

**Development of Evaluation Methods for Community-based
Participatory Risk Management – with a focus on Social Earthquake
Resilience.**

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CHAPTER 1 – ORIENTATION

1 Introduction

Recently community-based earthquake disaster management, participatory methods and techniques and procedures are very hot topics in Japanese disaster management practices. After the Kobe Earthquake in 1995 local governments realized that they are not any more able to provide sufficient relief and rescue services to the citizens immediately after such a low-frequency, high impact (catastrophic) disaster. During the recovery process after the Kobe Earthquake various voluntary organizations: NGO/NPOs started their activities (in cooperation with local governments and organizations), and some of the activities have lasted up to now. The purpose of the NPO activities has been gradually shifting towards raising awareness and preparedness of the citizens in order to increase their overall resilience. Many of the workshops that are being organized are participatory events, aiming at active involvement of “communities” in disaster prevention activities. Also the citizens seem to have developed their own attitudes and wish to achieve better preparedness, but sometimes they do not know how to do it. Promoted by both local government and NPO efforts are needed too facilitate expected changes toward better earthquake preparedness among community residents. The essential problem is how to evaluate the effectiveness of the participatory events so that they can be recognized as a tool that really contributes to the increase of the overall community social disaster resilience and to the extent to which the participatory approach contributes to the overall community since hereby social disaster resilience is defined. It is important to focus on quantification of community *social* disaster resilience and the role of participatory management is because there has not been so much work on this topic.

2 Research problem

The aim of this thesis is to describe, evaluate a selected type of community – based participatory earthquake risk management approach, the major focus is placed on the development of evaluation methods especially in terms of earthquake social resilience.

This thesis addresses two different but mutually complementary scopes.

- 1) community-based management (neighborhood scale),
 - 2) overall evaluation of the social system which community (neighborhood) is a part of.
- Three approaches corresponding to three different scopes as mentioned above are proposed (see Table 1.1).

We propose 3 levels of evaluation. First level is very basic (event) and tries to answer the question: How effective are the disaster management workshops where effectiveness is defined by the extent to which the expert's and non-expert's knowledge are being mutually shared by the participants of the event.

The structure of the thesis			
Scope	Method/Approach	Purpose	Policy issues addressed
1)	i) Modified Mental Models Approach	Designing the approach and evaluating the participatory event	Rising public awareness against earthquake risk
2)	ii) Fairness and Competence model of evaluation participatory processes revised	Evaluation of 'Fairness and Competence' approach against the criteria of perceived satisfaction from the workshops	Participatory democracy for enhancing preparedness and social resilience against earthquake
3)	iii) Modeling of Social Resilience (Structural Equation Modeling)	Assessment of the factors facilitating social resilience to the earthquakes and assessing the role of 'community participation' in it	Community participatory management as a part of wider social governance system

Table. 1.1

The second level (process) takes under examination 'Fairness and Competence' approach for the evaluation of the community participatory processes. On this level we will try to answer the question whether the way of organization of participatory events in Japan is 'Fair and Competent' and whether it is effective in terms of perceived satisfaction from the process. At this level we also examine the role of social context in planning an effective participatory process.

In the third level of our analysis we look on community participation as one among many tools and factors that contributes (or not) to overall social community resilience. This level's analysis will answer the question: What are the most important factors influencing the overall social community resilience to earthquake disasters and what is the role of community participation among them?

3 Research methodology

In chapter 3 the modified Mental Model Approach (Morgan et al 2002) is employed to assess the impact of the workshops on participant's views regarding the household earthquake preparedness, especially house reinforcement techniques. The MMA was initially designed for the purpose of risk communication. Since the risk communicates are sometimes complicated and misunderstood MMA was aiming in the development of the Mental Model representations of the risk communicates of experts-communicators, as well as laymen-receivers in order to adjust the laymen views to experts expertise. The modification that makes our approach different is that it allows not only experts to influence the laymen but also creates possibility for the laymen to influence the expert's views.

The second approach is to examine whether the 'Fairness and Competence' framework for evaluation of participatory processes could be applicable in Japan. For this purpose we have developed the questionnaire consisting of scales representing the concepts of 'Fairness and Competence' and others (Scope of Deliberation, Sense of Community etc.) and checked whether they correlate significantly (or not) positively or negatively with the criteria of perceived satisfaction from the workshops. For this we have used the Kendall's Tau-b correlation technique.

