A Meta-Analysis Framework and Its Application for Exploring the Driving Causes to Social Vulnerability

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1. Introduction

Since 1970s, along with the emerging of concept of complex problems, especially in the fields of environment, socioeconomic, population and sustainable development, there has been more and more studies turned from mathematical modeling or other qualitative methods to qualitative analysis and synthesis. Partly it is because that the studies becomes more and more cross-disciplined, on the other hand, difficulties to quantify them are the reasons. But as yet, little accumulation of the understandings have been gained from these studies. Compared to the considerable amount of attention on quantitative modeling and analysis, the attentions on the qualitative synthesis still keep a relative lack generally.

Along with increasing recognisation on the important implications for both knowledge development and the utilization of qualitative research methods in practice，and along with the explosively growing amount of scientific research, there progressed the integration synthesis method – meta-analysis. Meta-analysis helps to ensure that relevant qualitative studies are not lost in the growing body of research(Evans 2002); also meta-analysis permits those studies to be appraised and their findings to be combined (Jones 2004). More importantly, under the current situation that qualitative research is still falsely characterized as ungeneralizable, when generalization is narrowly conceived in terms of sampling and statistical significance (Sandelowski, Docherty et al. 1997), meta-analysis could achieve greater generalizability with higher level of abstraction(Estabrooks, Field et al. 1994).

Vulnerability to natural hazard is a typical research area of qualitative and multi-disciplined. A wealth of empirical case studies on risk and vulnerability has been undertaken at scales ranging from household to global level. The experience in undertaking such assessments is diverse and the findings are highly context and place specific (B. L. Turner, Kasperson et al. 2003). Also, the understanding of the causal structures and dynamics of vulnerability remains patchy and anecdotal despite the advances of vulnerability research in the past two decades (Adger et al., 2005; Kasperson 2006). To-date, very few rigorous comparative studies that aim to synthesise this collective experience have been undertaken. Examples are the work of Misselhorn (2006) in the area of food insecurity in Southern Africa and that of Geist (2004) and Geist and Lambin (2004) in the area of land cover change.

Therefore, the rationale of this study is promoted by factors on both sides of methodology and research question:

- What are the pivotal methodological issues of the qualitative meta-analysis when applied? With the development of more than three decades, various frameworks have been brought out for the application of meta-analysis. Although it is widely accepted that with the basic principles, the techniques could be different according to characteristics of research fields, there are still problems of relative uncertainty. The aim of methodological is to discuss these pivotal issues with the vulnerability research as an applied case.
- What are the key driving causes to the vulnerability to natural hazards? Compared with the increase in the number of advanced research on vulnerability, in the real world people are still suffering from rising vulnerability to natural hazards. Especially with the shocks from 2004 tsunami, 2005 and 2007 hurricanes, the coastal hazards came to the attention focus. With the application of meta-analysis, the aim of research is to recognize the key factors contributing to vulnerability, and synthesize the driving relationship between these factors.

To achieve the above aims, this paper applies meta-analysis in the qualitative studies with the context of the vulnerability research questions. In the second section, the methodology of meta-analysis is introduced; in the third section, the findings of the application of meta-analysis in vulnerability research are presented; finally, in the forth section, there are the discussions on both the vulnerability and the implementation of meta-analysis itself.

2. Methodology of meta-analysis

The results of a single study can be influenced by characteristics of the study setting, the sampled population, timing, locations and the subjective bias of the researchers. Causal factors of certain effects can only be unearthed by a synthesis of multiple studies rather than a single study. Some general trends and underlying principles can only be deduced across a large body of case studies or empirical studies. Therefore, since its very beginning, the methodology of meta-analysis is expected to be such a solution to synthesize amount of studies and get to the essences of problems with as least as possible bias.

Beecher (1995) undertook the earliest example of a meta-analysis and Glass (1976) coined the term "meta-analysis" to refer to a philosophy, not a statistical technique. The meta-analysis method began as a statistical procedure for combining and comparing research findings from different studies focusing on similar phenomena (Nijkamp and Pepping 1997-98), and a variety of meta-analytical methods have been developed in the past decades(Nijkamp 1999).

