DETERMINAION OF SOCIAL IMPACT OF EARTHQUAKE DISASER BY REPUTATION ANALYSIS OF NEWSPAPER

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SUMMARY

The objective of this study is to assess the social impact of earthquake disaster and to explore how the mass media covered earthquake issue under earthquake disaster by a methodology known as reputation analysis. To evaluate the social impact of earthquake disaster, Reputation Quotients were calculated using the newspaper articles related to earthquake disaster occurred in Japan from 1978 to 2007. The evaluation of public about earthquake risk can be underestimated. The social impact of earthquake disaster does not depend on just number of death or damaged buildings. The social impact of the earthquake reaches a peak for a couple of days after the occurrence of an earthquake. The major focal article published in newspaper is direct damage or indirect damage. The most reported topic on front page was Human casualties.

Keywords: risk communication   reputation   content analysis

1. INTRODUCTION

It may be difficult to reduce the earthquake disaster such as human losses and building collapse to zero in the severe strong ground motion. The most important thing in the prevention of the earthquake disaster is to reduce the seismic damage to the slightest level which does not yield extreme social burden and is to make easy to restore the damage. It is necessary to develop a national consensus on social tolerance level of earthquake damage through the earthquake risk communications. For this reason it is necessary to measure the social impact of earthquake disaster. However the aftermath of earthquake affects in many fields, it is difficult to estimate it from a comprehensive standpoint. A marker to evaluate the aftermath of earthquake is needed.

Reputation is commonly known as overall estimation of the character or quality of a person generally held by those who know him or her. The concept has been developed in social management and technological sciences. For instance, Fortune ratings, which is index to measure reputation, had a positive effect on stock market and accounting performance. Charles J. Fombrun and Harris Interactive developed the instrument- the REPUTATION QUOTIENT -which measures a company's reputation by examining how a representative group of stakeholders perceives companies on 20 underlying attributes that constitute the six pillars of reputation (Fombrun 2004). There are variety of definition for the reputation and the theoretically weakness have been disputed (Deephouse 2000). Although numerous attempts have been made to study this point, the definition and the concept of the reputation are still controversial. However reputation analysis is useful methodology to measure an affect which extend in many fields from a comprehensive standpoint.

In case of an earthquake disaster, the media play a major role in communicating with the public. For those who have just been struck by earthquake, the media are often relied on as a source of leading information under earthquake disaster. Micro-blogging websites such as Twitter or Facebook are getting attention recently because of their ability to distribute information very quickly. These new communication channel was widely reported as outperforming the mainstream information channels in

numerous ways during the massive 2008 China earthquake (Li 2010) or the Great east Japan earthquake (Kaigo 2012).

For those who have never suffered from earthquake disaster, their perception about earthquake disaster is built up by indirect experiences through the media reporting such as disaster damages, governmental response, social reaction, research or assessment and so on. However, newspaper reports is often different between newspapers. It was pointed out that disaster reporting on newspaper was different between disaster-stricken area out of the area in Hansin-Awaji Earthquake (Murakami 1999). Management of information about earthquake disasters is the key to solving this problem.

The purpose of this study is to measure the social impact of earthquake disaster, to identify the factors which affect it by reputation analysis and to research what issues appears on newspaper after occurrence of an earthquake.

2. METHODOLOGY

2.1. Reputation Analysis

In this research the concept of the measurement is relies on Fombrun's study(Fombrun 2000). Reputation is defined as a degree of recognition of public about an event. Reputation Quotient, which is a measure of reputation of the event, is given by the formula;

$$RQ = \sum_{1}^{N} ((AS_i / PS) + (PsS_i+GS_i) / 2) / 2$$

where N' is number of articles, 'RQ' is Reputation Quotient of an earthquake, 'AS$_i$' is square of an article, 'PS' is square of a page space, 'PsS$_i$' is Publication side Score of an article, and 'GS$_i$' is Graphic Score of an article. Publication Side score of an article is 1 or 0. When the article appears just on a front page, the score is 1. Graphic Score of an article is 1 or 0. When a picture is inserted on the article, the score is 1.