In the third approach we used Structural Equation Modeling (SEM) approach to determine the direction and strength of the relationship between the participation and other factors and the indicator of social resilience (Paton 2006). To meet requirements of Japanese social organization we have developed two additional scales in the Paton's model. Collective Action Coping with regard to communities of place and Collective Action Coping with regard to communities of interest. Both of the scales scored very well on Cronbach's Alpha test.

5 Structure of the thesis

This thesis consists of 5 chapters. The first chapter introduces the background, research problem, methods employed to solve the research problem and the structure of the thesis. Chapter 2 is devoted to literature review on participatory management and resilience. It discusses the purposes of using participatory management approach, provides adequate definitions and key concepts. It describes also the history of participation, methods to evaluate the participation and some case studies already performed by other authors. At the end of the chapter it discusses participatory processes in Japan and also in the context of disaster management.

Chapter 3 is called A Mental Model Approach-based procedure for the evaluation of the impact of the workshops on participant's views. This chapter discusses the methodological issues on evaluation of events, workshops etc. It proposes a modification of the Mental Models Approach employed for the purpose of evaluation of participatory events. The approach is tested empirically and proved to serve well in the process of mapping and measuring the participant's views for the purpose of evaluation of workshop's effectiveness.

Chapter 4 examines the 'Fairness and Competence' in the context of Japanese society with a special reference to the social context (Jishubo organization) as an important factor in organizing the participatory processes. It will be shown that that 'Fairness and Competence' approach have its value but also its limitations particularly in the sense of being universal. In this chapter it will be shown that other variables are valued higher than 'Fairness' and that even softly – motivated people (those who were not willing to take a part in the process but were made to join) can benefit from the participatory process in terms of perceived satisfaction, knowledge and practical use of knowledge.

Chapter 5 is devoted to the discussion of the role of the participatory management as one among many possible factors contributing to community social resilience to earthquakes.

Chapter 6 concludes entire thesis summarizing following major outcomes of this thesis: the comprehensive approach has been proposed to evaluate community based participatory earthquake risk management approach; the major focus is placed on the development of evaluation methods especially in terms of earthquake social resilience. Another emphasis was on quantification of social resilience to earthquake disasters. The future research should focus on integration of the social resilience model with other models (economical, infrastructural) to create the really integrated approach for the earthquake resilience.

CHAPTER 2 – LITERATURE REVIEW.

1 Introduction

This literature review aims at examining thoughts and concepts of public participation in the context of environmental and disaster management. This chapter also introduces the theory of resilience focusing especially on quantifying social resilience. On the beginning answer the question: why should consider public participation as a necessary vehicle of environmental decision making? will be provided. Then we will discuss the definitions of what we understand by public, participation, stakeholders, deliberation etc. Next subchapter will be devoted to brief history of citizen's involvement in public decision-making. Some of the methods – techniques of involving the public into the decision-making process will be the subject of the subchapter 5. We will discuss such techniques like opinion polls, opinion polls, in-depth interviews, focus group interviews, citizen's juries, consensus conferences, Charrette, and structured value referenda. In the subchapter 6 I will discuss different approaches to evaluation of participation as "Fairness and Competence", Evaluation using Social Goals and others. I will also make a comment on the evaluation of participation. Next step will be to describe the implementation of participatory management on the case study that took place in Germany. "Hard to reach groups" will be the topic of the next section after which I will describe the Seveso directive case study as a trigger thanks to which the participatory mechanisms were established is legal norms in European Union. Next, I will try to give a picture of recent participatory processes in Japan. At the end of the chapter I will introduce the concept of resilience, its definitions and ways of measurement of social resilience.

2 Why Participation?

Dienel and Renn (Dienel, Renn 1995) mentioned that knowledge is usually a key variable in coping with many problems but what makes present situation paradoxical is that in most problems even if we have better knowledge the problems continue to exist. It means that there are other factors causing this situation. Dienel and Renn state that the difficulty with these problems is that they defy any mono-casual scheme of explanation. All these problems are caused by many factors, but they have one characteristic in common: they demonstrate the inability of present administrative and governing systems to cope with pressing challenges. They, the administrative and governing systems, are reactive but they do not anticipate (Renn, Dienel, 1995). The participatory techniques and mechanisms are seen as the ones that enable the

indigenous knowledge to influence the governance thus becoming more tailored to the needs of policy recipients.

