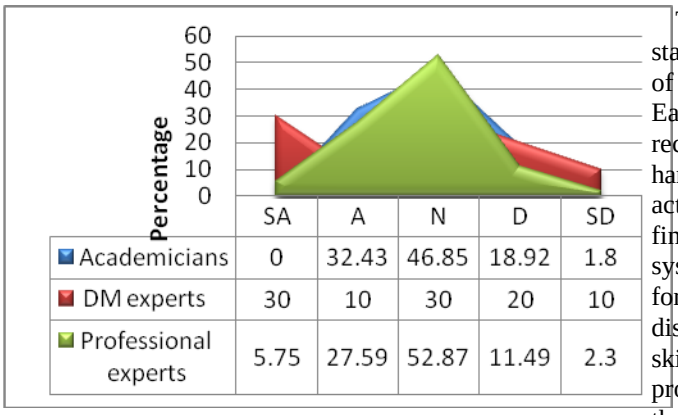
	SA	A	N	D	SD
Academicians	0	12.61	35.14	52.25	0
DM experts	0	20	10	70	0
Professional experts	0.96	12.5	47.6	38.94	0

Fig.7. Responses to the question: Training to adapt to the changing nature of work was sufficient.

Other experts opined as follows: 39.1% disagreed, 47.13% were neutral, 11.48% agreed and 2.29% strongly agreed. When the data from all the experts was analyzed in totality, it emerged that none strongly disagreed, 47.6% disagreed, 38.94% were neutral, 12.5 % agreed and 0.96% strongly agreed (Fig. 7).

2321-3264/Copyright©2017, IJRMST, April 2017

In response to the question whether currently provisions exist for enhancing skills through retraining, development, and educational programs for workers already employed, 1.8% of the academicians strongly disagreed, while 18.92% disagreed, 46.85% were neutral, 32.43% agreed, while none of the academicians strongly agreed. 10% of the Disaster Management (DM) experts on the other hand strongly disagreed, 20% disagreed, 30% were neutral, 10% agreed and 30% strongly agreed.

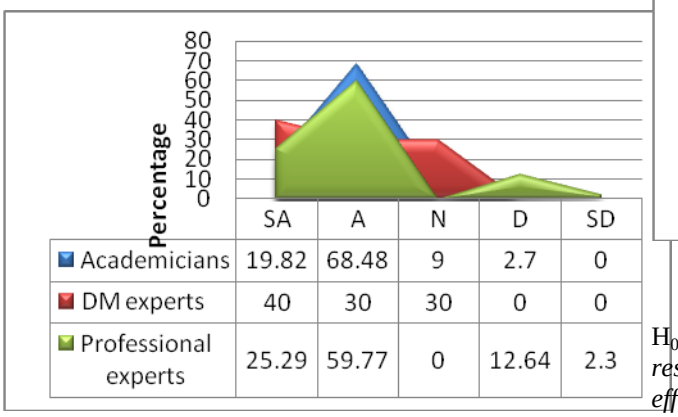


	SA	A	N	D	SD
Academicians	0	32.43	46.85	18.92	1.8
DM experts	30	10	30	20	10
Professional experts	5.75	27.59	52.87	11.49	2.3

Fig. 8. Responses to the question: Currently provisions exist for enhancing skills through retraining, development, and educational programs for workers already employed.

Other experts opined as follows: 2.3% strongly disagreed, 11.49% disagreed, 52.87% were neutral, 27.59% agreed and 5.75% strongly agreed. When the data from all the experts was analyzed in totality, it emerged that 2.4% strongly disagreed, 15.86% disagreed, 48.56% were neutral, 29.33% agreed and 3.85% strongly agreed (Fig. 8).

In response to the question whether community disaster training and mock drills are an effective tool in reducing casualties, 2.7% disagreed, 9% were neutral, 68.48% agreed, while 19.82 of the academicians strongly agreed.



	SA	A	N	D	SD
Academicians	19.82	68.48	9	2.7	0
DM experts	40	30	30	0	0
Professional experts	25.29	59.77	0	12.64	2.3

Fig. 9. Responses to the question: Community disaster training and mock drills are an effective tool in reducing casualties.

