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Published in:
Procedia Engineering

DOI:
10.1016/j.proeng.2018.01.117

Published: 01/01/2018

Available online at www.sciencedirect.com

ScienceDirect

Procedia Engineering 212 (2018) 910–917

Procedia Engineering

www.elsevier.com/locate/procedia

7th International Conference on Building Resilience; Using scientific knowledge to inform policy and practice in disaster risk reduction, ICBR2017, 27 – 29 November 2017, Bangkok, Thailand

Modelling predictors of earthquake hazard preparedness in Nepal

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Abstract

In countries exposed to natural hazards, population preparedness is an important component of a comprehensive disaster risk reduction strategy. Recognition of poor preparedness, despite risk acknowledgement, prompted the development of theories for identifying motivators and barriers to hazard preparedness. While the majority of preparedness theorising and research has been in culturally individualistic countries, recent years have witnessed growing interest in applying the theories to more collectivistic settings. However, limited empirical evidence exists concerning the application of these theories in developing countries where disaster impacts are substantial. This paper assesses population preparedness in the aftermath of a major disaster in a developing country. Two theories of preparedness Protection Motivation Theory (PMT) and Community Engagement Theory (CET), which have been previously applied in natural hazard contexts, were integrated to develop a new model of earthquake hazard preparedness. The validity of the proposed model was explored using 306 household surveys collected from Chainpur and Jeewanpur Village Development Committees, Dhading, Central Nepal during a field visit in April-May 2016. Structural Equation Modelling (SEM) in SmartPLS version 3.2.4 revealed that individual risk beliefs (risk appraisal and coping appraisal) and community and institutional factors could predict hazard preparedness in Nepal. The model was moderately successful (R^2 41.6%) in predicting that earthquake hazard preparedness occurs at the individual cognition phase and is also influenced by community and institutional phases.

Peer-review under responsibility of the scientific committee of the 7th International Conference on Building Resilience.

Keywords: Earthquake; preparedness; recovery; community participation; collective efficacy; empowerment; trust; Nepal

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1877-7058
Peer-review under responsibility of the scientific committee of the 7th International Conference on Building Resilience
10.1016/j.proeng.2018.01.117

1. Introduction

Globally, earthquakes expose populations to increased risk of death and injury, damage to infrastructures and disruption to those facilities and services people rely on to sustain societal functioning [1]. These impacts are particularly acute in developing countries. For example, there were 200,000 fatalities in Haiti in 2010, [2], 69,200 fatalities in the Wenchuan, China, [3], 73, 256 fatalities in Pakistan in 2005, [4] and 8510 fatalities in Nepal in 2015 [5]. Even within developing countries, the scenario that unfolded in Nepal was unique due to the specific demands and characteristics of life in the Himalayan region. Population characteristics such as poverty, poor quality infrastructure construction and logistic challenges amplified the earthquake risk in Nepal [6-8].

This risk can be managed in two general ways. The first involves enhancing the availability of physical assets such as retrofitting buildings, applying building codes and regulatory measures, and land use planning for mitigating seismic hazards risk [9]. Pursuing this requires comprehensive development strategies, financial and human resources and long time frames for implementation and maintenance [9]. While this should remain a strategic goal in Nepal, it is important to complement this approach with more cost-effective activities that can be implemented in the short term. Non-structural measures that implicate developing the knowledge and capabilities of people required to reduce household and community risk, can complement structural mitigation [9].

Preparing for a disaster at the household level (securing food, water and basic utilities, making household emergency plan etc) is a cost-effective way of increasing people's ability to cope with and adapt to the consequences of hazards [10]. For achieving this goal, educating the public by providing information has been viewed as a panacea in general. But research has shown that providing information has not necessarily changed people's behaviour; even when people acknowledge the risk of a hazard, they still may not change their behaviour [11]. This issue of adjustment adoption provokes thinking around i) how people interpret their circumstances and risk, and ii) how they make decisions about how to act when they have to do so in the highly uncertain situation.