3 Definitions

In this section I will define such terms as participation, public, stakeholders and deliberative process. The definition of 'participation' is derived from the work of Arnstein (1969), the definitions of public, stakeholders and deliberative process, are taken from the work of Petts and Leach (2000).

3.1 Participation

Looking for the definition of "public participation" we can't not to refer to the old, but crucial paper of Arnstein (1969). Arnstein defines citizen participation as:

"the redistribution of power that enables the havenot citizens, presently excluded from the political and economic processes, to be deliberately included in the future".

According to this definition participation people who "have a stake" in the issue but have not a power to influence the issue, should be given a legal opportunity to influence and take an active part in the decision – making process related to the issue at the stake.

The degree of this civic involvement is shown as the eight rungs of citizen participation:

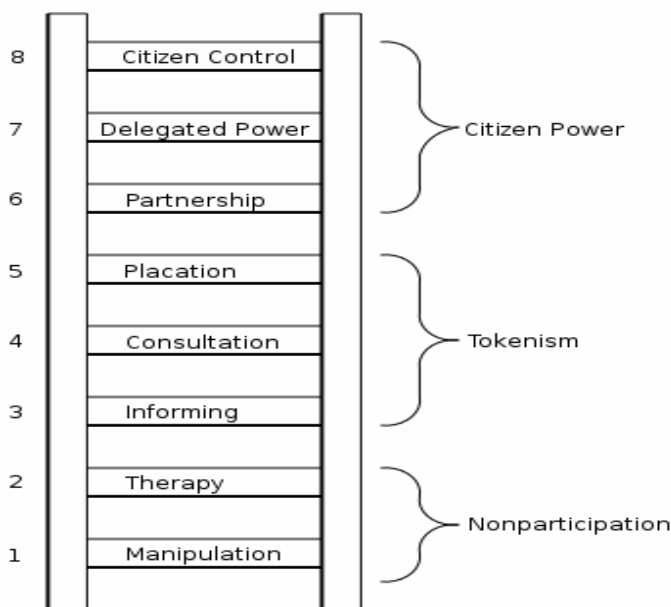


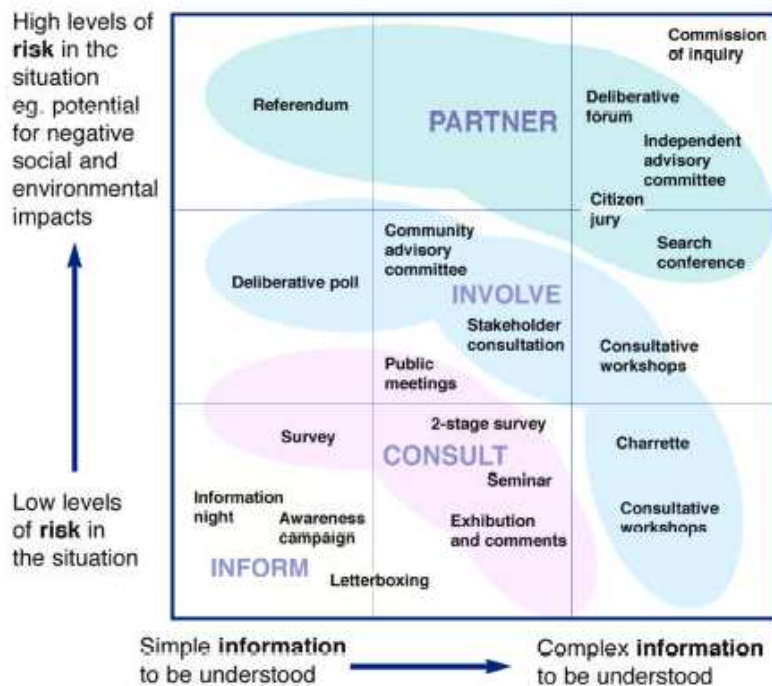
Figure 2.1. A Ladder of citizen participation (Arnstein 1969)

The idea standing behind the model of ladder of citizen participation is very simple and reflects the different stages of (non)engagement from Nonparticipation to Full participation. This model became basic (implicit or explicit) reference in many latter works on participatory management, risk communication (Beierle 1998, Chess 2001, Fishhoff 1995 and others).

The first two bottom rungs, “Manipulation” and “Therapy”, indicate the “Nonparticipation”. “Manipulation” is when power holders keep citizens out of planning processes. “Therapy” reflects the situation when power holders, “experts” or other specialists try to “educate” and/or “cure” the citizens or participants.