In some studies, "meta-analysis", "meta-synthesis", "synthesis review", and some other terms, are not distinguished clearly, but there are uses of the technique in various research fields. While some researchers refer to the term "meta-analysis" as the quantitative integration and analysis of the findings from all empirical studies relevant to an issue and amenable to quantitative aggregation (Glass 1976), most treat the terms "literature review", "synthesis review", "synthesis analysis" and "meta-analysis" as equivalent. Also some researchers separate "meta-summary" and "meta-synthesis". For example, in study of Sandolowski and Barroso (2003) in the field of nursing, the qualitative meta-summary is explained as involving the extraction and further abstraction of findings, and the calculation

of manifest frequency effect sizes while meta-synthesis is an interpretive integration of qualitative findings that are themselves interpretive syntheses of data, including the phenomenologies, ethnographies, grounded theories, and other integrated and coherent descriptions or explanations of phenomena, events, or cases that are the hallmarks of qualitative research. (Sandelowski and Barroso 2003).

Here the definition of "meta-analysis" is simply taken as the general term of all the different nominal meta-methods, as "…an analytical framework for comparative research that aims to draw inferences on common issues with different but allied empirical backgrounds" (Matarazzo and Nijkamp 1997).

Meta-analysis has now become a widely accepted research tool, encompassing a range of procedures used in a variety of disciplines, such as medicine, nursing, psychology, labor economics, environmental science, and transportation science (Gaarder 2002; Yu 2002; Greenaway, Milne et al. 2004; Travisi, Florax et al. 2004). The wide employment of meta-analysis is partially because that it is an integration which is more than the sum of parts in that it offers novel interpretations of findings(Sandelowski and Barroso 2003). In the study of Sandolowski and Barroso(2003), they found that this kind of interpretations will not be found in any single report, but rather are inferences derived from taking all of the reports in a sample as a whole. Their validity does not reside in replication logic, but rather in inclusive logic whereby all findings are accommodated and in the craftsmanship exhibited in the final product(Sandelowski and Barroso 2003).

Under the Meta-analysis framework, appropriate methods can be selected according to different research questions. Commonly used methods include the counting method, classical Meta-analysis method, Meta-analysis on effectiveness, homogeneity testing and other methods.

1. Vote-counting

This approach is similar to the narrative review, which divides the results of previous researches into three groups of significant positive results, significant negative results, and non-significant results. The result of the group with most literature number then represents the entire field of study. This method is relatively simple to determine the general trend of a large number of case studies. However, this is an inaccurate statistics which relies on the statistical significance. Also each individual study is limited by the collection of samples, so the final results of vote-counting do not necessarily reflect the true situation.

2. Classic or Glassian Meta-analysis

This approach evolves from the early Glass Meta-analysis. It defines research questions first, then collects case studies, followed by encoding the outputs of each features, and finally analyzes the relationship between the output values and the study characteristics. This method of Meta-analysis and its subsequent improved methods have three common characteristics: First, the selection criteria of literature is liberal, generally based on the research needs. Second, the units of analysis are the results of each single studies, and through selecting the appropriate sample size (ie, the number of literature), the comparative analysis is taken. Third, Meta-analysis methods usually weaken the characteristics of each individual study, and present the overall average characteristics instead.

Practice has proved that the classic Meta-analysis in many areas has good applicability, and is considered as "research on research" (Greenaway, Milne et al. 2004). However, this classical method has some weaknesses. The most obvious one is that because this method averages all case studies, and the differences between the various studies are ignored. Therefore the reliability of the analysis results is very susceptible to those flawed researches. In addition, if a single case study has a large sample size, it is possible that the weight given to this study is relatively large, which affects the results of the analysis.

3.   Study effect meta-analysis

This method of Meta-analysis improves the classical methods on two aspects. First, the literature becomes more selective, excluding case studies which have defects in the methods and probably mislead the analysis results. Second, the method takes each individual study as the unit of analysis, rather than the results of each individual study. Thus, in essence, each individual research is given the same weight, and the results of the Meta-analysis will not be affected by sample size. However, this method will directly reduce the amount of data involved in the analysis, also the subjectivity of the researchers possibly affects the research.

4.   Tests of homogeneity

The idea of homogeneity testing originated from pattern recognition. Some scholars believe that the traditional statistical test method is not suitable for Meta-analysis. The effective sample size is affected by many factors: the reliability of measurement, sampling limits, reporting errors of data processing, unreported factors, etc. Homogeneity test can effectively distinguish the nuances in different samples. If the homogeneity test is significant for a group of researches, it can be deduced that this group of researches belongs to one category. With this method, people can classified the collected large number of empirical studies, figuring out the similar characteristics of each category.