2.2.The Coding of the Articles

The media analysis of the earthquake disasters reported here was done by means of content analysis. Content analysis is frequently used in the social science to describe a message system (Krippendorff 1980). Every article was coded by two independent coders. Each coder received a training on content analysis before coding.

Once the articles were selected according to the rules described above, each article was assigned a number of codes for the following six categories of data: a) meta data, b)title of article, c) type of article, d) issue codes, e) focus of the article, f)square of article. In case of disagreement, the master coder decided the final code based on a discussion. The original files containing the coding from the two coders were preserved, and the final coding was stored in a separate file.

2.3. Sampling of the Articles

The earthquakes which had occurred to cause loss of lives in JAPAN were selected. The target time period was from 14th of January, 1978, till the 21th of July, 2007 including these two dates .

The selected newspaper was The Asahi SHIMBUN(Japanese language) which was one of the leading Japanese newspaper and highest quality newspapers in Japan usually taken as subject of scientific research in the field of earthquake engineering (Matsumura 1998).

The articles related to earthquake disaster were collected from a front page and a city news page using all 'Asahi SHIMBUN' morning editions and evening editions. Each articles which either directly or indirectly related to the earthquake disaster were picked out.

The selected earthquakes and number of articles are shown in Table 1.

Table 1. Selected Earthquake and Damage Statistics

Earthquake name	Year	Date	Magunitude	Death toll	Number of damage buildings		Number of articles
					total collapse	partial collapse	
Niigata-ken Chuetsuoki	2007	July 16	M7.0	15	1319	562	111
Noto Hanto	2007	Oct.25	M6.8	1	684	1732	31
Fukuoka Seihouoki	2005	Mar.20	M6.4	1	133	244	27
Niigata-ken Chuetu	2004	Oct.23	M7.3	68	3175	13810	137
Geiyo	2001	Mar.24	M7.6	2	70	774	23
Hyougo-ken Nanbu	1995	Jan.17	M8.2	6434	104906	144274	249
Sanriku Harukaoki	1994	Dec.28	M7.8	3	72	429	14
Hokkaido Touhouoki	1994	Oct.4	M6.7	10	61	348	30
Hokkaido Nanseioki	1993	July 12	M6.6	202	601	408	80
Chiba-ken Touhouoki	1987	Dec.17	M6.8	2	16	0	20
Hyuga Nada	1987	Mar.18	M6.0	1	0	0	3
Nagano-ken Seibu	1984	Sep.14	M7.7	29	14	73	61
Kanagawa-Yamanashi Kenkyo	1983	Aug.8	M6.0	1	0	2	3
Nihon-kai Chubu	1983	Mar.26	M7.4	104	934	2115	66
Miyagi-ken Oki	1978	June 18	M7.4	28	1183	5574	42
Izu Ohshima Kinkai	1978	Jan.14	M7.0	25	96	616	77

3. FORCUS OF ARTICLES

To investigate what issues related to the earthquake disaster affects the social impact of earthquake disaster, the codes used to describe the focus of the articles were summarized in the following.

a:The category 'Governmental response or Social reaction' contained all articles that deal with the government initial response, government aid, government inquiry, the medical care and relief effort.

b:The category 'Direct damage' contained all articles that deal with the human casualties, the damage of building structures and social facilities, ground disaster and fire disaster.

c:The category 'Indirect damage' contained all articles that deal with traffic obstacles, the influence of energy supply and economic.

d:The category 'Research or assessment' contained all articles that deal with the research or explanation of seismic activity, the technology for earthquake-resistant design, and standard for earthquake resistant design.

e:The category 'Restoration' contained all articles that deal with reconstruction of social infrastructure.

f:The category 'Volunteer' contained all articles that deal with volunteer activities.

g:The category 'Earthquake or Tsunami' contained all articles that deal with the possibility and warning about aftershock or tsunami.

h: The category 'Other forcus' contained all articles except above articles.