The next 3 levels represent: “Tokenism” that allow to have a voice (Informing and Consultation). Participants have the right to be heard and they can hear but they do not have power of influencing decision making process. The “Placation” is just the highest level of “Tokenism”.

The highest 3 levels of citizen participation ladder consist of level with the characteristic feature of increasing degree of influence of participants/citizens on the decision-making process itself and its results. In Arnstein’s words, “Partnership” enables public to negotiate the trade-offs with power holders, “Delegated Power” and “Citizen Control” have-not citizens obtain a majority of decision making sits or full control.



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Figure 2.2 Community involvement matrix Les Robinson (2002) p. 4

The Arnstein's model of citizens ladder of involvement has been combined with the particular techniques (described later in the section 4) of participation on account of the level of risk and the complexity of information to be understood - Figure 2.2 Robinson emphasizes that the more complex information to understand and the higher level of risk the method to be chosen for relevant risk communication should be more deliberative and should give more power to the citizen involved.

2.3.2 Public

Usually when we think about "public", we mean a homogenous entity as Petts and Leach mention (Petts, J. Leach B. (2000)) – "an object or audience which in being so large encourages focusing upon definable or specialist interests. Minorities (social, ethnic etc) can either be ignored or the assumption made that their views will be adequately represented by others. A clear understanding of who "the public" are and their interests is essential not only to recognition of the benefits of participation but to the design of specific activities (Petts, 1999)." After Petts, J. Leach B. (2000) p.2

Therefore in planning any of participatory events or processes, it is essential to remember that even so called 'public' may consist of different groups of individuals having different goals and interests.

2.3.3 Stakeholders

The so popular term 'stakeholder' means: some groups with a stake or an interest on an issue, as companies, NGO's - NPO's, government, citizens organizations as well as individuals. Petts, J. Leach B. (2000)

2.3.4 Deliberative Process

Deliberative processes take relevant groups of stakeholders into debate in order to represent relevant points of views and interests in order to build consensus between the parties regarding the issues in the stake. Petts and Leach defines the deliberative processes as those that: engage relevant interests in debate, discussion and negotiation and are presented as needing to be integrated with assessment methods. (Petts, J. Leach B. 2000)

2.4 A Short History of Public Participation

One might claim that history of public participation is as long as the history of humanity. As Glenn (1994) states, "One might argue that explorations of the future through public

participation began three million years ago in Africa as groups of humans clustered together gazing at the evening sky while contemplating their fate. These group meetings have evolved into the "palavers" common in much of Africa today." Of course broad recognition of what we call "public involvement" or "public participation" tracks back about 60 years ago where the Universal Declaration of Human Rights in 1948 provided the opportunity to access the information:

Article 19.

Everyone has the right to freedom of opinion and expression; this right includes freedom to hold opinions without interference and to seek, receive and impart information and ideas through any media and regardless of frontiers.

As well as the right to associate:

Article 20.

(1) Everyone has the right to freedom of peaceful assembly and association.

(2) No one may be compelled to belong to an association.

It is worthy to mention that, there were several acts preceding the Declaration of Human Rights. The first global treaty includes strong provisions for public access to information and participation was International Boundary Waters Treaty in 1909, (Ewing 2003).

In the U.S. and in much of the Western countries the increase of participation movements took place in the 60'ies and 70'ties . According to The Freedom of Information Act from 1966 people could get access to data held by the governmental agencies (Ewing 2003). By the virtue of NEPA - National Environmental Policy Act, 1969 among various environmental measures it required public review regarding the Environmental Impact Statements. The next step was United National Conference on the Human Environment - Stockholm Conference, 1972 where for the first time in the history non-profit organizations took active part in the event. Among many impacts of this meeting: within four years 31 major laws were passed in the OECD countries (Ewing 2003). The next big event was United Nations Conference on Environment and Development in Rio De Janeiro. The two outputs of this meeting are:

Agenda 21 – This promotes sustainable development. It also emphasizes the importance of straightening the role of non-governmental organizations, groups and individuals in the process of environmental deliberation (Ewing 2003).

Principle 10:

"Environmental issues are best handled with the participation of all concerned citizens, at the relevant level. At the national level, each individual shall have appropriate access to information concerning the environment that is held by public authorities, including information on hazardous materials and activities in their communities, and the opportunity to participate in decision-making processes. States shall facilitate and encourage public awareness and participation by making information widely available. Effective access to judicial and administrative proceedings, including redress and remedy, shall be provided".