None of the Disaster Management (DM) experts on the other hand strongly disagreed or disagreed, 30% were neutral, 30% agreed and 40% strongly agreed. Other experts opined as follows: 2.3% disagreed, 12.64% were neutral, 59.77% agreed and 25.29% strongly agreed. When the data from all the experts was analyzed in totality, it emerged that 2.4% disagreed, 11.54% were neutral, 62.98% agreed and 23.08% strongly agreed (Fig. 9).

Training Construct: Statistical Analysis

The responses of the respondents were statistically analyzed to evaluate the effectiveness of the training post-2011 Great East Japan Earthquake disaster with respect to the reconstruction, reducing the impact of the disaster, handling entirely new or additional jobs, training acted as a safety net in securing employment, finding suitable jobs, effectiveness of the support system for job seekers, sufficiency of the training for the changing nature of the work in the post disaster scenario, provisions for the enhancing skills, retraining, development and educational programs, training and mock drills for reducing the causalities.

The values from the training Descriptive data from Table 4.5 are taken, which shows that n=208, sample mean= 3.08, SD=0.49.

Interpretation: Mathematically the sample mean was 3.0890 (Fig. 10), which was more than 3 i.e., the actual mean, however, to see whether there existed a significant difference between the two values, statistical analysis was done using the t-test.

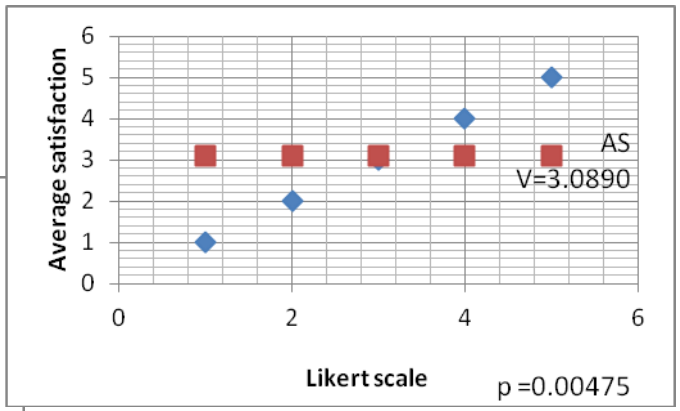


Fig. 10. Diagram showing the value of mean for Training construct on a scale of 1-5.

H_0: *There is no significant difference in the mean responses of the respondents vis-à-vis the overall effectiveness of the training post-2011 Great East Japan Earthquake.*

H1: *There is significant difference in the mean responses of the respondents vis-à-vis the overall*

effectiveness of the training post-2011 Great East Japan Earthquake.

It was observed that the p value is 0.004 for the training, which is less than the value of the level of significance i.e., $\alpha = 0.05$.

With respect to the overall effectiveness of the training, significant difference in the scores of the responses [(M = 3.08, SD = 0.49); t(207) = 90.85, p = 0.004] was observed, hence the null hypothesis was rejected. Since the sample mean was more than the actual mean, it was, therefore, concluded that the average respondents agree with respect to the effectiveness, suitability and usage of the training in the post-disaster scenario. The overall conclusion for the training responses was that the training was very effective for the reduction of the disaster impact, reconstruction work, handling new jobs/ additional jobs, securing and retaining the jobs, sufficient and effective for the changing nature of the job in the post disaster disrupted scenario.

One-way between the groups ANOVA was conducted to compare the opinions of the respondents on Training construct. The analysis was done on three categories groups i.e.: Profession, Qualification and Employment.

One-way between groups ANOVA: Profession Category

To conduct ANOVA for the category profession, the respondents were divided into three groups i.e., Academicians, Disaster Management experts and Others based on their type of profession.

The values of the group profession ANOVA Descriptive data for the training construct is shown in Table 5.

TABLE 5. ANOVA DESCRIPTIVE DATA FOR THE TRAINING CONSTRUCT VIS-À-VIS PROFESSION.

Profession	N	Mean	Std. Deviation
Acad	105	3.02	0.44
DM	20	3.10	0.41
Others	83	3.16	0.55
Total	208	3.08	0.49

TABLE 6. ANOVA TABLE FOR THE TRAINING CONSTRUCT VIS-À-VIS PROFESSION.