A variety of Meta-analysis methods has long been used in research field of laboratory medicine, clinical medicine and behavioral science. There are also applications in experimental or quasi-experimental studies in the economic environment (Travisi, Florax et al. 2004). For example, a New Zealand government-funded research built a framework for future implementation of very effective guidelines drawn from the Meta-analysis of 10 government aided community projects (Greenaway, Milne et al. 2004). In recent years, Meta-analysis methods began to be used in the environment and climate change related researches.

3. A meta-analysis framework for exploring the driving causes to vulnerability for coastal hazards

3.1 Process of meta-analysis

Meta-analysis involves a critical examination of multiple accounts of phenomena to review similarities and differences among them (Nijkamp and Pepping 1997-98). The purpose of meta-analysis is to combine findings from separate but largely similar studies. According to some researchers, such studies may be suitable for the application of a variety of analysis techniques (common literature review, formal statistical approaches, etc.) for combining, comparing, selecting or seeking out common elements, relevant results, cumulative properties etc. from a broad set of individual cases (Matarazzo and Nijkamp 1997).

Generally, Meta-analysis methods include constant comparison, taxonomic analysis, the reciprocal translation of in vivo concepts, and the use of imported concepts to frame data(Sandelowski and Barroso 2003).

The mata-analysis requires the establishment of an analytic strategy and coding system to categorize data and to interpret findings in relation to predefined research questions. According to Glasmeier and Farrigan (2005) the synthesis process on qualitative research comprises seven steps:

1. Formulation of the research questions;
2. Selection and appraisal of primary research (development of a literature search strategy);
3. Analysis and synthesis of the theories (meta-theory);
4. Identification of an analytic strategy (meta-analysis)；
5. Analysis of the methods in collected cases (meta-method)；
6. Synthesis of the outputs of the above processes (meta-synthesis);
7. Presentation and dissemination of the findings.

The process of meta-analysis is not a linear process. 3), 4) and 5) are parallel steps that focus on different aspects of theories, contents and methodologies. Also, the various steps overlap and are circular. The development of the coding system continues throughout all stages, in order to substantiate the process and make sure that all important information is included. In this way, the coding system can be modified, revised and supplemented according to the concrete cases.

Also Matarazzo and Nijkamp (1997) present the meta-study as six different "levels", each of which assumes a particular importance from a methodological point of vview. The levels are named real-world level, study level, pre-meta-analysis level, study selection level, meta-analysis level and implementation level(Matarazzo and Nijkamp 1997).

Combining the different steps and the levels together, meta-analysis is essentially a kind of "mining" or "emerging" of integrated findings. An integrated map of undertaking meta-analysis steps is shown in figure 1.
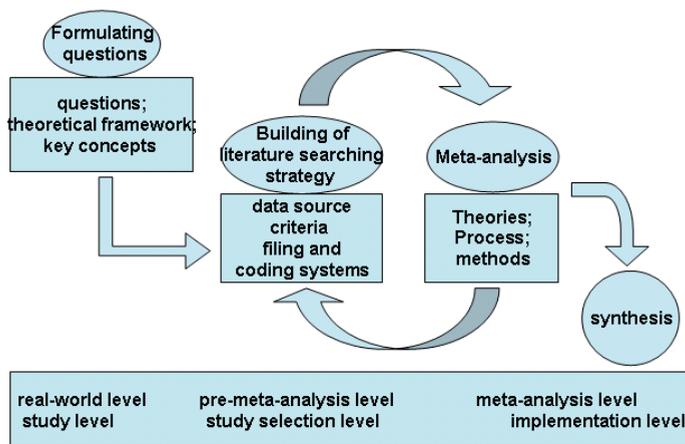

Fig. 1. The levels and corresponding steps of a meta-analysis

3.2 Undertaking meta-analysis: Case in research of vulnerability to coastal hazards

Although the meta-analysis has developed remarkably, there are however few uses of this methodology in the field of natural hazard research. Harremoes, Gee et al. (2001) studied 14 "man-made" disaster cases and investigated the reasons behind ineffective early warnings. The study demonstrated that in most cases information warning of the potential harm was available at an early stage, but that due to the complexity of the situation, lack of awareness, and the politically high stakes of the decision-making process, many warnings were not implemented effectively or not implemented at all. Other typical researches in environment-related and vulnerability researches are those from Geist and Lambin (2004) on the desertification in tropical areas and from Misselhorn (2005) on the vulnerability to food security in Africa (Geist and Lambin 2004; Misselhorn 2005).