The Aarhus convention was signed in 1998 by the European Community and ratified in 2001. The Aarhus convention is based on 3 pillars included in P. 10. and Agenda 21. These are access to information; public participation in decision-making as well as the access to justice which were consequently implemented under European environmental law (Ewing 2003).

2.5 Techniques of Public Involvement

In this section I will describe some of the various techniques' used in public participation practices. It is necessary to mention that there are a lots of participatory and not all of them are listed and described in this report. Those which are described are following:

Opinion polls, In-depth interviews, Focus group interviews, Citizen's juries, Consensus conferences, Charrette, Structured Value Referenda

Opinion polls

Opinion polls surveys ask specified questions to the specific sample or quota of the public in order to provide objective statistics of public opinion. Having large samples we can actually compare the differences in attitudes and perceptions with relation to specific phenomena researched. The representativeness of the samples allows drawing conclusions on whole population. Opinion polls are very useful to provide information to the questions like: "how many...", "how often". Opinion polls are not very insightful when we need to know qualitative issues and "understand the complexity and nuances of attitudes.

In-depth interviews

In-depth interviews, known also as open-ended interviews, provide answers to the qualitative question: "why?". There are at least three types of in-depth interviews. Informal conversational interview or non-structured interview; Semi-structured interview; and Structured interview (Patton, M. Q. 1987).

Informal conversational interview is used in case our knowledge about the phenomena under the study is very poor. That is why we do not have any fixed set of questions. It relies on spontaneous generation of questions in the flow of as much as possible natural interaction.

In Semi-structured interviews we use fixed set of questions but the order of asking questions and wording is not fixed and depends on the flow of the interview.

In Structured interviewing the questions are fixed in terms of the wording as well as ordering. (Mayntz, Holm, Hübner, 1985).

Focus Group Interviews

Kreuger defines a focus group interviews as a "carefully planned discussion designed to obtain perceptions in a defined area of interest in a permissive, non-threatening environment" (Krueger 1988, p.18).

Focus groups are one – time or few-times group interviews on specified topic. They involve 8-12 individuals that represent broad range of society according to some specified criteria. In other words focus group interviews are structured forms of group interviewing aiming in encouraging the interactions and discussion among the participants in order to obtain in depth information on a particular topic.

Focus group interviews are used in many fields of social research and also in disaster management studies (Wachtendorf, Tricia, Riad, Jasmin K., Tierney, Kathleen J. 2000)

Citizen's juries

Citizen's juries are also known as "planning cells" in Germany. They usually involve 10 - 25 people as value consultants. They are selected randomly in order to represent all strata of the society. The meetings of planning sells usually take few days during which participants are given several information about the issue from the different sources in order to deliberate the policy options and finally to reach the decision. Often the participants are paid as value consultants. Citizen's juries bring legitimacy and control to non-elected public bodies. The weakness of Citizen's juries is that they have no formal decision-making power. (Renn, O. Webler, T. Rakel, H. Dienes, P. Johnson, B. 1993)

Consensus conferences

Consensus conferences are meetings where group of citizens meets and discuss certain issues. The Consensus conferences consist of two stages. First stage consists of small meetings with experts, discussion and conclusions toward achieving consensus. The second stage is a big conference during which the conclusions and observations are being presented to the general public. (Rowe, G. and Frewer, L.J. 2000).

Charrette

Charrette is the process designed to bring people from different segments of society into consensus within a short period of time. Before actual Charrette starts, the issue is being broken into its component parts. Those parts are given to the groups which are reporting the results from the discussion to the whole. The feedback given from the whole to small is given. This process continues until the consensus is reached or the deadline for the report to whomever is coming. (Glenn 1994)