Acknowledging the issue of adjustment adoption, several preparedness theories in a pre-disaster context have been formulated and tested [11-13]. Although theoretical work on preparedness originated in developed countries predominantly with individualistic cultures (e.g. USA, Australia, New Zealand) [14, 15], several studies have confirmed the utility of these theories in highly collectivistic cultures (e.g. Indonesia, Taiwan) [16, 17]. These theories have also proven useful in developing countries such as Ethiopia with a highly marginalised population [17, 18]. Nonetheless, empirical evidence of theorising preparedness and its application in the recovery period are limited in both developed and developing countries. Preparing to cope with and adapt not only to the severe impacts of disaster but also to build back better is an urgent need for increasing community resilience in these nations [18]. But in developing countries, preparedness activities are confined to response and survival due to inadequate resources and skills for contingency planning for the future [19]. This research expands on existing preparedness theories, by exploring preparedness during the recovery phase of 2015 Nepal earthquake. This offers an opportunity for exploring how the actual hazard experience of people contribute to their risk beliefs and coping capacity analysis and how they decide whether to prepare or not.

2. Theoretical framework

This section explains the theoretical foundation of the new model and its variables (dependent and independent). The proposed model adopts the basic conceptual underpinning of Community Engagement Theory (CET) [20]. It integrates Protection Motivation Theory (PMT) variables with CET variables to develop a parsimonious model that provides the insights of earthquake hazard adjustments during the recovery period. Originally, the PMT variables were designed to predict the volitional behaviour in people facing a known and immediate health issue such as smoking [21]. These variables are suitable for tracing the behavioural intentions of the population who have experienced earthquake hazards. In natural hazards, past research has shown that direct experience is important in motivating people to protect themselves [11]. The CET was designed to examine how people make preparedness decisions during the periods of high uncertainty that prevail in pre-hazard settings. Its constituent variables are not well suited to capturing elements of people's experience when (to some extent, at least) knowledge of hazard consequences are known. A composite PMT/CET model thus offers a way of modelling preparedness by integrating variables that capture how people interpret risks present in the recovery environment with social variables in the

CET that influences how people collectively develop risk management (i.e., preparedness) strategies (Figure 1). The key elements of the proposed model are discussed in the next section. This discussion commences with factors implicated in how people evaluate their recent disaster experience; risk appraisal and coping appraisal.

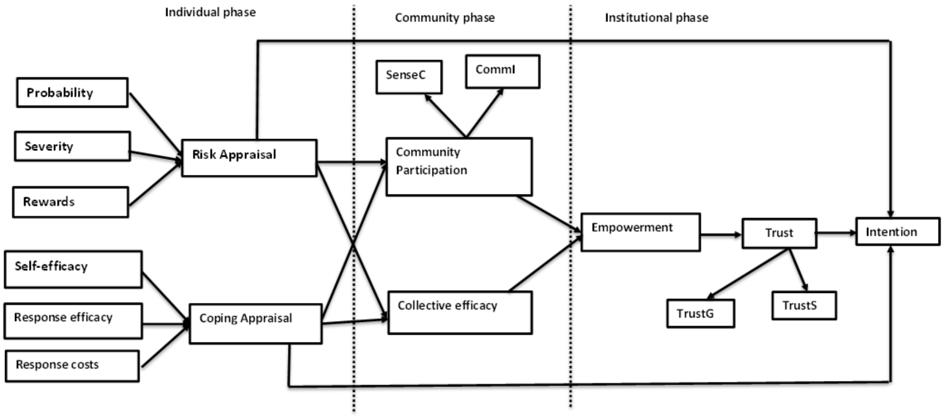

Figure 1 Earthquake hazard preparedness model

2.1. Individual phase

In this phase, individual cognition is evaluated using risk appraisal and coping appraisal. **Risk appraisal** is a primary cognitive process that motivates people to adopt protective actions. It is a composite of perceived probability of a threat (susceptibility of people to the current earthquake risk), perceived severity (the severity of the consequence of the risk) and rewards (perceived benefits) connected to current practices. Risk appraisal involves weighing the benefits of not adopting protective behaviour against the existing risk. The acceptance of risk is a primary process to begin coping appraisal. **Coping appraisal** process begins if people acknowledge the risk of an earthquake (through direct or indirect experience such as radio, TV, disaster management agencies, etc) and accept it. Coping appraisal consist of Perceived self-efficacy (the belief that one is capable of performing a protective action), perceived response efficacy (the belief that protective actions are effective to protect oneself from the consequences of the threat), and perceived response cost (perceived personal capabilities and resources e.g. time, skills, physical resources and social network required to take the protective action). A relative balance between risk appraisal and coping appraisal processes stimulate intentions to prepare/adjust.