Figure 1. shows presence of articles for a week.
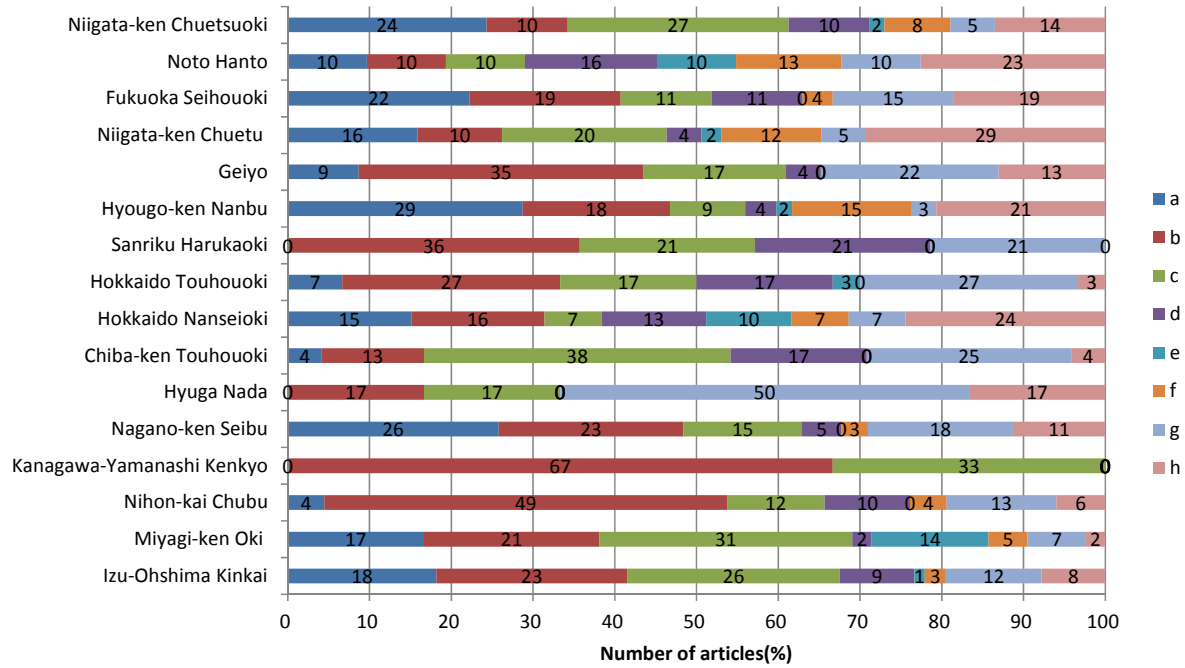
Figure 1. Presence of articles for a week

a: Governmental response or Social reaction b: Direct damage c: Indirect damage
d: Research or assessment e: Restoration f: Volunteer g: Earthquake or Tsunami h:Other focus

