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Media's Effects on People's Perceptions and Intentions in Post-Disaster Recovery – a Case Study of the Great East Japan Earthquake

For the 26th European Regional ITS Conference, San Lorenzo de El Escorial, Spain, June 24-27, 2015.

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Abstract

Prior studies show that both mass and social media have played an influential role after the Great East Japan Earthquake, in particular, media information can affect a person's perception of the disaster as well as their behavioural intention of post-disaster activities. However, currently the underlying mechanism is still not clear, for instance, what kinds of perception did mass and social media cultivate? Were they complementing or contracting with each other? And how different kinds of perceptions affect people's intention of post-disaster activities?

This study attempts to understand the mechanism between the use of media and their effects on a person's perception of the disaster and the behaviour intention of post-disaster activities. Using data collected from the three prefectures that were hit by the disaster directly and structural equation modelling, three key findings are identified. First, the use of mass media has a dominating effect of a person's perception of the disaster, but to a certain extent, its effects can be regulated by social media. Second, among different perceptions of the disaster, the perception of bonds in society appears to be the most influential on people's intention of altruistic actions, civic communications, and preparation for future disasters. Third, media has a stronger influence on those who were not affected the disaster directly than those who were. These findings have some important implications for government authorities and NGOs who are working in post-disaster recovery and disaster preparation.

1. Introduction

On the 11th March 2011, the north-east coast of Japan was hit by one of the strongest earthquakes in history. Known as the Great East Japan Earthquake¹, the magnitude 9.0 undersea earthquake, subsequent massive tsunami and Fukushima nuclear power plant accident have created substantial social and economic damages to the country (Reconstruction Agency, 2013). On top of the unprecedented scale of the damage, another very remarkable aspect of this disaster is the role digital media, especially social media² has played. As Slater et al. (2012a) describe, *'If Vietnam was the first war fully experienced through social media. 3/11 [the Great East Japan Earthquake] was the first natural disaster fully experienced through social media.'* (Slater, et al., 2012a, p. 94). Indeed, when the traditional telephone network was paralysed by the disaster and the public was overwhelmed by the complex situation, social media provided an alternative communication tool and information source for many people in Japan and across the world (Appleby, 2013; Endo, 2013).

After the disaster, social media has further become a major communication platform for disaster information for government authorities, NGOs, mass media, and also the public (Peary, et al., 2012; Slater, et al., 2012a; Yoshimura & Inoue, 2012). That being said, although social media had caught most people's attention, reports after the disaster, for example, (Kimura, 2011; MIC, 2012) have shown that mass media, in particular television was still the most trusted, reliable and used information sources for most people. Furthermore, the role media have played after the disaster has raised many discussions on current media regulations and policies (Ichikawa, 2013).

Thus, further understanding on how both media can influence people's perceptions and behaviours will have important implications for researchers, government authorities and NGOs that are working on post-disaster recovery and disaster preparation, as well as for policy makers. One of the main challenges of this topic, however, is how to model and evaluate the effects of different media in today's digital media society. For instance, despite the fact that mass and social media are very different by nature, but driven by ICT advancements, they are becoming more and more intertwined. For example, while social media has enabled the public to become part the media themselves (Castells, 2007), at the same time, traditional mass media such as television and newspaper are utilising social media as their main outlet (Napoli, 2015).

In order to address this question, a study by Cheng et al. (2015) has adopted a two-model approach in an attempt to evaluate how mass and social media can contribute to post-disaster recovery. In their study, they have constructed two models based on the active and passive audience perspective in media studies (Biocca, 1988). Their first model assumes that

¹ Hereafter referred to as 'the disaster' or 'the event'.

² In this paper, social media is referred as *'a group of Internet-based applications that build on the ideological and technological foundations of Web 2.0'* (Kaplan & Haenlein, 2010, p. 61), such as social network service (SNS), blog, forum and video sharing site.

people in general are capable to select and reject media information selectively based on their own uses and gratifications, and their second model considers that most people are subjected to the influence of media directly. By synthesising the result from the two models, they have found a consistent pattern for both perspectives; mass and social media can work in parallel to encourage people to support the recovery in different ways. Their study has provided a broad perspective on how media information can affect people's behaviours and perceptions; however, it has not explored in any depth the underlying mechanisms. For example, although their second model which based on cultivation theory by Gerbner et al. (1980) has shown that media as a whole can effectively cultivate a person's perceptions of the disaster and affect their behavioural intentions. It has not addressed the in-depth questions to distinct the effect of mass and social media, for example, what kinds of perception did mass and social media cultivate? Were they complementing or contracting with each other? How different kinds of perceptions affect people's intention of post-disaster activities?

Understanding of these questions is essential for government authorities and NGOs to utilise different media effectively in their communication plan in practice. Thus, with this background in mind, the aim of this paper is to address these questions by extending from the cultivation theory model proposed by Cheng et al. (2015).

2. Cultivation theory

In media studies, two of the most widely adopted but often rival approaches are the active and passive audience perspectives (Biocca, 1988). This study focuses on the passive audience perspective which assumes that people in general are *'grey, uniform, anomic, faceless, gullible, and defenseless against the power of the propagandist'* (Biocca, 1988, p. 56). This perspective is often associated with mass media, in particular television, it is most notably represented by cultivation theory by Gerbner et al. (1980), wherein they define the concept of cultivation as the *'the independent contributions television viewing makes to viewer conceptions of social reality'* (Gerbner, et al., 2002, p. 47), through the cultivation process which is a *'massive, long-term and common exposure of large and heterogeneous publics to centrally produced, mass-distributed and repetitive systems of stories'* (Gerbner, et al., 2002, p. 47), that *'the more important, consistent, and coherent [the messages in these stories are], the more cultivation can be expected'* (Gerbner, et al., 2002).