Here in this study, the meta-analysis is practicalized in 6 steps: 1) formulating the research questions, 2) choosing an appropriate conceptual framework, 3) developing a literature search strategy, 4) collecting case studies, 5) coding information from individual case studies, 5) formulating and describing the object under investigation, and 6) synthesizing the data collected from individual case studies.

3.2.1 Formulating research questions

In order to conduct a meta-analysis it is necessary to define a clear outcome of vulnerability as a basis of the analysis and to narrow down the large volume of research that has been undertaken in this area to-date. In this study, the research questions are:

1. What are the key factors contributing to vulnerability? And
2. What is the current status of research in the vulnerability field?

3.2.2 Choosing conceptual framework

In some sense, the choice of the conceptual framework is the most important phase beside the formulating of research problems. Choosing which framework indicates the connotations, scales, and philosophy of the concepts and relative terms and definitions. Therefore, the conceptual framework in this analysis should reflect the complex interactions in the coupled social environmental vulnerability system.

Additionally, the choice of conceptual framework impacts the following process of meta-analysis. Though the causes to vulnerability exist no matter what methodology is chosen, the organization and categorization of the information would be different. Further, the presentation of the analysis results would be different.

The Turner et al. (2003) framework takes the concerned coupled social environmental system in which vulnerability resides as the core system, with consideration of functions from broader social and biophysical conditions' interactions. With the three elements of exposure, sensitivity and resilience, this framework presents the complexity and the multi-scale characteristics in the system(Turner, Kasperson et al. 2003).

3.2.3 Searching and selecting literatures

In this study, peer-reviewed scientific articles including place-based vulnerability case studies and theoretical and conceptual discussion papers are included. The literature search was undertaken in two steps:

1. Scoping of the literature: A set of search filters (combinations of search terms) is set up to identify articles relevant to the objectives of the review and undertook scoping searches including searches for existing reviews and primary studies relevant to the objectives of the review.
2. Review of questions: The goal of reviewing questions was to determine the true topical similarity of studies. This entailed the comparison of studies on broad surface parameters, including stated research purposes, research questions asked, and the outputs produced (Sandelowski, Docherty et al. 1997).

In order to minimise the likelihood of excluding important information or views (Sherwood 1999), a thorough and comprehensive literature search was undertaken. This required an appropriate and efficient search strategy. In this study we chose to limit our search to coastal hazards defined by Adger, Hughes et al. (2005): coastal floods (storm surges), tsunamis, tidal waves, hurricanes and marine-related infectious diseases (Adger, Hughes et al. 2005). Geographically, we limited our search to eight East and Southeast Asia countries: Laos, Malaysia, Philippines, Thailand and Vietnam, Bangladesh, India, and Indonesia.

Considering the availability and authenticity, the following electronic databases were used as mining places: JSTOR (www.jstor.org), Sciencedirect (www.sciencedirect.com), Springerlink (www.springerlink.com), Synergy (www.blackwell-synergy.com), Google (http://scholar.google.com), and Emerald (www.emeraldinsight.com).

For those databases that allowed searches in several languages, the search was limited to documents in English. The time period searched was from 1970 to March 2006. The key words are grouped in three kinds: type of hazards, region and aspects of hazards vulnerability. Through combining the key words, the searching strategy is set up as shown in Table 1.

The collected literatures are sifted further to insure all the articles are related to the aims of this study. Firstly the articles are browsed by titles, but the relevance of a qualitative study is often not clear from its title alone. Second round of sifting is on abstracts. But as (Evans 2002) has noted, the abstracts of qualitative studies vary considerable in the contents, and some are without addressing the research methods used. If a study could not be determined whether should be included in the meta-analysis, a full text reading is required as the last way.

3.2.4 Coding the information

After getting the collection of sifted literature, the papers are read fully one by one, to abstract the needed information. In order to avoid limiting the approach or excluding relevant literature, we do not apply a pre-defined coding system as in other meta-analysis research, but develop a new system which is flexible enough to be updated throughout the process as new information becomes available.