4. SOCIAL IMPACT OF AN EARTHQUAKE DISASTER

Figure 2. shows Reputation Quotient by earthquake. Most of RQ is smaller than 20. Compared with RQ of Hyougo-ken Nanbu, these are too small. The evaluation of public about earthquake risk can be underestimated. Compared with Table 1, a distribution of RQ is not similar to a distribution that of number of articles or damage statistics. To take a single example, RQ of Hokkaidou Touhouoki earthquake is less than that of Izu-Oshima Kinkai earthquake despite number of articles, death toll and number of buildings are larger than those of Izu-Oshima Kinkai. These results indicate the social impact of earthquake disaster does not depend on just number of death or damaged buildings.
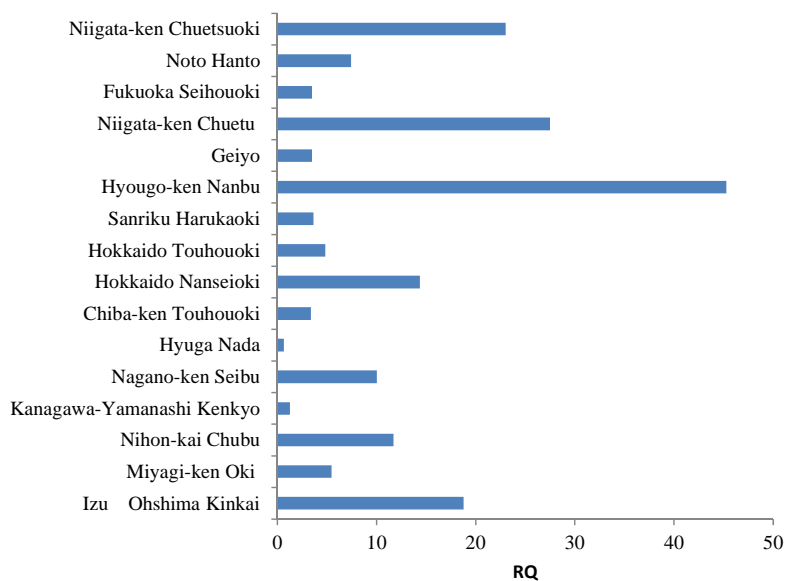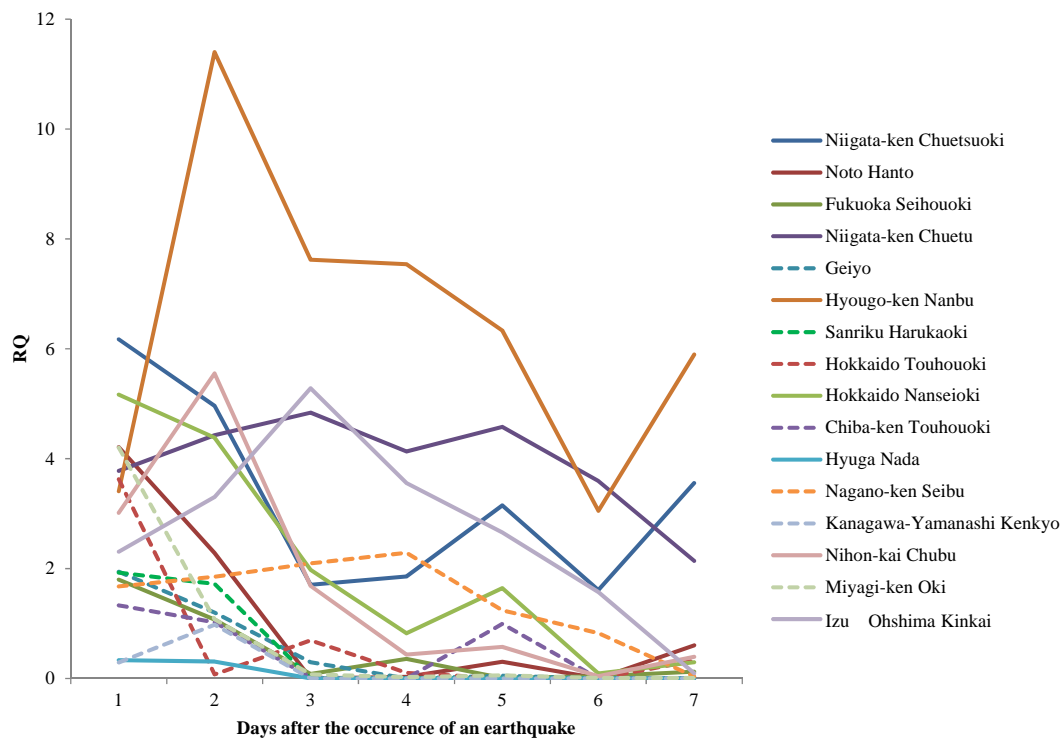