Based on these assumptions, cultivation theory predicts that the viewing of television can change a person's perception of the reality in two ways (Potter, 1988). First, known as the *'mainstream effect'*, media information can cultivate a common perspective that represents a homogeneous set of perceptions of reality among the society. In other words, the more people receive the same message from the media, the more likely it will override their personal beliefs (Gerbner, et al., 1980). Second, referred as the *'resonance effect'*, a person will resonate their own experience with media information, that is, the closer resemblance the media information to their own experience, the stronger the influence of the media will have

on their perceptions of reality. These effects are in particular salient when it is associated with risks and dangers (Gerbner, 1988).

Although cultivation theory was developed based on the characteristics of mass media, especially television, considering today's digital media environment, it can nevertheless be argued that they can also be applied to social media as well. For example, in the case of the Great East Japan Earthquake, numerous shocking video footages and photos of the tsunami, as well as reports directly from the frontlines were shared repetitively over social media to a large group of audience over a prolonged period of time (Slater, et al., 2012b). In this respect, it can be said that social media also fits the description of the cultivation process described by Gerbner.

2.1 Perceptions and behavioural intentions

Based on the social cognitive theory which suggests that a person's behaviour, their personal factors as well as their perceived environment are interrelated, studies, for example, Bandura (2002) and Shrum (2002), have further explained that as a person forms their perception of the environment based on media information, their behavioural intention will be altered subsequently in the process. Thus, media information can influence a person's behavioural intention through affecting their perceptions of the reality. For example, in the case of emergency situations or disasters, studies have found that the perception of risk and safety have affected people's behavioural intention such as their willingness to evacuate, to help others and to prepare for future disasters (Paton, 2003; Riad & Norris, 1998; Shaw, et al., 2014). Similarly, in the case of the Great East Japan Earthquake, studies have also revealed that the disaster has affected people's anxieties and hazard perception (Nakayachi, et al., 2014), as well as their behavioural intentions such as evacuations, energy conservations, and purchase intention (Kano, 2013; Naoi, et al., 2014; Yamamura, et al., 2014).

3. Theoretical framework and hypotheses

Based on the above observations, a theoretical framework (Figure 1) is constructed as follows.

First of all, as the mainstream effect suggests, it is assumed that the use of mass and social media will affect a person's perceptions of the disaster. Acknowledging the important role television has played, the use of mass media will be represented by a person's exposure to disaster related content from television. In parallel, the use of social media will be represented by a person's usage of social media applications such as SNS, blogs, forum and video sharing site to obtain information related to the disaster. Second, as resonance effect predicts, it is anticipated that the effects from of both mass and social media will be moderated by a person's experience of the disaster.

Third, it is assumed that a person's perceptions of the disaster will influence their behavioural intentions. In this case, their perceptions of the disaster are represented by the perception of concerns about the disaster, anxieties of future disasters, and bonds in the society and families. While the perception of anxieties and concerns are commonly associated with disasters, the perception of bonds is also included in this case because the theme of strong bonds -'kizuna' in Japanese- in society and families was widely used by the Japanese media after the disaster, and it has subsequently become the symbol of the recovery³.

Forth, it is also assumed that these perceptions will affect a person's intention to carry out different post-disaster activities. In this case, three particular types of activity are taken into consideration. The first and second type, namely altruistic actions and civic communications are selected because they are found to be the essential elements that can bond a community together in post-disaster recovery (Aldrich, 2012; Shaw, 2014). The third type, preparation of future disasters is included because preparation is one of the most important aspects in disaster prevention (Todd & Todd, 2011).

Finally, it is expected that a person's perceptions and intentions are also affected by their personal background such as age, gender, employment status, as well as their use of other media, in this case, newspaper, Internet portal website are selected as they are found to be the other widely used media after the disaster (MIC, 2012).