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	0.93	2	0.46	1.97	0.14
Within Groups	48.83	205	0.23		
Total	49.77	207			

Interpretation:

There was no significant difference among the opinions of the three categories of the profession group (academicians, DM experts and others) at the level of significance $\alpha = 0.05$ [F (2,205) = 1.97, p= 0.14] (Table 6). These results suggested that all the respondents under the category profession were of the same opinion with respect to the training construct.

One-way between groups ANOVA: Qualification Category

To conduct ANOVA for the category qualification, the respondents were divided into three groups i.e., PhD, Post Graduates, Graduates based on their qualification.

The values of the group qualification ANOVA Descriptive data for the training construct is shown in the Table 7.

TABLE 7. ANOVA DESCRIPTIVE DATA FOR THE TRAINING CONSTRUCT VIS-À-VIS QUALIFICATION.

Qualification	N	Mean	Std. Deviation
PhD	49	2.99	0.56
Post-Graduation	106	3.09	0.46
Graduation	53	3.15	0.46
Total	208	3.08	0.49

TABLE 8. ANOVA TABLE FOR THE TRAINING CONSTRUCT VIS-À-VIS QUALIFICATION.

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	0.67	2	0.33	1.40	0.24
Within Groups	49.10	205	0.24		
Total	49.77	207			

Interpretation:

No significant difference among the opinions of the three categories of the qualification group (PhD, Post-Graduates and Graduates) at the level of significance $\alpha = 0.05$ [F (2,205) = 1.403, p= 0.24] (Table 8). These results suggested that all the respondents with qualification PhD, Post-Graduation and Graduation were of the same opinion with respect to the training construct.

One-way between groups ANOVA: Employment Category

To conduct ANOVA for the category employment, the respondents were divided into

three groups based on their employment type i.e., Full time, Part Time, Others.

The values of the group employment ANOVA Descriptive data for the training construct is shown in Table 9.

TABLE 9. ANOVA DESCRIPTIVE DATA FOR THE TRAINING CONSTRUCT VIS-À-VIS EMPLOYMENT.

Employment	N	Mean	Std. Deviation
Full time	162	3.09	0.05
Part time	34	3.06	0.04
Others	12	3.13	0.04
Total	208	3.08	0.04

TABLE 10. ANOVA TABLE FOR THE TRAINING CONSTRUCT VIS-À-VIS EMPLOYMENT.

	Sum of Squares	df	Mean Square	F.	Sig
Between Groups	0.05	2	0.02	0.11	0.89
Within Groups	49.71	205	0.24		
Total	49.77	207			

Interpretation:

There was no significant difference among the opinions of the three categories of the employment group (Full time, Part Time, and Others) at the level of significance α= 0.05 [F (2,205) = 0.11, p= 0.89] (Table 10). These results suggested that all the respondents with employment type Full time, Part Time, and Other professionals were of the same opinion with respect to the training construct.

At an overall level the satisfaction of people with respect to the effectiveness of the training is slightly towards the positive side. According to the respondents the training was very effective for the reduction of the disaster impact, reconstruction work, handling new jobs/ additional jobs, securing and retaining the jobs, sufficient and effective for the changing nature of the job in the post disaster disrupted scenario. Furthermore the responses analysed on the basis of the profession, qualification and the employment are of the same opinion and there exist no difference in their responses.

IV. FINDINGS

The findings of the study are based on the results obtained from the analysis of data on experts vis-à-vis the Training construct.

Findings from the One-Sample T-Test

The responses of the respondents were statistically analyzed to evaluate the effectiveness of the training post-2011 Great East Japan Earthquake disaster with respect to the reconstruction, reducing the impact of the disaster, handling entirely new or additional jobs, training acted as a safety net in securing employment, finding suitable jobs, effectiveness of the support system for job seekers, sufficiency of the training for the changing nature of the work in the post disaster scenario, provisions for the enhancing skills, retraining, development and educational programs, training and mock drills for reducing the causalities.

With respect to the overall effectiveness of the training, significant difference in the scores of the responses [(M = 3.08, SD = 0.49); t(207) = 90.85, p = 0.004] was observed. Since the sample mean was more than the actual mean, it was, therefore, concluded that the average respondents agree with respect to the effectiveness, suitability and usage of the training in the post-disaster scenario.