Figure 2. Reputation Quotient

Figure 3. shows detailed Reputation Quotient by category apart from category h. Reputation Quotient is the highest in category 'b:Direct damage' except (a)Niigata-ken Chuetsuoki, (d) Niigata-ken Chuetu and (o) Miyagi-ken Oki . Most of the second highest Reputation Quotient present in category a: Governmental response or Social reaction or 'c:Indirect damage' except (b)Noto Hanto. These results indicate the newspaper reports about earthquake disaster for a week after occurrence of an earthquake are biased toward damages.
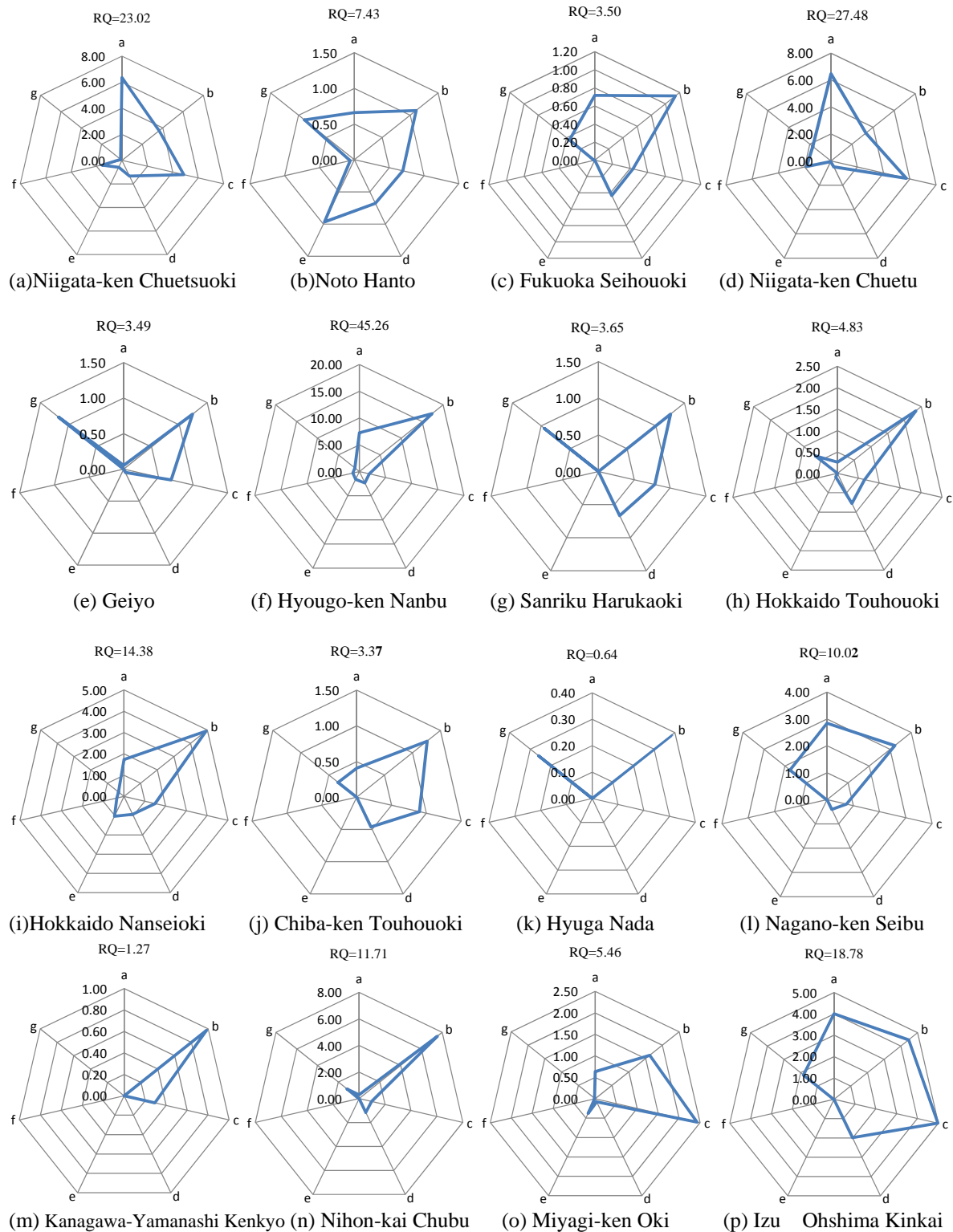
Figure 3. Reputation Quotient of articles by category

To identify the statistical signature of social impact of the earthquake disaster in the newspaper, the outburst of attention and the rate of attention decay were analyzed.

Figure 4. presents a transition of RQ for a week after occurrence of an earthquake. The RQ of the published articles in the press was highest in the first day or the second day after the occurrence of an earthquake. The transition of RQ during the aftermath indicates aspects of changes of the social impact on earthquake disaster well. I concluded the social impact of the earthquake reaches a peak for a couple of days after the earthquake.

Figure 4. Reputation Quotient per a day

5. MAJOR TOPIC OF ARTICLES

In order to identify the media content related to 'Direct damage' or 'Indirect damage', the articles were classified. The codes used to describe the focus of the articles are summarized in the following.