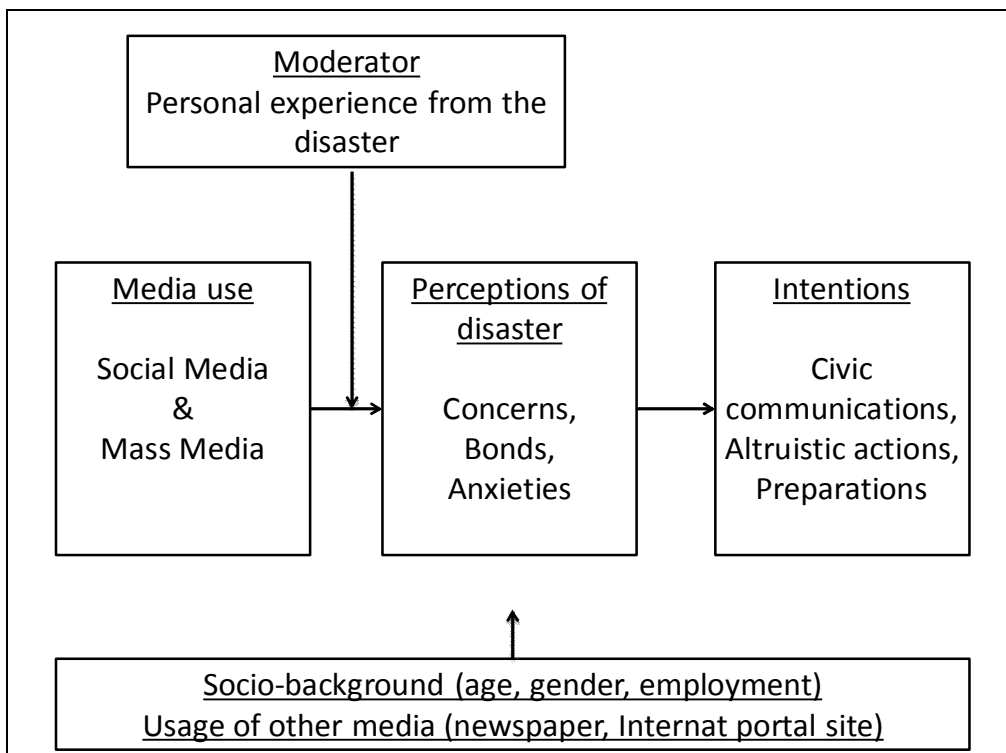


Figure 1 – Theoretical framework

³ The word 'kizana' (bonds) was selected by the Japanese public as the kanji (Chinese character) of the year for 2011 (BBC News Asia, 2011).

3.1 Hypotheses

Based on the theoretical framework presented above, a set of hypotheses is drawn to represent the relationships between media use, perceptions of the disaster and intentions of post-disaster activities. First of all, as the mainstream effect suggests, it is anticipated that:

- The use of mass media has a positive effect on a person's perception of concerns (Hypothesis H1), bonds (Hypothesis H2) and anxieties (Hypothesis H3).
- The use of social media has a positive effect on a person's the perception of concerns (Hypothesis H4), bonds (Hypothesis H5) and anxieties (Hypothesis H6).

Secondly, as mentioned in section 2.1, knowing that a person's perceptions of the reality can affect their behavioural intentions, it is hypothesised that:

- The perception of concerns has a positive effect on a person's intention of civic communications (Hypothesis H7), altruistic actions (Hypothesis H8) and preparations for future disasters (Hypothesis H9).
- The perception of bonds has a positive effect on a person's intention of civic communications (Hypothesis H10), altruistic actions (Hypothesis H11) and preparations for future disasters (Hypothesis H12).
- The perception of anxieties has a positive effect on a person's intention of civic communications (Hypothesis H13), altruistic actions (Hypothesis H14) and preparations for future disasters (Hypothesis H15).

Thirdly, as the resonance effect suggests, the influence of media on a person's perception will be stronger if the media content is similar to their own experience. Thus, it is expected that:

- Having affected by the disaster directly increases the effect of the use of mass media on a person's perception of concerns (Hypothesis H16), bonds (Hypothesis H17) and anxieties (Hypothesis H18).
- Having affected by the disaster directly increases the effect of the use of social media on a person's perception of concerns (Hypothesis H19), bonds (Hypothesis H20) and anxieties (Hypothesis H21).

Fourthly, a person's background such as age, gender and employment status, as well as their use of other media are also expected to influence on their perceptions and intentions. Therefore, they are included as control variables. Finally, the above hypotheses are considered into a path model with eight variables as shown in Figure 2 below.

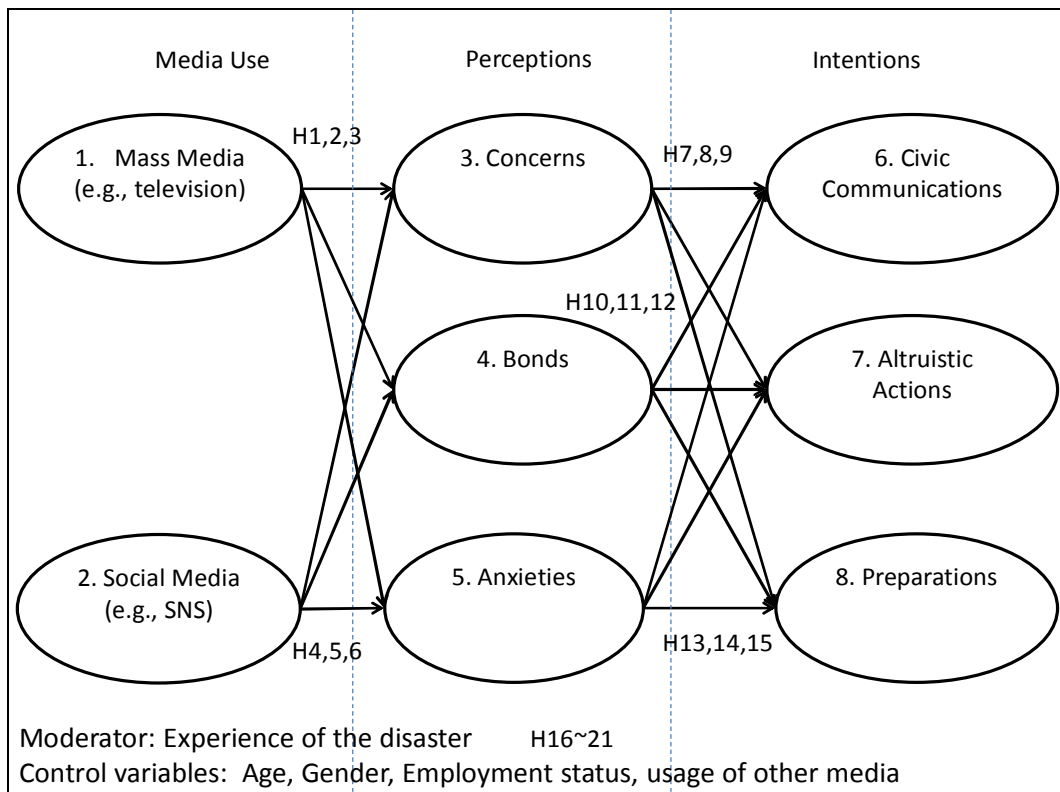


Figure 2 – Path model

4. Methodology

The above hypotheses were examined using a quantitative approach, specifically structural equation modelling (SEM). This method was selected because it can precisely model the relationships between multiple independent variables and multiple dependent variables that are correlated with one another in different degrees (Tabachnick & Fidell, 2013).