CHARRETTE

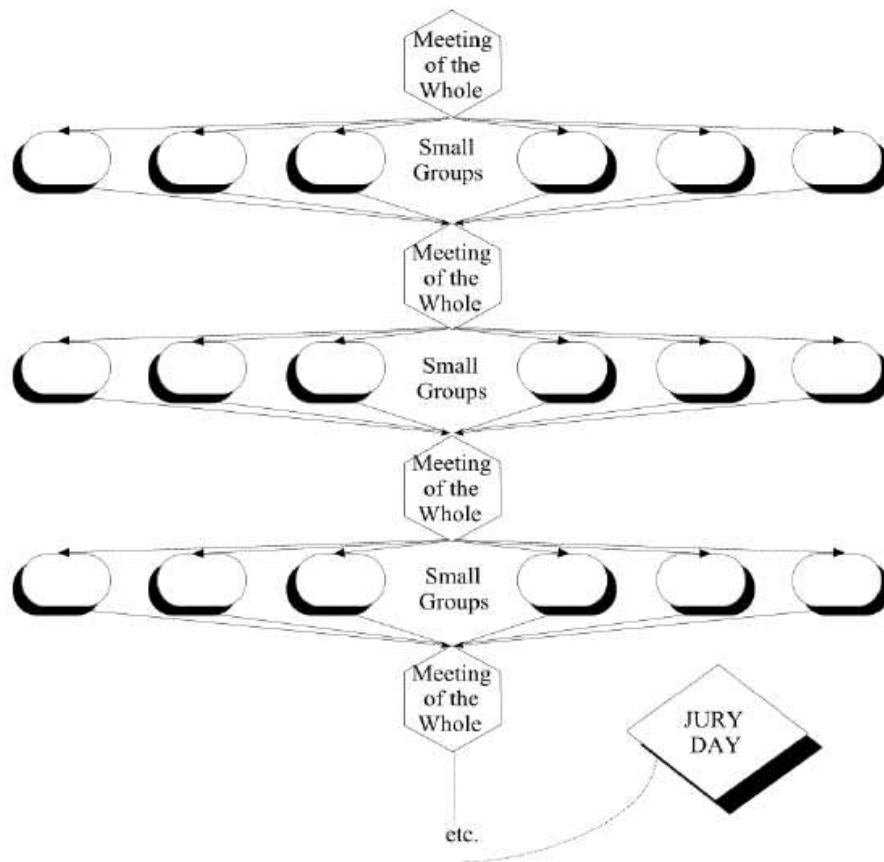


Figure 2.3 Charrette after Glenn (1994)

Structured Value Referenda

This approach is based on method of eliciting and structuring public preferences. It starts from asking public about preferences and after using decision analysis theory and principles the voters select among specified alternatives. (McDaniels 1996, 1999)

2.6. Approaches to the Evaluation of Participation

At this point we will review the present approaches to the evaluation of participatory processes. First we will review the approach based in “Fairness and Competence” by Renn, O., Webler, T., & P. Wiedemann (1995). Then we will examine the evaluation procedure using social goals proposed by Thomas C. Beierle (Beierle, Thomas C. 1998).

Next we will discuss the study by Webler, T. and Tuler, S. (2001) on what constitutes the good policy process in the eyes of the participants of the process.

2.6.1 Fairness and Competence

In their book: *"Fairness and Competence in citizen participation: Evaluating models for environmental discourse"*, Renn, Webler and Wiedemann proposed a "Fairness and Competence" framework for evaluation of participatory processes, by building on Jürgen Habermas theory of communicative action (Habermas 1984, 1987). The question asked by the authors is the following: since different parties having different, often opposite interests, are engaged in the process, the evaluation criteria should be set up according "to whom?", or to which group? Because of that we should not expect any desirable *outcome*, because the outcome is always an outcome according to somebody. The *outcome* is not important but the process itself should be "fair and competent" where *fairness* means that everyone who is affected by the decision should have an equal chance to take part in, and have influence on the decision making procedure's *outcomes* (Webler 1995). And *competence* is a *construction of the most valid understandings and agreements possible given what is reasonably knowable at the time*, (Webler, 1995 p.58). *Competence* means that everyone who is taking part in the process is able to understand all the issues related to the process. In other words, if the process is fair and competent, the outcomes will be fair and competent as well. This provides qualitative frameworks for evaluating whether given methods/mechanisms of participation are found less fair and competent. This approach is an example of process oriented approach.

2.6.2 Evaluation of Participation Using Social Goals

Another approach for evaluation of public participation was the one proposed by Thomas C. Beierle (Beierle, 1998), who emphasized the importance of the outcomes of the process. Beierle argues that every participatory process should achieve six societal goals:

1. Educating and informing the public
2. Incorporating public values into decision-making
3. Improving the substantive quality of decisions
4. Increasing trust in institutions
5. Reducing conflict
6. Achieving cost-effectiveness.