Findings from the One-way between the groups ANOVA

One-way between the groups ANOVA was conducted to compare the opinions of the respondents on Training construct. The analysis was done on three categories groups i.e.:

Profession-wise (Academicians, Disaster Management Experts & Other Professionals):

There was no significant difference among the opinions of
the three categories of the profession group (academicians, DM experts and other professionals) at the level of significance α= 0.05 [F (2,205) = 1.97, p= 0.14]. These results suggested that all the respondents under the category profession were of the same opinion with respect to the training construct.

Qualification (PhD, Post Graduates, Graduates):

These results suggested that all the respondents with qualification: PhD, Post-Graduation and Graduation were of the same opinion with respect to the training construct.

Employment (Full time, Part Time, Others):

These results suggested that all the respondents with employment type: Full time, Part Time, and Others were of the same opinion with respect to the training construct.

V. CONCLUSION

The key suggestions from the studies carried out on the studies carried out to evaluate the perspective of experts in Japan vis-à-vis are the Training Construct are enumerated in the ensuing sections:

At an overall level the satisfaction of people with respect to the effectiveness of the training was to some extent towards the positive side. According to the respondents, the training was effective for the reduction of the disaster impact, reconstruction work, handling new jobs/ additional jobs, securing and retaining the jobs, sufficient and effective for the changing nature of the job in the post-disaster disrupted scenario. Furthermore, the responses analyzed on the basis of the profession, qualification and the employment were of similar opinion and there existed no difference in their responses. The overall conclusion for the training construct was that the training was effective for the reduction of the disaster impact, reconstruction work, handling new jobs/ additional jobs, securing and retaining the jobs, sufficient and effective for the changing nature of the job in the post-disaster disrupted scenario. The learnings and best practices used for training in Japan need to be emulated by other nations for effective disaster management.

ACKNOWLEDGMENT

The authors acknowledge the support and help of all the respondents. Personal thanks are due to Prof. Yasuyuki Sawada, University of Tokyo, Japan for useful technical discussions and help with the questionnaire translation. The help of Mr. Abhishek K. Umrawal, Assistant Professor, Department of Statistics, University of Delhi, India in statistical analysis of the data is duly acknowledged. Preeti Arora is especially thankful to the Japan Institute for Labour Policy and Training (JILPT), Tokyo for financially sponsoring visits to and within Japan. These visits facilitated several interactions and discussions with experts, responder team members and members of the community cutting across various sections of society, professions and subjects. Personal site visits to some of the severely disaster-affected sites in Tōhoku region helped in gaining an enhanced situational insight and understanding of the on-ground situation. The authors are grateful to Dr. W. Selvamurthy, Former Chief Controller R&D (LS & IC), DRDO and currently President, Amity Science, Technology & Innovation Foundation (ASTIF) and Dr. Manas K. Mandal, Distinguished Scientist & Director General- Life Sciences, DRDO for suggestions and encouragement.

DISCLAIMER

The views contained in the article are purely personal to the authors and do not in any way whatsoever reflect the views of any of the departments/institutions within the ambit of the Govt. of India or the Govt. of Japan. The interpretation of the results represents entirely the personal views of the authors based on the data collected from the respondents.

STATEMENT

The authors declare no competing interests.

REFERENCES

[1] Paton, D. (1994). Disaster Relief Work: An Assessment of Training Effectiveness. *Journal of Traumatic Stress*, 7(2), pp. 275–288

[2] Ogedegbe, C., T. Nyirenda., G. DelMoro., E. Yamin, and J. Feldman (2012). Health care workers and disaster preparedness: barriers to and facilitators of willingness to respond. *International Journal of Emergency Medicine*, 5(29), pp. 1–9.

[3] NIDM (2013) Human Resource and Capacity Development Plan for Disaster Management and Risk Reduction in India (Government of India). A Publication of the National Institute of Disaster Management, New Delhi, India, pp.74.

[4] Nazli, N.., Sipon, S. and Radzi, H.M. (2014). Analysis of training needs in disaster preparedness. *Procedia-Social & Behavioral Sciences*, 140, 576–580.

[5] Jacquet, G., C.C. Obi., M.P. Chang, and J.D. Bayram (2014). Availability and diversity of training programs for responders to International disaster and complex human emergencies. *PLOS Currents Disasters*, pp. 1–14.