2.2. Community phase: Social influences on the construction of risk and its management in the community

People face considerable uncertainty when being asked to prepare for the complex and unfamiliar earthquake hazards. They turn to family, friends or community members for guidance about how to interpret the event and its implications for them [20]. In this way, people deal with their novel circumstances by co-constructing their (social) understanding and imposing local meaning on their situation [22]. The effectiveness of this process is a function of the quality of people's relationship with others and their experience of dealing with challenging circumstances with these others [23]. These processes are assessed using constructs of community participation and collective efficacy respectively. Community participation includes a sense of community and community involvement. The sense of belongingness to people and place increases the feeling of community and social cohesion [11]. Social cohesion contributes to creating a context in which the social construction of risk can emerge, and in which community members can determine the community preparedness measures appropriate for managing their risk [24, 25].

Collective efficacy is the capability of the community to self-assess their capacity to coordinate, access resources and skills required to meet the general and specific needs of the community [16].

2.3. Community-Agency/institutional influence

Given the uncertainty inherent in both pre-event and disaster recovery settings, where people face novel challenges, key determinants of community action is the degree to which agencies empower community members and the extent to which community members trust agency sources of information and resources [20]. Two factors trust and empowerment are considered important to measure community agency relationship. Empowerment is the ability of the people to deal with an earthquake hazard consequences by generating capabilities and resources required to manage the issues from emergency agencies [11]. Empowerment derives from the quality of the relationship between community and agency [11, 26]. Trust is an important parameter that mediates community and societal factors to intentions (intentions to adjust). Trust is the willingness of people to rely on to others to meet their needs and expect that others would complement their needs despite acknowledging that there will be some level of risk in doing so [27]. Shared values, norms, attitudes, beliefs and feelings between two parties in the course of interactions over a period of time yields trust [28]. The quality of relationship may influence people's perceptions of others' motives, competence, and predictability [11].

2.4. Intentions to prepare: Intention to prepare is an important mediator of actual preparedness [29]. It is used here as the dependent variable because of a lack of established formal measures of preparedness. The use of proxy measure minimises the confounding influence that might arise if measures of preparedness were used.

3. Method

On 21 April 2015, a 7.8 magnitude earthquake with epicentre struck Barpak, Gorkha district, adjoining to Dhading district and 80 km north-west of Kathmandu, Nepal. It affected 31 of the 75 districts in Nepal [5]. Dhading district was selected for the research following reasons: a) a severely impacted district; b) accessible, c) it had readily available data on direct loss and damage and d) sensitive to secondary hazards such as landslide and earthquake aftershocks. Chainpur (no casualty) and Jeewanpur (highest casualty) VDCs were selected for the data collection.

The variables described in the model were compiled into a questionnaire. The questionnaire was distributed among a random sample of 700 households in the Chainpur and Jeewanpur VDCs. 471 (67%) were returned out of the 700 questionnaires. The return rate was sufficient to ensure the required sample size recommended for structural equation modelling. The 471 questionnaires were screened in SPSS version 24 for non-response; responses with less than 50% of the total responses, and unengaged responses were excluded.

The model tested is a complex model consisting of 38 indicators and two 2^{nd} order formative constructs, two 2^{nd} order reflective constructs and three first order reflective constructs which cannot be tested using 1G technique and CB-SEM [30]. The Partial Least Squares (PLS) technique of structural equation modelling was used for analysing data. This approach is suitable for validating predictive models especially composite and complex models and is appropriate to correctly specify model [31]. PLS supports two measurement models: (a) the assessment of the measurement model and (b) the assessment of the structural model (b) and the R^2 [32].

4. Results

4.1. Measurement model evaluation

The path model and parameters were estimated in Smart PLS 3.2.4 to assess the measurement model and evaluating the structural model [33] using recent guidelines for PLS-SEM given by Chin [34] and [33]. In the model, all the first order variables were reflective. The indicator reliability and validity of the constructs were assessed using indicator loadings in each variable. The items with factor loading below 0.5 were removed. The loadings were above 0.70 except for four items (Self-efficacy2, Self-efficacy4, Response cost2, and Empowermet5).