The data set used was collected using an Internet panel survey. This approach offers a good balance between sampling error and cost and time efficiency comparing with traditional survey methods such as face-to-face or random-digit-dialling (Couper, 2000). The samples were selected from the three prefectures -Iwate, Fukushima and Miyagi- that were hit directly by the Great East Japan Earthquake because it is anticipated that they will be more likely to have experienced the disaster directly.

In order to construct the SEM model, the eight variables in path model (Figure 2) are represented as latent variables, that is, variables that cannot be measured directly such as social or psychological status, which instead can be represented by a set of observed variables

that can be measured directly (Tabachnick & Fidell, 2013). The observed variables are collected from a survey questionnaire⁴ described as follows.

First of all, the use of media consists the use of 'mass media' and 'social media'.

1. Mass media is represented by a person's exposure to disaster related content from television. It is operationalised by asking the respondents *'In the past year, how often had you seen the following content on television? 1.1. Damages caused by the Great East Japan Earthquake, 1.2. Recovery status in the disaster area, 1.3. Events supporting the recovery (volunteering, charity events), 1.4. Discussions on the problems and policies related to the recovery, 1.5. Preparations for future disasters'* in a 5 level Likert scale (1= Never, 2= Rarely, 3= Once a few month, 4= A few times per month, 5= A few times per week).
2. Social media is represented by a person's usage of different social media applications to obtain information related to the disaster. It is operationalised by asking the respondents *'In the past year, how often did you use the followings to obtain information relating to the disaster and recovery? 2.1. Social network sites (e.g., Facebook, Twitter, Mixi etc.), 2.2. Forum / BBS / Discussion group, 2.3. Blog / Unofficial homepage / Personal homepage, and 2.4. Video sharing site (YouTube, NicoNico etc.)'* in the same 5 level Likert scale.

Second, perceptions of the disaster is represented by a person's perception of 'concerns' about the disaster, 'bonds' in the society and 'anxieties' of future disasters. They are operationalised by asking the respondents *'How did you feel when you saw the media information about the disaster?'* in a 5 level Likert scale (1= No, not at all, 2= No, not much, 3= Neutral, 4= Yes, somewhat, 5= Yes, strongly)

3. Concerns – *'3.1. Concern about the disaster area, 3.2. Concern about the status of the people in the disaster area, 3.3. Concern about the financial situation of the people in the disaster area, 3.4. Concern about the safety of the people in the disaster area, 3.5. Concern about the psychological status of the people in the disaster area'*.
4. Bonds – *'4.1. Heart-warmed by the works of the volunteers, 4.2. Strong bond in the society, 4.5. Strong bond in families'*.
5. Anxieties – *'5.1. Anxious about future disasters, 5.2. Urge to prepare for future disasters'*.

Third, intention of post-disaster actions is represented by a person's intention to carry out 'civic communications' with others about the disaster, 'altruistic actions' to support the recovery, and to make 'preparations' for future disaster. They are operationalised by asking the respondents *'Do you intend to do the followings in the future for the disaster and the recovery?'* in a 5 level Likert scale (1= No, not at all, 2= No, not much, 3= Neutral, 4= Yes, somewhat, 5= Yes, strongly)

6. Civic communications - *'6.1. To search for more information related to recovery, 6.2. To discuss with my family about the recovery, 6.3. To discuss with my friends about the recovery, 6.4. To discuss with my colleagues about the recovery'*.

⁴ Originally in Japanese, translated by the author.

7. Altruistic actions - '7.1. To make donation, 7.2. To encourage others to make donation, 7.3. To support volunteering works, 7.4. To encourage other people to support volunteering works, 7.5. To join charity events to support the recovery'.
8. Preparations – '8.1. To prepare for supplies and tools, 8.2. To find out more about the evacuation procedures, 8.3. To learn about the safety procedures'.

5. Data and result analysis

5.1 Data analysis

The survey was conducted in March 2013, sponsored by the Japan Commercial Broadcaster Association. It was commissioned by Macromill Inc., one of the largest professional online research companies in Japan which has a survey panel of more than a million people across the country⁵. In total, 2,064 samples were collected. In data screening, 17 unengaged observations were identified and removed, resulted in a total of 2,047 effective samples. Their demographic characteristics data are shown in Table 1.

Among this group, 50.3% were male and 49.7% were female, their average age was 43.7 years old. 67.5% of them were employed⁶ and 53.3% reported that they had suffered direct damages from the disaster⁷. Compared with the 2010 national census data (MIC, 2010), it was found that the sample's location distribution and age group distribution were somewhat biased. This indicates this sample group consists of a certain level of non-coverage error⁸ that some groups are over or under represented. In order to reduce the sample bias caused by this error, the data set was weighted with the 2010 national census data as the reference using post-stratification weighting⁹.

⁵ <http://www.macromill.com/qManage/macromillQuality.pdf> [Accessed 27 Mar 2015]

⁶ Included full time, part time and self-employed.

⁷ Direct damages include physical damage (e.g., injury, housing damage) and financial damage (e.g., loss of job, significantly reduce of income). Other indirect damages (e.g., inconveniences caused by loss of lifeline, lack of supplies) are excluded.

⁸ Typical sample error of Internet survey, non-coverage error '*a function of the mismatch between the target population and the frame population*' (Couper, 2000, p. 467).