[6] Arora R and Arora P. (eds) (2013) Disaster Management: Medical Preparedness, Response and Homeland Security. CABI Publishing, Wallingford, Oxon, United Kingdom, pp. 680.

[7] Jones, W. (2005). The Human Side of Crisis Management'. *Louisiana Employment Law Letter*, 14.

[8] Hosie, P (2006). *Human Resource Development: Proactive Preparation to Manage Crises*. School of Management, Curtin University of Technology, Australia, 3, 1–15.

[9] Reilly, A.H. (2008). The role of human resource development competencies in facilitating effective crisis communication. *Advances in Developing Human Resources*, 10 (30), pp. 331–351.

[10] Crandall, W.R., Parnell, J.A. and Spillan, J.E. (2014). *Crisis Management: Leading in the New Strategy Landscape*. Sage Publications Inc. Thousand Oaks, California, pp. 384.

[11] Raphael, B., Singh, B. and Bradbury, L. (1986). Disaster: The helper's perspective. In: R.H. Moos (ed) *Coping with Life Crises*, Plenum, NY, USA.

[12] Wang, X., Gao, L., Zhang, H., Zhao, C. Shen, Y. and Shinfuku, N. (2000). Post-earthquake quality of life and psychological well-being: longitudinal evaluation in a rural community sample in Northern China. *Psychiatry and Clinical Neuroscience*, 54(4), 427–433.

[13] Robertson, A.G., E.K. Griffiths., I. Norton, and T.S. Weeramanthri (2011). Disaster response from Australia: What is the role of Forward Teams? *Travel Medicine and Infectious Disease*, 9(5), pp. 249–252.

[14] Aitken, P., Leggat. P., Robertson, A., Harley, H., Speare. R. and Leclercqu, M. (2009). Health and safety aspects of

deployment of Australian Disaster Medical Assistance Team members: Results of a national survey. *Travel Medicine and Infectious Disease*, 7(5), 284–290.

[15] Ahayalimudin, N. and Osman, NNS (2016). Disaster management: Emergency nursing and medical personnel's knowledge, attitude and practices of the East Coast region hospitals of Malaysia, *Australasian Emergency Nursing Journal*, 19(4), 203-209.

[16] Othman, S.H., Beydoun, G. and Sugumaran, V. (2016). Development and validation of a Disaster Management Metamodel (DMM). *Information Processing & Management*, 50(2), 235–271.

[17] Carley, K.M., Malik, M., Landwehr, P.M., Pfeffer, J., Kowalchuck, M. (2016) Crowd sourcing disaster management: The complex nature of Twitter usage in Padang Indonesia, *Safety Science*. 90, 48-61.

[18] Alamdar, F., Kalantari, M. and Rajabifard, A. (2016). Understanding the Provision of Multi-agency Sensor Information in Disaster Management: A Case Study on the Australian State of Victoria. *International Journal of Disaster Risk Reduction*, Available online 27 October 2016, http://dx.doi.org/10.1016/j.ijdrr.2016.10.008.

[19] Bello, O.M., Aina, Y.A. (2014). Satellite remote sensing as a tool in disaster management and sustainable development: Towards a synergistic approach. *Procedia – Social and Behavioral Sciences*, 120, 365–373.

[20] Santos, R., Mosse, D., Znati, T., and Comfort, L.K. (2016) Comfort, Design and implementation of a Witness Unit for opportunistic routing in tsunami alert scenarios, *Safety Science*, 90, 75–83.

[21] Gacasan, Eva Marie P. and Wiggins, M.W. (2016) Sense making through cue utilisation in disaster recovery project management. *International Journal of Project Management*, http://dx.doi.org/10.1016/j.ijproman.2016.09.009.

[22] Koyama, C.N., Gokon, H., Jimbo, M., Koshimura, S. and Sato, M. (2016) Disaster debris estimation using high-resolution polarimetric stereo-SAR, ISPRS. *Journal of Photogrammetry and Remote Sensing*, 120, 84–98.

[23] Hese, S. and Heyer, T. (2016) Earth observation data based rapid flood-extent modelling for tsunami-devastated coastal areas. *International Journal of Applied Earth Observation and Geoinformation*, 46, 63–83.

[24] Granell, C. and Ostermann, F.O. (2016). Beyond data collection: Objectives and methods of research using VGI and geo-social media for disaster management. *Computers, Environment and Urban Systems*, 59, 231–243.