However, these items were retained although the loadings for these items ranged from 0.585 and 0.684. As these loadings are higher than the commonly used thresholds of 0.40 or 0.50 in factor analysis [34, 35]. The composite reliability for all the constructs ranged from 0.76 to 0.90 and was above recommended threshold ≥ 0.70. Thus the internal consistency reliability of the model was confirmed. All the average variance extracted (AVE) values were higher than the threshold value of 0.50 providing evidence for the adequate convergent validity of the measurement model. The discriminant validity of the reflective constructs was established using HTMT criteria and all the values were below the threshold of 0.85. The variance inflation factor (VIF) provides an indication of multicollinearity and should be less than 5 [36]. VIF for all of the first order constructs of risk appraisal and coping appraisal were within the thresholds. The measurement model substantiates that all the constructs measures are reliable and valid. Based on these findings, the structural model was evaluated for the hypothesised relationships between constructs.

4.2. Structural model evaluation

The R^2, path coefficients (β) and Q-Stone-Geisser's Q^2 are the major criteria to evaluate the predictive relevance of the structural model [36]. The coefficient of determination (R^2) value is a measure of the predictive power of the model. R^2 values range from 0 -1; with higher levels indicating higher accuracy. However, it depends on the model complexity and the research discipline [33]. R^2 values of 0.67, 0.33 and 0.19 are regarded as a substantial, moderate and weak variance for a model [37]. The intention accounted for 41.6% of the variance explained by the model indicating the moderate predictive validity of the model (Figure 2).

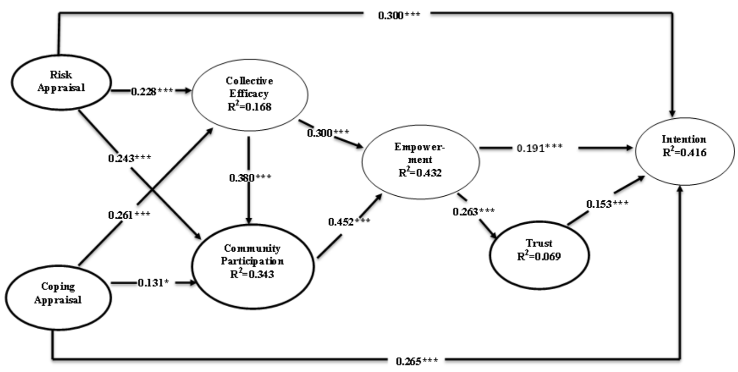

Figure 2 Structural model of earthquake hazard preparedness using two-stage approach

Notes: Risk appraisal and coping appraisal are 2nd order formative constructs composed of 1st order reflective constructs of perceived probability of the threat, perceived severity of the threat, rewards, self-efficacy, response efficacy and response costs. Community participation and trust are 2nd order reflective constructs composed of 1st order reflective constructs of a sense of community, community involvement, trust general and trust specific. Collective efficacy, empowerment and intention are 1st order reflective constructs. **p* 0.05*;* ****p* 0.001 represent bootstrapping of 5000 subsamples.

The next criteria to assess the predictive power of model are path coefficients (β). The β values closer to 0.20 and 0.30 or higher represent the good predictive power of the model [34]. The β values were above the recommended threshold of 0.20 except for paths from empowerment to intention (.191) and trust to intention (0.153). But the bootstrapping results of 5000 subsamples showed all the path coefficients were significant at p-values < 0.05 and p-values<0.001which confirms the predictive validity of the model (Figure 2). Stone-Geisser's Q^2 value criterion provides the predictive power of the structural model in PLS-SEM besides R^2 and path coefficients [38, 39]. Q^2 values larger than zero indicates that the exogenous constructs have predictive relevance for the endogenous construct under consideration [33]. Q^2 value for intention (0.396) was obtained by blindfolding procedure. The Q^2 values were above zero, indicated the predictive relevance of the PLS path model.