⁹ Post-stratification weighting, a '*method of data analysis which involves forming units into homogeneous groups after observation of the sample*' (Little, 1993, p. 315) commonly used to reduce non-coverage error.

Table 1 - Sample demographic characteristics

	Observed Data	Reference Data - 2010 national census (MIC, 2010)
N	2047	3,871,853
<u>Gender</u>		
Male	50.3%	50.1%
Female	49.7%	49.9%
<u>Location</u>		
Iwate	22%	23%
Miyagi	51%	42%
Fukushima	27%	35%
<u>Average age</u>	43.7	46 ¹⁰
<u>Age group</u>		
15-19	4%	7%
20-24	5%	7%
25-29	9%	8%
30-34	13%	9%
35-39	9%	10%
40-44	11%	9%
45-49	8%	9%
50-54	18%	10%
55-59	11%	11%
60-64	8%	11%
65-69	4%	9%

The overall result of the survey, including the mean value, standard deviation, range, Cronbach's alpha and code for each variable is summarised in Table 2.

First, the mean value of the observed variables for mass and social media show that in line with other reports, television is the still main source of disaster information for most people. Second, the Cronbach's alphas¹¹ of all eight latent variables are above 0.7, this indicates that the observed variables can reliably represent their corresponding latent variable statistically. Finally, the mean value of some observed variables under 2. Social media are quite low relatively, which indicates potential floor effect¹². Thus, in order to meet the joint multivariate normal distribution assumption for SEM, bootstrap re-sampling was employed in the calculation (Bollen & Stine, 1992).

¹⁰ According to Deguchi (2011)

¹¹ A commonly used measure of reliability between multiple measurements of a variable (George & Mallery, 2013).

¹² Floor effect - when the variables have scores that are at or near the lower limit, they potentially reduce the possible amount of variation in the variables (Everitt, 2002).

Table 2 – Latent observed and control variables

Variable		Description	Code	M	SD	Range	Cronbach's alpha
Latent	1	Use of mass media					
Observed	1.1	Damages caused by the Great East Japan Earthquake	MM1	3.66	1.07	1-5	0.93
	1.2	Recovery status in the damaged areas	MM2	3.75	1.05		
	1.3	Events supporting the recovery for the Great East Japan Earthquake (volunteering, charity events)	MM3	3.19	1.12		
	1.4	Discussions on the problems and policies associated with the recovery	MM4	3.22	1.14		
	1.5	Preparations for future disasters	MM5	3.23	1.08		
Latent	2	Use of social media					
Observed	2.1	Social network sites (e.g., Facebook, Twitter, Mixi etc.,)	MS1	1.86	1.34	1-5	0.80
	2.2	Forum / BBS / Discussion Group	MS2	1.59	1.12		
	2.3	Blog / Unofficial homepage / Personal homepage	MS3	1.68	1.14		
	2.4	Video sharing sites (YouTube, Niconico etc.,)	MS4	1.84	1.23		
Latent	3	Perception - Concerns					
Observed	3.1	Concern about the disaster area,	PW1	4.35	0.77	1-5	0.92
	3.2	Concern about the status of the people in the disaster area	PW2	4.32	0.78		
	3.3	Concern about the financial situation of the people in the disaster area	PW3	4.07	0.85		
	3.4	Concern about the safety of the people in the disaster area	PW4	4.1	0.82		
	3.5	Concern about the psychological status of the people in the disaster area	PW5	4.1	0.87		
Latent	4	Perception - Bonds					
Observed	4.1	Heart-warmed by the volunteers' works	PB1	3.8	0.91	1-5	0.77
	4.2	Strong bond in the society	PB2	3.31	0.96		
	4.3	Strong bond in families	PB3	3.76	0.89		
Latent	5	Perception - Anxieties					
Observed	5.1	Anxious about future disasters	PA1	3.99	0.88	1-5	0.80
	5.2	Urge to prepare for future disasters	PA2	4.2	0.78		
Latent	6	Intention - Civic communications					
Observed	6.1	To search for more information related to recovery status	IC1	3.39	0.91	1-5	0.90

	6.2	To discuss with my family about the recovery	IC2	3.39	0.92		
	6.3	To discuss with my friends about the recovery	IC3	3.32	0.92		
	6.4	To discuss with my colleagues about the recovery	IC4	3.14	0.92		
Latent	7	Intention - Altruistic actions					
Observed	7.1	To make donations	IA1	3.2	0.98	1-5	0.90
	7.2	To encourage other people to make donations	IA2	2.74	0.95		
	7.3	To support volunteering works	IA3	2.99	0.98		
	7.4	To encourage other people to support volunteering works	IA4	2.70	0.95		
	7.5	To join charity events to support the recovery	IA5	2.97	0.98		
Latent	8	Intention - Preparations					
Observed	8.1	To prepare for supplies and tools	IP1	3.80	0.87	1-5	0.92
	8.2	To find out more about the evacuation procedures	IP2	3.74	0.87		
	8.3	To learn about the safety procedures	IP3	3.76	0.85		
Control		Age	AGE	43.7	15.21	15-60	
		Gender (1=Male, 2=Female)	GEN	0=50.1%; 1=49.9%			
		Employed (incl. full time, part time and self-employed) (0=No, 1=Yes)	EMP	0=37.9%; 1=62.1%			
		Direct damages from the disaster (self only) (0=No, 1=Yes)	SDID	0.53			
		Use of Internet port sites, search engines	MIP	3.57	1.52	1-5	
		Use of Newspaper	MNP	2.57	1.54	1-5	
M=Mean, SD=Standard Deviation							