[25] Kawai, J., Mitsuhara, H., Shishibori, M. (2015). Tsunami Evacuation Drill System Using Smart Glasses, *Procedia Computer Science*, 72, 329–336.

[26] Cheng, J.W., Mitomo, H., Otsuka, T. and Jeon, S.Y. (2016). Cultivation effects of mass and social media on perceptions and behavioural intentions in post-disaster recovery – The case of the 2011 Great East Japan Earthquake. *Telematics and Informatics*, 33(3), 753–772.

[27] Syafwina. (2014). Recognizing Indigenous Knowledge for Disaster Management: Smong, Early Warning System from Simeulue Island, Aceh. *Procedia Environmental Sciences*, 20, 573–582.

[28] Liu, Y., Yin, K., Chen, L., Wang, W. and Liu, Y. (2016). A community-based disaster risk reduction system in Wanzhou, China. *International Journal of Disaster Risk Reduction*, 19, 379–389.

[29] Baytiyeh, H. and Öcal, A. (2016). High school students' perceptions of earthquake disaster: A comparative study of Lebanon and Turkey. *International Journal of Disaster Risk Reduction*, 18, 56–63.

[30] Alfred, D. Chilton, J., Connor, D., Deal, B., Fountain, R., Hensarling, J. and Klotz, L. (2016). Preparing for disasters: Education and management strategies explored. *Nurse Education in Practice*, 15(1), 82–89.

[31] Srivihok, P., Honda, K., Ruangrassamee, A., Muangsin, V., Naparat, P., Foytong, P., Promdumrong, N., Aphimaeteethomrong, P., Intavee, A., Layug, J.E. and Kosin, T. (2014). Development of an online tool for tsunami inundation simulation and tsunami loss estimation. *Continental Shelf Research*, 79, 15, 3–15.

[32] Hettiarachchi, S. and De Silva, K. (2014). Post tsunami rehabilitation in the context of national initiatives: Case Study-port City of Galle Sri Lanka. *Procedia Economics and Finance*, 18, 865–872.

[33] Usman, F., Murakami, K., Kurniawan, E.B. (2014). Study on reducing tsunami inundation energy by the modification of topography based on local wisdom. *Procedia Environmental Sciences*, 20, 642–650.

[34] Lorca, Á., Çelik, M., Ergun, Ö. and Keskinocak, P. (2015). A decision-support tool for post–disaster debris operations. *Procedia Engineering*, 107, 154–167.

[35] Arziman, I. (2015). Field Organization and Disaster Medical Assistance Teams. *Turkish Journal of Emergency Medicine*, 15(Suppl 1), 11–19.

[36] Rakes, T.R., Deane, J.K., Rees, L.P. and Fetter, G.M. (2014). A decision support system for post-disaster interim housing. *Decision Support Systems*, 66, 160–169.

[37] Jassempour, K., Shirazi, K.K., Fararooei, M., Shams, M. and Shirazi, A.R. (2014). The impact of educational intervention for providing disaster survival kit: Applying precaution adoption process model. *International Journal of Disaster Risk Reduction*, 10, Part A, 374–380.

[38] Nazli, N.., Sipon, S. and Radzi, H.M. (2014). Analysis of training needs in disaster preparedness. *Procedia-Social & Behavioral Sciences*, 140, 576–580.

[39] Goswami, S., Chakraborty, S., Ghosh, S., Chakrabarti, A., Chakraborty, B. (2016). A review on application of data mining techniques to combat natural disasters. *Ain Shams Engineering Journal*, http://dx.doi.org/10.1016/j.asej.2016.01.012.

[40] Ferris, G.R., Hochwarter, W.A. and Matherly, T.A. (2007) HRM after 9/11 and Katrina. In: Werner, S., S. Jakson and R. Schuler (eds.) *Current Issues in North American HRM*. Taylor and Francis, New York, USA, pp. 172–185.

[41] Alfred, D. Chilton, J., Connor, D., Deal, B., Fountain, R., Hensarling, J. and Klotz, L. (2016). Preparing for disasters: Education and management strategies explored. *Nurse Education in Practice*, 15(1), 82–89.