The coding needs to be done in a way that allows both quantitative and qualitative analysis of the information recorded. Quantitative analysis includes statistical analysis on the numbers and frequencies of certain kinds of information, such as how many times a particular cause of vulnerability is mentioned or how many case studies were conducted in a particular country. Qualitative analysis is aimed at gaining an improved understanding of

the key causes of vulnerability, their complex interactions, and key lessons for vulnerability reduction.

steps	keywords	notes
1	Coastal disasters	Type I: Type of hazard
2	Coastal Floods	
3	Hurricanes	
4	Tsunamis	
5	Storm surges	
6	Tidal waves	
7	Marine-related infectious diseases	
8	Combinations of 1-7	
9	South-east Asia	Type II: Region
10	South Asia	
11	East Asia	
12	Asia	
13	Islands	
14	Any of the countries' name	
15	Loss of life	Type 3: Aspects of hazard vulnerability
16	Deaths (death rate)	
17	Mortality (mortality rate)	
18	diseases	
19	health	
20	social	
21	impacts	
22	Vulnerability (vulnerable)	
23	Causes	
24	Consequences	
25	development	
26	23+15(or 16 or 17)	
27	23+18	
28	23+22	
29	20+21	
30	20+22	
31	20+24	
32	20+25	

Table 1. Searching strategy for literatures in meta-analysis of vulnerability to coastal hazards

In this study a synchronous way of coding is set up. At the very beginning there are only some basic questions in the coding system. Along with the progress of review, more and more information would be found in the literatures. These "newly" found information will be formatted into a question and added into the coding system and form a new cause to the vulnerability according to some regulation (for example the key words drawing scheme). After going through all the literature, there will be a long but unstructured list of causes and

other information. This information and their interrelationships (for example the cause-effect relations) will be categorized and structured according to the philosophy of the conceptual framework.

There are 7 sections designed in the coding system: basic information, type of scale of assessment, methodology and data, definition of vulnerability, causes of vulnerability, vulnerability indicators, and recommendations for policy and management. The basic information section is about the literatures themselves, such as the article title, authors' name and disciplines. The causes of vulnerability and recommendations for policy and management sections are the main two sections, in which the list of causes and the recommendations in different scales and levels will be set up. And further analysis on the interactions will also be set up on the basis of these two sections. Other sections are aimed to detect the current situation of vulnerability community itself. Additionally, since the scientific inquiry should remain logical and straightforward(Rosenthal and DiMatteo 2001), and to make the analyzing easier and more accurately, the questions are standardized designed as yes-or-no questions. Then in the later analysis, the statistics of various information will be simplified into vote counting.

4. Results from a case: Driving causes to vulnerability to coastal hazards in Southeast Asia

The literature search results in a total of 128 eligible papers. Of these, 120 are scientific articles published in academic journals and 8 are journal editorials or communications. This body of literature is statistically analysed to reveal information on the types of study undertaken, the spatial scale of analysis, country or regional focus, hazard types, disaster management phase, conceptual approach, and research methodology.

In the analyzing process, vote counting, qualitative analysis and statistical methods are employed. The selected documents are characterized in terms of the disciplinary and geographical affiliations of the authors, their epistemological approaches and methodologies, and the focus of their work within the disaster risk reduction cycle. In 128 selected articles, a total of 336 vulnerability factors and 227 recommendations are identified and analyzed.

Some of the main findings about the vulnerability are as below:

- Population dynamics, development, cooperation and power relations, and institutional organization and culture are the most important driving causes to vulnerability in the study area.
- Increase hazard awareness and knowledge, improve early warning systems and evacuation procedures, improve communication and cooperation, and strengthen environmental protection and post-disaster rehabilitation are the most popular recommendations to decrease the vulnerability.
- Limited understanding of vulnerability patterns, recommendations ignoring the most important underlying causes of vulnerability, lack of conceptual frameworks in guiding vulnerability case study analysis, and gaps between assessment, policy and practice are the main insufficiencies in existing researches.

Also there are several key findings arising from this synthesis on the research communities:

- There is a clear gap between conceptual and theoretical work and empirically based case studies where deployment of or even reference to particular conceptual frameworks are rare.
- Second, partly as a result of the existing gap, there seems no clear pattern or causal structure emerging from the reviewed researches, with all the factors interwoven in a complicated way. Interpretations of how these factors interact to produce social vulnerability to coastal hazards in different environmental, historical, and social contexts are still largely idiosyncratic.
- Third and most importantly, there are mismatches between causal factors of social vulnerability and the recommendations for its reduction and management. With most of the recommendations do not target the underlying factors but rather focusing on short-term relief.