5.2 Result analysis

Based on the path model (Figure 2), a SEM model was constructed to examine the hypotheses defined in section 3.1 using statistical software SPSS and AMOS. The model is presented in Figure 3. The latent variable is represented by an oval shape, the observed variable is represented by a rectangle, the error term is represented by a circle, and the arrow indicates the relationship between different variables. The model was refined with references to the modification indices¹³. Overall, the model fits indicators (CMIN/DF=5.487, CFI=0.948, GFI=0.922, AGFI=0.905, RMSEA=0.047, PCLOSE=0.999) indicate that this SEM model is

¹³ Based on the modification indices by AMOS, the error terms of some variables were co-varied. For examples, the error term of the different perceptions were co-varied, because it is logically to assume that they are interrelated. Similarly, for the intentions and some of the observed variables under the same latent variable.

statistically acceptable¹⁴. Using on the results of the SEM model, the hypotheses are tested by examining the standardised estimate (Est.) between the latent variables and its corresponding significance (Sig.)¹⁵.

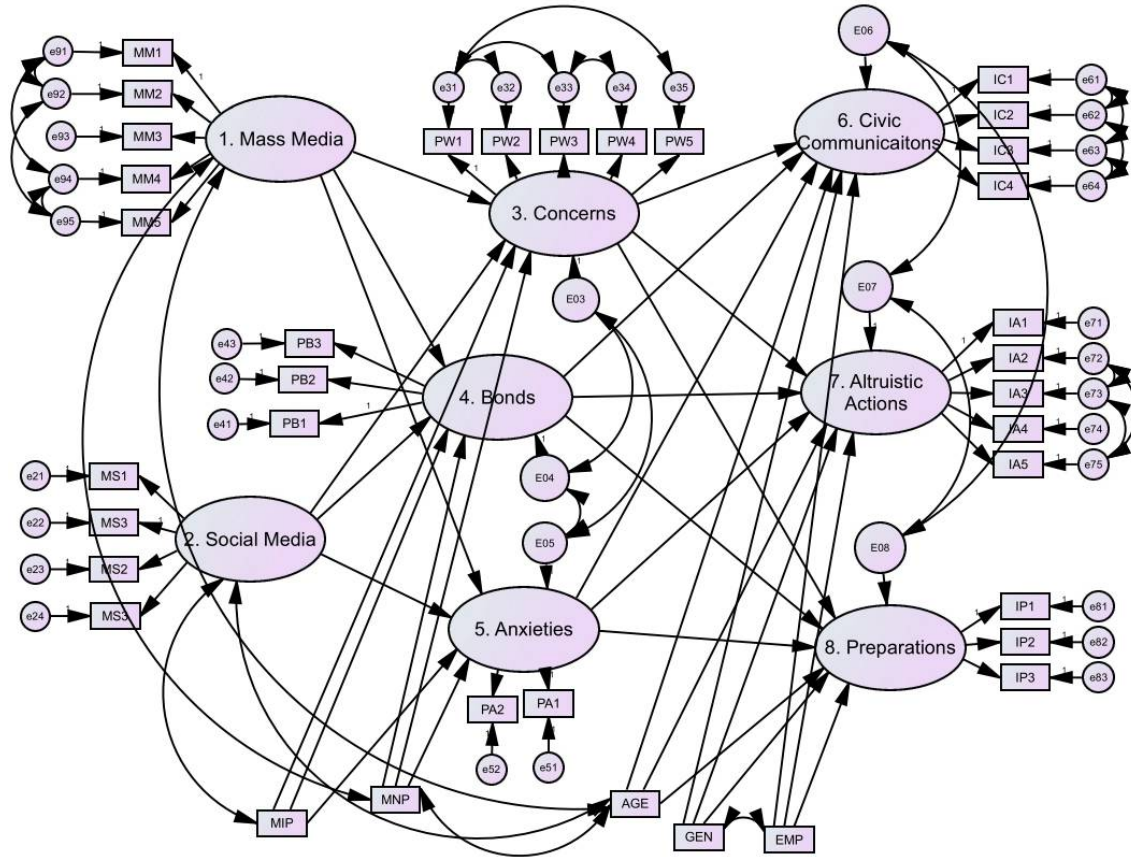


Figure 3 – SEM model

5.2.1 Mainstream effect

Results of the mainstream effect, i.e., the effect of the use of media on a person’s perceptions -hypotheses H1 to H6- are summarised in Table 4. First of all, the results show that the use of mass media has a significant and positive effect on all three perceptions; concerns, bonds and anxieties. Thus, hypotheses H1, H2 and H3 are all supported. On the other hand, a very different pattern is revealed for the use of social media. While it has no significant effect on the perception of bonds, it has a significant but mildly negative effect on the perception of concerns and anxieties. Therefore, hypotheses H4, H5 and H6 are all rejected.

In other words, comparing with a person who mainly relies on television for disaster related information, those also use social media to obtain disaster related information might feel less concern and anxious about the disaster. This finding implies that although television

¹⁴ Based on the model fits indices recommended by (Kenny, 2014).

¹⁵ The significances are obtained with 2,000 Bootstrap Samples and Bias-Corrected Confidence level of 95%.

has strong influence on a person’s perceptions of the disaster, some of its effects, to a certain extent can be reduced by the use of social media.