5. Discussion

A new model of earthquake hazard preparedness was developed by integrating PMT and CET variables.The model was moderately successful (R^2 41.6%) in predicting the proposed theoretical view that earthquake hazard preparedness process commences at individual cognition level and proceeds through community and institutional phases in a sequential manner. The analysis supports that individual cognition (risk appraisal and coping appraisal) and social contextual factors interact to increase the likelihood of preparing in a post-disaster scenario in Nepal.

Individual cognition (risk appraisal and coping appraisal) was assessed using PMT. PMT ascertains that people elicit intentions to protective actions when they face a threat. They can neither avoid risk nor take precautionary actions so they will suffice to adjust to the changing circumstances [40]. The strength of relationship from risk appraisal to intention (β values of 0.3) and from coping appraisal to intention (β values of 0.265) supported the view that individuals develop the intention to prepare for an earthquake hazard by assessing their risk and coping abilities.

Following risk appraisal and coping appraisal phase, the interaction between individual and community members begin. The significant relationship between people's personal experience (belief) of risk and coping appraisal with community participation and collective efficacy with a variance of 16.8% and 22.4% respectively provide evidence of individual to community interaction. This implies that in a highly uncertain situation also, people actively seek information from significant others to reduce the uncertainty [41]. In this way, people deal with their novel circumstances by co-constructing their social understanding and imposing meaning on their situation [22].

The relationship between community participation to collective efficacy (β values of 0.380 at $p < 0.001$) illustrates the role of community in local issues in Nepal and highlights the cultural interdependency, social bonding and mutual obligations in Nepali society. In a collectivistic society, people are interdependent to their in-group (e.g. family, clan, tribe, community, and state) and shared norms and values influence their behaviour [42]. Community response when conducting rescue operation such building temporary shelters and arranging basic supplies with the available local resources reflected the mutual obligation and social bonding (field discussion, May 2016). However, the scope of this research is limited to identifying factors of community preparedness. Therefore further qualitative research that explores the relationship between people's preparedness and sociocultural beliefs, norms and values are deemed necessary for articulating the culturally specific responses that underpinned the implicit community response towards a disaster and its consequences.

Empowerment is an institutional factor that precedes community factors in the model. The relationship between community participation, collective efficacy and empowerment reveal the strength of community capabilities and collective efforts for building empowering environment for preparing during recovery in Dhading, Nepal. People as collectives play a vital role in the response-recovery process as they bear the recurrent challenges earthquake disasters pose in most parts of the world [43]. In Dhading communities were exposed to multiple challenges such as loss of lives and property, disruptions to basic services, and a shortage of safe housing structure and much more [7, 8]. Consequently, communities' identified demands were forwarded through Ward Citizen Forum to the government as the collective efforts to overcome these issues rendered inadequate [8]. However, they received a limited support in kind and cash from the government. So, a gap between the government service delivery and community expectations was evident [44].

Another institutional factor that mediates the relationship between empowerment and intention is trust. Trust explained weak (6.7%) variance although the relationship of trust to intention was significant in the model. The prevailing gaps between the expectations of communities and government service provision explain the low variance of trust. Trust represents communities' level of familiarity to disaster-related information and general trust developed due to the complementary relationship between relevant agencies and communities in the normal context. In Nepal also, communities turned towards the public institutions for assistance based on the general trust (around 59% of trust on public institutions) communities have on them [45] to reduce the persistent ambiguity during recovery[5]. However, more work is needed to further explore the relationship between these variables.

6. Conclusion

This research developed and tested a model of preparedness during the recovery phase of 2015 Nepal earthquake. Researching disaster preparedness during recovery offered an opportunity to develop an understanding of people's direct experiences and their coping abilities in an unusual situation. It informed people's motivation to prepare for the future event as their direct experience of the event stimulates behavioural intention. Prior experience of a hazard event also promotes the preparedness needs for effective coping in the future; which corroborates with the concept of Built Back Better.