Beierle has also classified the different participatory mechanisms/techniques in accordance to the four following criteria:

- information flows the degree of interaction among potentially opposing interests (Fig. 2.4 after Beierle 1998)

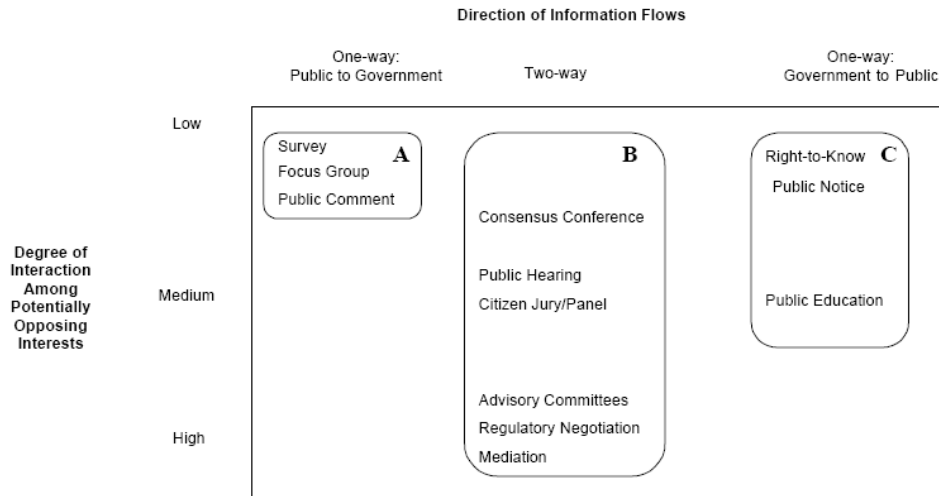


Fig. 2.4 (after Beierle 1998)

- the type of representation, and
- the decision making role of the public (Fig. 5 after Beierle 1998)

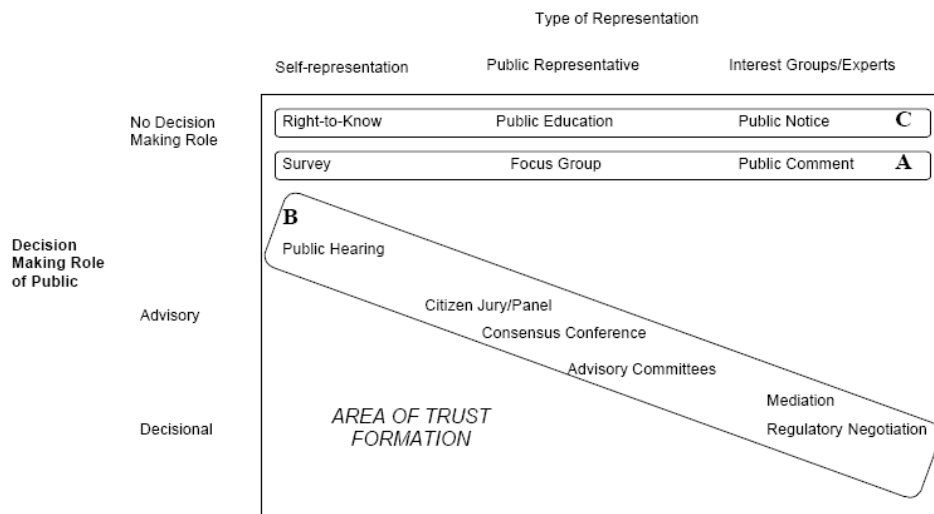


Fig. 5 (after Beierle 1998)

The idea standing behind this classification is that certain mechanisms support achieving certain number of social goals. For example:

Information flows: the mechanisms which provides information about the public to the government "Group A" will be useful mainly for providing decision-makers with public values, assumptions, and preferences (Goal 2) and substantive information to improve decisions (Goal 3) the mechanism which provides information from the government to the public "Group C" will be mainly useful for increasing public knowledge (Goal 1) and, to the extent that it increases transparency, trust in institutions (Goal 4). The mechanism which allows for two-way flows "Group B" is expected to achieve all of these first four goals.

Interaction among potentially opposing interests: the greater the degree of interaction among potentially opposing interests, the greater will be the opportunity for reducing conflict among stakeholders (Goal 5). This applies mainly to mechanisms for Group B.