Table 3 – Results - hypotheses H1 to H6

Hypothesis				Est.	Sig.	Results
H1	1. Mass Media	Increases	3. Concerns	0.294	***	Supported
H2	1. Mass Media	Increases	4. Bonds	0.348	***	Supported
H3	1. Mass Media	Increases	5. Anxieties	0.275	***	Supported
H4	2. Social Media	Increases	3. Concerns	-0.068	**	Rejected ¹⁶
H5	2. Social Media	Increases	4. Bonds	0.008	NS	Rejected
H6	2. Social Media	Increases	5. Anxieties	-0.093	**	Rejected ¹⁷
Sig. ***P≤0.001; **P≤0.05; NS-Not Significant						

5.2.2 Effect of perceptions on intentions

The effect of a person’s perceptions of the disaster on their intention of different post-disaster activities -hypotheses H7 to H15- are summarised in Table 5.

First, for the perception of concerns, the result shows that while it has a significant positive effect on civic discussions, it has no direct effect on altruistic actions as well as preparations. Hence, H7 is supported but H8 and H9 are rejected. Second, for the perception of bonds, it can be seen that it has a significant positive effect on civic discussions, altruistic actions and preparations, thus, H10, H11 and H12 are all supported. Finally, for the perception of anxieties, the results indicate that while it has a strong positive effect on preparations, it has no direct effect on civic communications and a mild but negative effect on altruistic actions. Therefore, hypotheses H13 and H14 are rejected but H15 is supported.

In summary, the results show that different perceptions have different influences on a person’s behavioural intentions. The perception of bonds in society and families is the most influential, for instance, it increases a person’s intention to communicate with others, to perform altruistic actions as well as to prepare for future disasters. On the other hand, the perception of concerns just leads to the intention of civic communications. Finally, being anxious of future disaster increases a person intention to prepare for future disaster, but surprisingly, it reduces their intention of altruistic actions.

¹⁶ Significant but negative.

¹⁷ Significant but negative.

Table 4 – Hypotheses H7 to H15

Hypothesis				Est.	Sig.	Results
H7	3. Concerns	Increases	6. Civic communications	0.132	**	Supported
H8	3. Concerns	Increases	7. Altruistic actions	0.070	NS	Rejected
H9	3. Concerns	Increases	8. Preparations	0.016	NS	Rejected
H10	4. Bonds	Increases	6. Civic communications	0.453	***	Supported
H11	4. Bonds	Increases	7. Altruistic actions	0.521	***	Supported
H12	4. Bonds	Increases	8. Preparations	0.243	***	Supported
H13	5. Anxieties	Increases	6. Civic communications	0.039	NS	Rejected
H14	5. Anxieties	Increases	7. Altruistic actions	-0.090	**	Rejected
H15	5. Anxieties	Increases	8. Preparations	0.489	**	Supported
Sig. ***P≤0.001; **P≤0.05; NS-Not Significant						

5.2.3 Resonance effect

For hypotheses H16 to H21, the resonance effect, in other words, how a person's experience of the disaster moderates the effect of media on their perceptions was examined by comparing the effect of the use of mass and social media on their perceptions between those who were affected by the disaster directly and those who were not. This was tested by dividing the sample into two groups, namely the affected group and the not affected group and then compares the effects of media statistically based on their z-score¹⁸. The results are summarised in Table 6.

First, for the effects of mass media, the results show that between those who were directly affected by the disaster and those who were not, although there is no significant difference on their perception of concerns, there is a significant difference on the perception of bonds as well as anxieties. However, comparing the two groups' coefficients more closely, it is found that the coefficient -the strength of the effect- of mass media on those who were not affected by disaster directly is actually stronger than those who were. Thus, hypotheses H16, H17 and H18 are all rejected. Second, for the effects of social media, there is no significant difference of its effects on a person's perceptions between the two groups, thus hypotheses H19, H20 and H21 are all rejected.

In summary, it is interesting to find that contrary to what the resonance effect of cultivation theory predicts, mass media, television in this case, appears to have a stronger cultivation effect on those who were not affected by the disaster directly than those who were, in particular on their perception of bonds and anxieties. At the same, social media seems to have no resonance effect at all.

¹⁸ 'A distribution of values that standardizes raw data to a mean of zero (0) and a standard deviation of one (1.0).' (George & Mallery, 2013, p. 398)

Table 5 - Hypotheses H16 to H21

	Parameter	Affected by disaster			Not affected by disaster		Difference z-score ¹⁹	Results
		Est.	Sig.		Est.	Sig.		
H16	3.Concerns <--- 1.Mass Media	0.212	***	Stronger than	0.206	***	NS	Rejected
H17	4.Bonds <-- - 1.Mass Media	0.236	***	Stronger than	0.333	***	-2.077**	Rejected ²⁰
H18	5.Anxieties <--- 1.Mass Media	0.165	***	Stronger than	0.292	***	-2.81***	Rejected ²¹
H19	3.Concerns <--- 2.Social Media	-0.075	**	Stronger than	-0.018	NS	NS	Rejected
H20	4.Bonds <-- - 2.Social Media	-0.011	NS	Stronger than	0.040	NS	NS	Rejected
H21	5.Anxieties <--- 2.Social Media	-0.127	**	Stronger than	-0.013	NS	NS	Rejected

Sig. *P<0.001; **P<0.05; NS-Not Significant**

5.2.3 Control variables

Among the control variables, first, age is found to be the most influential. It is positively correlated with the use of mass media and negatively correlated with the use of social media. This implies that older people are exposed to disaster related information from television more frequently, while younger people are more likely to utilise social media for disaster related information.

Second, regarding use of other media, the results show that newspaper is strongly correlated with the use of mass media and similarly, has a positive effect on all three perceptions. Thus, the effect of newspaper is very similar to television. On the other hand, the use of Internet portal site is positively correlated with the use of social media, but unlike social media, it is positively related to the perception of concerns and anxieties. Thus, although both social media and Internet portal site are online media, their effects are quite different. Finally, employment status and gender appear to have minimal effect.