This research also indicates that the fusion of PMT and CET theories permits a better understanding of behavioural and social aspect instead of using each of them separately. Researchers investigating hazard preparedness may consider integrating theoretical perspectives from differing domains as it serves to deepen research knowledge in preparedness modelling. The model tested is specific to earthquake hazard preparedness in Nepal. Researchers may consider testing it for all hazard applicability in Nepal and across different countries and cultures**.**

References

1. UNISDR, *Global Assessment Report on Disaster Risk Reduction*. 2015.
2. Cavallo, E., A. Powell, and O. Becerra, *Estimating the direct economic damages of the earthquake in Haiti.* The Economic Journal, 2010. **120**(546): p. F298-F312.
3. Yuan, Y., *Impact of intensity and loss assessment following the great Wenchuan Earthquake.* Earthquake Engineering and Engineering Vibration, 2008. **7**(3): p. 247-254.
4. Sullivan, K.M. and S. Hossain, *Earthquake mortality in Pakistan.* Disasters, 2010. **34**(1): p. 176-183.
5. The government of Nepal, *Nepal earthquake 2015 Post disaster needs assessment*. 2015, Government of Nepal: Kathmandu.
6. Poudel, S. and R. Shaw, *Demographic Changes, Economic Changes and Livelihood Changes in the HKH Region*, in *Mountain Hazards and Disaster Risk Reduction*. 2015, Springer. p. 105-123.
7. Sanderson, D. and B. Ramalingam, *Nepal earthquake response: Lessons for operational agencies.* The active learning network for accountability and performance in Humanitarian action ALNAP, 2015.
8. Goda, K., et al., *The 2015 Gorkha Nepal earthquake: insights from earthquake damage survey.* Frontiers in Built Environment, 2015. **1**: p. 8.
9. Coppola, D.P., *Chapter 4 - Mitigation*, in *Introduction to International Disaster Management (Third Edition)*. 2015, Butterworth-Heinemann: Boston. p. 224-274.
10. Coppola, D.P., *Chapter 5 - Preparedness*, in *Introduction to International Disaster Management (Third Edition)*. 2015, Butterworth-Heinemann: Boston. p. 275-320.
11. Paton, D. and J. McClure, *Preparing for Disaster: Building household and community capacity*. 2013: Charles C Thomas Publisher.
12. Duval, T.S. and J.P. Mulilis, *A Person ‐ Relative ‐ to ‐ Event (PrE) Approach to Negative Threat Appeals and Earthquake Preparedness: A Field Study1.* Journal of applied social psychology, 1999. **29**(3): p. 495-516.
13. Lindell, M.K. and D.J. Whitney, *Correlates of household seismic hazard adjustment adoption.* Risk Analysis, 2000. **20**(1): p. 13-26.
14. Mulilis, J.P. and T.S. Duval, *The PrE model of coping and tornado preparedness: Moderating effects of responsibility.* Journal of Applied Social Psychology, 1997. **27**(19): p. 1750-1766.
15. Paton, D., *Disaster preparedness: a social-cognitive perspective.* Disaster Prevention and Management: An International Journal, 2003. **12**(3): p. 210-216.
16. Paton, D., et al., *Making sense of natural hazard mitigation: Personal, social and cultural influences.* Environmental Hazards, 2010. **9**(2): p. 183-196.
17. Paton, D., N. Okada, and S. Sagala, *Understanding Preparedness for Natural Hazards: Cross cultural comparison.* IDRiM Journal, 2013. **3**(1): p. 18-35.
18. Ejeta, L.T., A. Ardalan, and D. Paton, *Application of behavioural theories to disaster and emergency health preparedness: a systematic review.* PLoS Currents, 2015. **7**.
19. Fan, L., *Disaster as an opportunity*, in *Building back better in Aceh, Myanmar and Haiti*. 2013.
20. Paton, D., *Risk communication and natural hazard mitigation: how trust influences its effectiveness.* International Journal of Global Environmental Issues, 2008. **8**(1-2): p. 2-16.