This work highlights the urgent need for a multi-scaled and multi-disciplined research approach that addresses the gaps between field-based case studies, larger-scale vulnerability assessments, conceptual frameworks and theory, and the implications for policy and practice.

5. Conclusions and discussions

The objective of this project lies in two folds: one is to undertake a comprehensive systematic analysis of the scientific literature on coastal hazards to identify the factors contributing to hazard vulnerability, the other is to explore the utility of meta-analysis method in the research of vulnerability. Therefore, based on the eight East and Southeast Asia countries, a meta-analysis methodology is applied, including the development of a system for coding information, statistical characterization, and the synthesis of key findings.

Reviewing the historical routine it could be seen that in mid 1990s to early 2000s, the qualitative meta-analysis got a booming development. In that period, from the very beginning of application in nursing research(Beecher 1955) and psychology research(Glass 1976), these methods have been employed in many research areas. In fact the quantitative meta-analysis also progressed and even developed into a relative complete system with key parameters measuring the quality of analysis. By examining the dynamics that go beyond individual studies, in this meta-analysis we are aiming to extrapolate from lessons learnt (from the case studies and previous works), and to contribute to the body of knowledge about the driving forces and dynamics of the vulnerability to natural hazards. During the process of meta-analysis, technique issues are also addressed.

5.1 Sample size of the collected literature

The decision of how many studies should be included in a meta-analysis is always a hot spot of argument. Some researchers think that the inclusion of all studies, following an exhaustive literature search, could help to prevent the exclusion of important information or views, and thus strengthens the findings because they are generated from a broader base(Sherwood 1999; Jones 2004). On the other hand, some argue that in any kind of qualitative research, overly large sample sizes tended to impede deep analysis and threaten the interpretive validity of findings(Sandelowski, Docherty et al. 1997). Also Paterson et al.

(2001) suggest that working with more than 100 studies may be "overly ambitious", and recommend focusing the research question more tightly(Paterson, Thorne et al. 2001).

The field of Sandelowski's study was health and nursing, in which there were relatively fewer uncertainties and the topics mainly focused on the effectiveness of certain remedies, the environment around the illness and the impacts of some external factors to the therapies. For more complex issues that involve many uncertainties, more studies are required in order to ensure a complete and comprehensive analysis.

Furthermore, if a "purposive sampling or saturation techniques" brought out by Booth (2001) is employed in a meta-analysis(Booth 2001), a criteria would be set up even implicitly. Then a bias in sampling would be inevitable. Although every meta-analysis has some inherent bias by virtue of the inclusion/exclusion criteria and the methods chosen to review the literature(Rosenthal and DiMatteo 2001), in this study the bias is minimized as possible.

Based on the above consideration, for the process of sampling, the method of (Suri 1999) was applied. According to this method, the search for additional literature can be terminated once the stage of data-redundancy is reached where every additional case included in the synthesis is likely to tell the same story rather than provide a new perspective. Preliminary content analysis was used to determine redundancy.

5.2 Criteria of entering meta-analysis

Some researchers argue that the mixing of various literature in meta-analysis can be confusing and obscure the understanding of the facts each single studies trying to tell(Guss 1995). Also meta-analysis is sometimes criticized for mixing good and bad studies together, which is known as "garbage in and garbage out(Hunt 1997)" issue (Rosenthal and DiMatteo 2001).

Although this criticism is mainly from the quantitative research field, same suspicion exists in the qualitative field. For example, in the research of Barroso et al. (2003), when taking a meta-analysis on HIV infection, around 20% are excluded(Barroso, Gollop et al. 2003). In the research of Jones (2004) on pragmatic health service, 132 papers were read in full, but only 17 met the inclusion criteria.

Meta-analysis seeks to identify as many potentially relevant studies as possible that meet the research question for a given review topic. The included studies vary considerably in their objectives, methods, data and findings. Excluding some studies indicates factitious frame that restricts the boundary of researches. But in reality, along with the merging and crossing among disciplines and methodologies, it is impossible to limit the research views, thus unadvisable to set strict criteria. In fact, the criteria of goodness and badness are objective and in some sense context dependent. Different communities of researchers have different criteria of goodness and these criteria change all time. Additionally, it is with large possibility that the criteria will bring along the problem of rising bias in the meta-analysis.