¹⁹ 'A z-score with a magnitude greater than +/- 1.96 indicates a significant difference at <.05 level.' (George & Mallery, 2013, p. 398)

²⁰ Significant but weaker

²¹ Significant but weaker

6. Key findings and implications

6.1 Key Findings

Overall, the results are consolidated into the following three key points.

1. Different role of mass and social media

From the results of the mainstream effect -hypotheses H1 to H6-, as expected, it can be seen that mass media has a strong and dominating influence on a person's perceptions of the disaster, including their perception of bonds in society and families, concerns of the disaster, and anxieties of future disasters. In contrast, the effects of social media appear to be much less salient that it has no direct effect on the perception of bonds, but interestingly, although not very strong, it actually reduces the perceptions of concerns and anxieties.

One possible explanation is that those who use social media more frequently, the younger people in this case, were simply less concern about the disaster. However, if this was the case, social media shall have a negative effect on all three perceptions. Another possible explanation is that because social media can provide additional information and communication channels, it can ease a person's concerns and anxieties about the disaster. Therefore, it can be argued that, while mass media still plays the dominant role in cultivating people's perception of reality, social media, to a certain extent can regulate its influence.

2. The importance of the perception of bonds

As mentioned in section 2, traditionally media's cultivation effect is mostly associated with the perception of risk and danger, in this case, the perception of concerns and anxieties. From the results of the effect of perceptions on intentions -hypotheses H7 to H15-, it can be seen that the effects of concerns and anxieties are quite limited.

For example, the perception of concerns only leads to the intention of civic communications, and the perception of anxieties increases intention of preparation for future disaster but at the same time reduces the intention of altruistic actions. In contrast, the perception of bonds in society and families appears to have a much wider and stronger influence, it has a positive effect on all three intentions including altruistic actions, civic communications as well as preparations. Therefore, it can be argued that the perception of bonds is very effective to increase the public's intention of post-disaster actions and disaster preparations.

3. The mediating power of media

From the results of the resonance effect -hypotheses H16 to H21-, it is interesting to find that for those who were not affected by the disaster directly, their perceptions of the disaster actually are influenced by television information more than those who were. On the surface, this appears to be contradictory to the resonance effect in the cultivation theory

which predicts the opposite. However, considering the media environment in Japan, it concurs with earlier study Mitomo et al. (2012) which shows that the vividness and abundance of media information can effectively create a sense of reality for people outside the disaster area. Thus, this finding does not imply that resonance effect of media does not exist, instead, it demonstrates the mediating power of media, especially television on shaping people's perceptions of the disaster, especially for those who had not experienced the event directly.

6.6 Implications

In summary, the results have empirically shown the different role of mass and social media, stressed the importance of the perception of bonds, and demonstrated the mediating power of the media. In practice, what are contribute to post-disaster recovery and disaster preparation?

By now, more than four years have passed since the Great East Japan Earthquake. Most of the infrastructures that were destroyed are rebuilt (Reconstruction Agency, 2014). For the general public, life has returned to normal²², and naturally, as shown by recent surveys, for example, NHK Newsweb (2015) and JA Zenchu (2015), people's attention on the disaster is fading away. However, for the disaster victims, the road of recovery is still very long, and continuous support from the society is essential for their recovery. Moreover, located on the active earthquake zone, it is critical that the society to continue to stay vigilant for future earthquakes. Therefore, for government authorities as well as NGOs that are working on post-disaster recovery and disaster preparation, it is important to maintain and promote the public awareness on post-disaster recovery as well as preparation for future disaster.

In this aspect, understanding of the different role between mass and social media, knowledge of the effects of different perceptions they can cultivate, as well as the mediating power of media will have some important implications for these organisations. For instance, they can utilise television as the main medium to promote public awareness on post-disaster recovery and disaster preparations, especially to the general public that did not experienced the disaster directly. With the knowledge that television will cultivate the perceptions of bonds which is the most influential as well as the perception of concerns and anxieties which are less effective, they can utilise social media in parallel to achieve the optimal results. Especially, with the knowledge that social media can reduce some the perceptions of concerns and anxieties. For example, they can provide the supplementary information as well as the communication platform over social media.

Furthermore, understanding of how different media can assist these organisations will also facilitate policy makers to establish the corresponding policy to support the promotion of post-disaster recovery and disaster preparations.

²² To illustrate, a survey conducted by Dentsu has found that more and more people in the Tokyo Metropolitan area felt that their daily life had returned to normal after the disaster, and by 2013, this had reached 80% (Dentsu Marketing Insight, 2013).

7. Conclusion

In conclusion, extending from the cultivation model proposed by Cheng et al. (2015), this study has further elaborated the effects of mass and social media on people's perceptions of the disaster and their intention of different disaster related activities. That being said, it has some limitations that must be considered carefully when interpreting the results. First is causal ambiguity, despite the fact that the path model is developed based on a sound theoretical background, since the data was collected from a single survey, the possibility of a spurious causality cannot be overlooked. Second is sample bias, although the sample size is sufficiently large, but since they are collected with Internet survey, sample bias is inevitable (Couper, 2000). Even though the data was weighted with post-stratification weighting, errors from sample bias shall be kept in mind.

Finally, although this paper has examined the detail underlying mechanism of how mass and social media affect people's perceptions and intentions from the passive audience perspective, it has only presented one side of the story. Because in today's digital media society, people are both active and passive in terms of media usage, therefore, in order to complete the whole picture of how media can contribute to post-disaster recovery and the preparation for future disasters, further works are necessary to synthesise its results with another in-depth study from the opposite active audience perspective.

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