Articles of the 'Human casualties ' described the casualty statistics, the loss of life, the reporting about missing, the search and rescue activity and the situation of evacuation.
Articles of the 'Traffic obstacles ' described the interruption of railway communication, the obstruction of vehicles, the delay of airlines.
Articles of the 'Energy supply ' described the electric power failure, the stoppage in a pipeline, suspension of water supply and the energy shortage.
Articles of the 'Economic impact ' described the impact on economy and the influence on distribution.
Articles of the 'Damage of building structure ' described the damage statistics and the aspect of damaged buildings.
Articles of the ' Damage of social facilities ' described the damage of oil tank and road.
Articles of the 'Ground disaster ' described landslide and liquefaction.
Articles of the 'Tsunami ' described tsunami disasters and tsunami warning.

Figure 5. presents the frequencies of the identified topics on front page. The Human casualties was the most reported topic except Niigata Chuetsu-oki earthquake and Miyagiken-oki earthquake. The second most covered topic was The Energy supply or the Traffic obstacles. The percent of the articles related to building damage was smaller than or equal to 20% except Niigata Chuetsu-oki earthquake.
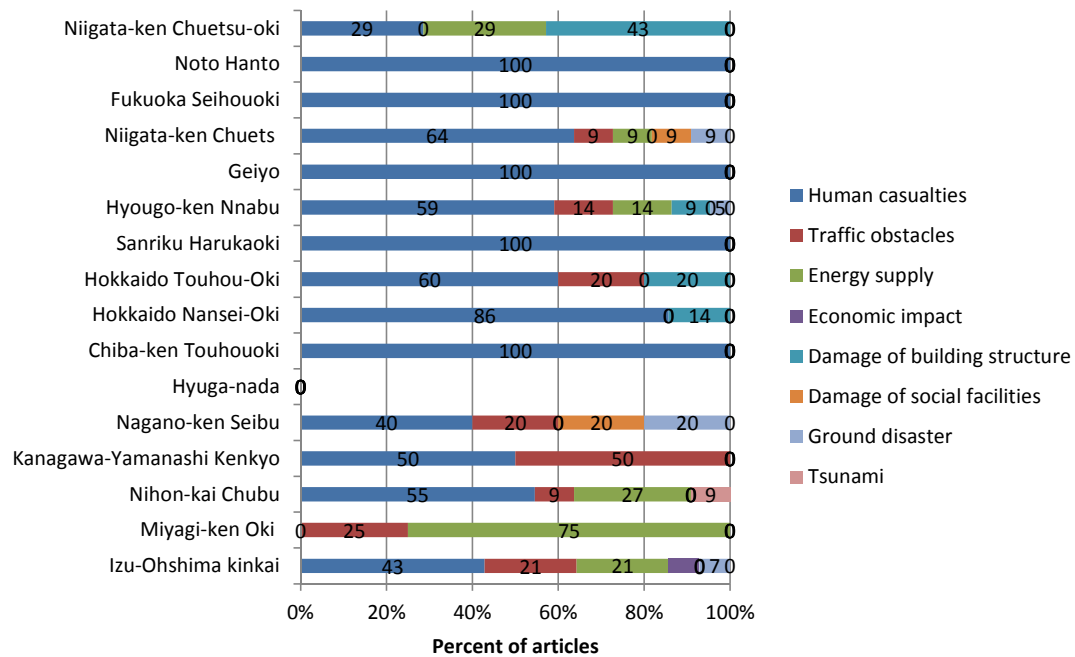
Figure 5. Major topic of articles on front page

6. CONCLUSION

The objective of this study was to measure the social impact of earthquake disaster with a maker defined as RQ which is a measure of reputation of the earthquake event on newspapers.

In conclusion, the following six points are obtained. 1) In general, RQ is small. The evaluation of public about earthquake risk can be underestimated. 2)The social impact of earthquake disaster does not depend on just number of death or damaged buildings.3)The social impact of the earthquake reached a peak for a couple of days after the earthquake. 4) The newspaper reports about earthquake disaster for a week after occurrence of en earthquake are biased toward damages. 5)The main focal article published in newspaper for seven days after earth quake were 'Direct damage' or 'Indirect damage'. 6) The most reported topic on front page was Human casualties.

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