From the view of vulnerability research, because vulnerability is such a complex characteristic of society-economy-nature system, and is impacted by almost all aspects in this system, in part of the studies the vulnerability is expressed implicit and even equivocal, especially in qualitative studies, where the concepts, meanings and expressions are diversely. This is substantiated in the literature searching in this study. In fact among the 128 collected studies,

over 50% are with the expression of "impacts", "losses", "suffering from", or "changes of life", even no these kind of words but only a description of the phenomena. Therefore, this study on the vulnerability to coastal hazards includes as many as possible literatures, and no special criteria set up to exclude or include studies. In the process of full-text reading, the synthesists analyze the literatures and mine the connotative driving factors and their causing relations of vulnerability from all studies. This requires skills in semantic (literal) and idiomatic (meaning) translation of key ideas in studies(Noblit and Hare 1988).

5.3 Weighting factors in synthesis

By virtue of their emphasis on idiographic knowledge, or the complexities and contradictions of particulars, in some sense qualitative studies resist "summing up"(Light and Pillemer 1984). Then developing a technique to compare the findings of each study, along with determining the methodological comparability, or the similarities and differences among studies is the permanent challenge to meta-analysis. Some researchers argue that a "quality weighting" could be set to weight the studies and then to make the comparison of findings(DiMatteo, Morton et al. 1996). But then the problem of "criteria by qualify" would be introduced inevitably.

The meta-analysis of vulnerability in this study meets the same problem. The factors in category "Geography and Environment" possess the highest total number of mentioned times and the highest percentage of times mentioned. But in some of the documents, the geography of the particular case under investigation is presented simply as background information rather than a contributing factor to hazard vulnerability. Then when determine the relative importance of factors only by counting the frequencies, geography and environmental factors would be the most important, which obviously is a misleading conclusion. On the other hand, if the relative importance is determined by other criteria of weight, such as the background of authors, the disciplines, the geographic affiliations, it would plunge in the bias of quality or sampling again.

Also the weighting of factors is related directly to the outputs of meta-analysis. Additionally, how to weight the difference and the similarity between studies is a complex problem which depends on the aims of meta-analysis, methods employed, criteria of selection and even the expectation of outputs.

Meta-analysis is a systematic framework that could be applied in the synthesis and comparison of accumulated studies, no matter literatures or field data. Unlike quantitative meta-analysis, in the qualitative research field the methods employed in meta-analysis is various according to different studies. Currently the main methods used in qualitative meta-analysis are still vote-counting or similar methods (Geist and Lambin 2001; Kevale 2001; Misselhorn 2005). But this is an inexact approach to integrating research, because it depends on the sample size very much. In fact, the wide variety of presentation ways, the artificial lines drawn in research reports among methods, results, discussions and findings are all challenges to the meta-analysis methods. Therefore, progressed approaches are expected in qualitative meta-analysis to match the progressed research framework.

From the view of applied fields, meta-analysis approach has been used for a long time mainly in the field of experimental medicine, clinical pharmacology, and behavioral sciences. Also it has been used in quasi or non-experimental contexts of economic research

and some social science studies (Travisi, Florax et al. 2004). For example, a meta-analysis funded by New Zealand government provided insights into the lessons learnt from 10 very different community action projects funded by a range of government agencies in New Zealand, and The analysis has been used to inform a framework for community action projects, which identifies key developmental practices that will strengthen similar projects (Greenaway, Milne et al. 2004). It has begun to be used in some fields linked to environmental problems or climate change. In the work of Gaarder (2002), a regression analysis is undertaken using the large sample of air pollution mortality studies to date, from both developing and developed countries, to further the understanding of the relationship between suspended particles and mortality(Gaarder 2002).

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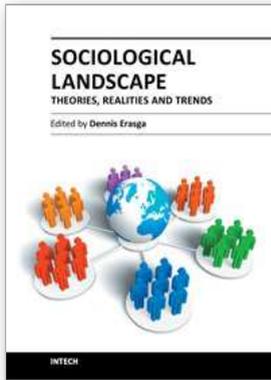
Sociological Landscape - Theories, Realities and Trends
Edited by Dr. Dennis Erasga

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