[42] Becker, S.L. and Reusser, D.E. (2016). Disasters as opportunities for social change: Using the multi-level perspective to consider the barriers to disaster-related transitions. *International Journal of Disaster Risk Reduction*, 18, 75–88.

[43] Løvholt, F., Setiadi, N.J., Birkmann, J., Harbitz, C.B., Bach, C., Fernando, N., Kaiser, G. and Nadim, F. (2014). Tsunami risk reduction – are we better prepared today than in 2004? *International Journal of Disaster Risk Reduction*, 10, Part A, 127–142.

[44] GOI-UNDP Disaster Management Programme (June 2008). Training of Trainers Manual on Gender Mainstreaming in Disaster Risk Management

[45] Goodman, D., and Mann, S. (2008). Managing public human resources following catastrophic events: Mississippi's local government's experiences post-hurricane Katrina'. *Review of Public Personnel Administration*, 28, pp. 3–19

[46] Hutchins, H.M. and Wang, J. (2008). Organizational crisis management and human resource development: A review of the literature and implications to HRD research and practice. *Advances in Developing Human Resources*,10(3), 310–330.

[47] Reilly, A.H. (2008). The role of human resource development competencies in facilitating effective crisis communication. *Advances in Developing Human Resources*,10 (30), pp. 331–51.

[48] Wang, J., Hutchins, H.M. and Garavan, T.N. (2009). Exploring the strategic role of human resource development in organizational crisis management.

Human Resource Development Review, March 2009; vol. 8, 1: pp. 22–53.

[49] Anderson, G. (2012). HR critical to disaster management strategies. HRM New Zealand. http://www.hrmonline.co.nz/resources/occupational-health-safety/hr-critical-to-disaster-management-strategies-129483.aspx

[50] Aoki, N (2015). Collaborative manpower support for restoring hope in the aftermath of the March 11 disasters in Japan. In: C. Brassard, D.W. Giles and A.M. Howitt (eds). *Natural Disaster Management in the Asia–Pacific: Policy and Governance*. Springer, Japan, pp. 101–117.

[51] Arora, P. (2011). The 2011 Tōhoku earthquake and tsunami of Japan: Lessons learnt and implications for effective disaster management. Dissertation submitted to the Center for Disaster Management Studies, Guru Gobind Singh University, Kashmere Gate, Delhi, India, p. 156.

[52] Cabinet Office, Government of Japan (2011a). Disaster Management Plan of Japan 2011. Cabinet Office, Government of Japan, Tokyo.

[53] Cabinet Office, Government of Japan (2011b). White Paper on Disaster Management 2011. Cabinet Office, Government of Japan, Tokyo.

[54] Cabinet Office, Government of Japan (2011c). Women and Men in Japan. Cabinet Office, Government of Japan, Tokyo.

[55] Likert, Rensis. (1932). A Technique for the Measurement of Attitudes. Archives of Psychology, 140(1), 55.

[56] Uebersax, John S. "Likert Scales: Dispelling the Confusion." Statistical Methods for Rater Agreement. 31 Aug. 2006. 20 Oct. 2007 <http://ourworld.compuserve.com/homepages/jsuebersax/likert.htm>.

[57] McIver, J. P., & Carmines, E. G. (1981). *Unidimensional Scaling*. Thousand Oaks, CA: Sage.

[58] Spector, P. (1992). *Summated Rating Scale Construction*. Thousand Oaks, CA: Sage.

[59] Nunnally, J. C., & Bernstein, I. H. (1994). *Psychometric Theory* (3rd ed.). New York: McGraw-Hill.

[60] Blalock, H. M., Jr. (1970). Estimating measurement error using multiple indicators and several points in time. *American Sociological Review*, 35(1), 101-111.

[61] Flesch, R. (1948). A new readability yardstick. *Journal of Applied Psychology*, 32(3), 221-233.

[62] Creswell, J.W. (2009) *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches*. 3rd Edition. Los Angeles: Sage Publications, Inc., USA.

[63] Vogt, W.P. (2007). *Quantitative Research Methods for Professionals.* Pearson/Allyn and Bacon, pp. 334.

[64] Neuman, W.L. (2007). Basics of Social Research: Qualitative and Quantitative Approaches. Pearson/Allyn and Bacon, pp. 403.

2321-3264/Copyright©2017, IJRMST, April 2017