21. Rogers, R.W., *Cognitive and physiological processes in fear appeals and attitude change: A revised theory of protection motivation.* Social Psychophysiology, 1983: p. 153-176.
22. Blumer, H., *Symbolic interactionism: Perspective and method*. 1986: Univ of California Press.
23. Paton, D., L.-j. Jang, and M. Irons, *Building Capacity to Adapt to the Consequences of Disasters: Linking Disaster Recovery and Disaster Risk Reduction*, in *Capacity Building: Planning, Programs and Prospects.*, D. Brown, Editor. 2015, Nova Scientific Publishers: New York. p. 85-114.
24. Paton, D., P.T. Burgelt, and T. Prior, *Living with bushfire risk: Social and environmental influences on preparedness.* 2008.
25. Tierney, K.J. *Toward a critical sociology of risk*. in the *Sociological forum*. 1999. Springer.
26. Poortinga, W. and N.F. Pidgeon, *Trust, the asymmetry principle, and the role of prior beliefs.* Risk analysis, 2004. **24**(6): p. 1475-1486.
27. Mayer, R.C., J.H. Davis, and F.D. Schoorman, *An integrative model of organisational trust.* Academy of management review, 1995. **20**(3): p. 709-734.
28. Jones, G.R. and J.M. George, *The experience and evolution of trust: Implications for cooperation and teamwork.* Academy of management review, 1998. **23**(3): p. 531-546.
29. Paton, D., et al., *Risk perception and volcanic hazard mitigation: Individual and social perspectives.* Journal of Volcanology and Geothermal Research, 2008. **172**(3): p. 179-188.
30. Lowry, P.B. and J. Gaskin, *Partial least squares (PLS) structural equation modelling (SEM) for building and testing the behavioural causal theory: When to choose it and how to use it.* IEEE Transactions on Professional Communication, 2014. **57**(2): p. 123-146.
31. Chin, W.W., *The partial least squares approach to structural equation modelling.* Modern methods for business research, 1998. **295**(2): p. 295-336.
32. Joseph F. Hair, J., C.M. Ringle, and M. Sarstedt, *Editorial-Partial Least Squares: The Better Approach to Structural Equation Modeling?* Long Range Planning, 2012. **45**(5-6): p. 312-319.
33. Hair Jr, J.F., et al., *A primer on partial least squares structural equation modelling (PLS-SEM)*. 2016: Sage Publications.
34. Chin, W.W., *How to write up and report PLS analyses*, in *Handbook of partial least squares*. 2010, Springer. p. 655-690.
35. Hulland, J. and R.I.S.o. Business, *Use of partial least squares (PLS) in strategic management research: A review of four recent studies.* Strategic management journal, 1999. **20**(2): p. 195-204.
36. Hair, J.F., C.M. Ringle, and M. Sarstedt, *PLS-SEM: Indeed a silver bullet.* Journal of Marketing theory and Practice, 2011. **19**(2): p. 139-152.
37. Henseler, J., C.M. Ringle, and R.R. Sinkovics, *The use of partial least squares path modelling in international marketing.* Advances in international marketing, 2009. **20**(1): p. 277-319.
38. Stone, M., *Cross-validatory choice and assessment of statistical predictions.* Journal of the Royal Statistical Society. Series B (Methodological), 1974: p. 111-147.
39. Geisser, S., *A predictive approach to the random effect model.* Biometrika, 1974. **61**(1): p. 101-107.
40. Maddux, J.E., M. Sherer, and R.W. Rogers, *Self-efficacy expectancy and outcome expectancy: Their relationship and their effects on behavioural intentions.* Cognitive Therapy and Research, 1982. **6**(2): p. 207-211.
41. Lion, R., R.M. Meertens, and I. Bot, *Priorities in information desire about unknown risks.* Risk Analysis, 2002. **22**(4): p. 765-776.
42. Markus, H.R. and S. Kitayama, *Culture and the self: Implications for cognition, emotion, and motivation.* Psychological review, 1991. **98**(2): p. 224.
43. Paton, D. and C.S.-k. Tang, *Resilience, adaptive capacity and post-traumatic growth in Thai communities following the 2004 Indian Ocean tsunami.* K. Gow and D. Paton, Phoenix of natural disasters: community resilience. New York, Nova Science, 2008: p. 235-50.
44. Paul, B.K., B. Acharya, and K. Ghimire, *Effectiveness of earthquakes relief efforts in Nepal: opinions of the survivors.* Natural Hazards, 2017. **85**(2): p. 1169-1188.
45. Jamil, I. and S. Askvik, *Citizens' trust in public officials: Bangladesh and Nepal compared*, in *In search of better governance in South Asia and beyond*. 2013, Springer. p. 145-163.