The type of representation: All else equal, mechanisms in which the public represents itself (through direct participation) will be better at achieving the goals of education (Goal 1) and trust formation (Goal 4) than those where the general public is represented by "representative" members or professionals (such as lobbyists, etc.).

The decision making role of the public: All else equal, the mechanism which provides the public, a direct decision-making role will be better at achieving the goal of trust formation (Goal 4) than otherwise. This applies mainly to the mechanism for Group B. (Beierle 1998) Table 2.1 below shows how different goals may be achieved by using different mechanisms/techniques available to us. In summary Beierle's approach emphasizes the importance of the evaluation of to what extent certain public participation mechanisms are capable or not capable to achieve six societal goals which Beierle thinks essential.

Mechanisms	Goal 1		Goal 2	Goal 3	Goal 4	Goal 5	Goal 6
	education	information	public values	substantive quality	trust	reduced conflict	cost-effectiveness
Non-Deliberative Mechanisms for Obtaining Information From the Public							
Survey	○	○	●	●	○	○	●
Focus group	○	○	●	●	○	○	●
N & C Rulemaking	○	○	●	●	○	○	●
Non-deliberative Mechanisms for Providing Information to the Public							
Information provision	▶	●	○	○	●	○	●
Public Notice	○	▶	○	○	▶	○	○
Public education	●	▶	○	○	●	○	●
Traditional Mechanisms							
Public hearing	○	●	●	●	▶	▶	●
Citizen Advisory Cttee.	●	▶	●	●	●	●	●
Public Deliberation							
Citizen Juries/Panels	●	▶	●	●	▶	▶	●
Consensus Conference	●	▶	●	●	○	▶	●
Alternative Dispute Resolution							
Mediation	○	○	●	●	▶	●	●
Regulatory Negotiation	○	○	▶	●	▶	●	●

○ = not applicable; ▶ = may be applicable; ● = applicable

Table 2.1 (after Beierle 1998)

2.6.3 What Constitutes a Good Process?

Webler and Tuler (2001) have studied a watershed management planning process and obtained responses from the participants on what is considered as a good public participation process. The study was conducted by using Q-Methodology (Stephenson, W. 1953) a unique combination of qualitative social research combined with factor analysis, which is useful especially in the assessment of subjective states, attitudes and behaviors. The authors have classified the obtained responses into five discourses – process should be legitimate, process should promote a search for common values, process should realize democratic principles of fairness and equality, process should promote equal power among all viewpoints, and the process should foster responsible leadership. (Table 1 after Beierle 1998)

2.6.4 A Comment on Evaluation of Participation

As we could see, evaluation of the public participation is not very easy and until now there are no schemes or approaches the majority of scientists can agree on. The Evaluation is problematic and often specific to the particular problem. As we could see it is always very normative and process based. “It has not knowing if experts alone would have saved as much or even more money if left to themselves (...) the general problem facing outcome evaluation” is “that it is impossible to establish a causal link between the process and its outcomes and to establish what the counterfactual situation would have been in the advisory board”. (Rayner 2003)

2.7. Implementation of Participation

2.7.1 A Three-step Procedure – The German Case Study

A three-step procedure has been designed to satisfy the need of combining technical expertise, rational decision making with public values and preferences (Renn, O. Webler, T. Rakel, H. Dienel, P. Johnson, B. 1993 p. 190) in order to generate policy suggestions.

This model consists of three steps:

Identification and selection of evaluative criteria.

This goal may be accomplished by asking all relevant (all social groups that perceived themselves as affected by the decision) groups of stakeholders about their concerns, evaluative criteria and values. As a technique proposed to achieve these goals is value-tree analysis. The result of the usage of this technique is the list of structured values representative to all the groups of stakeholders engaged in the process.

Identification and measurement of impacts of the different decision options.

In this step, the set of indicators is being derived from the outcome of the value tree analysis. All of this indicators are reviewed and accepted by the groups of stakeholders. Performance of the indicators is being discussed by the experts from the field using the modified Delphi method, called group Delphi. The desired outcome is the performance profile for each option.

Aggregation and weighting of expected impacts by randomly selected citizens and elicitation of citizens' preferences.

Evaluation of each option by the randomly selected citizens (or group of citizens) is the last step of the procedure. The tool used for this purpose is Citizens Panels for Policy Evaluation and Recommendation. During this phase of the process, citizens learn about technical and political options and evaluate their consequences. As Fig. 2.6 shows, the main product of this step is prioritization of the options and policy recommendations.

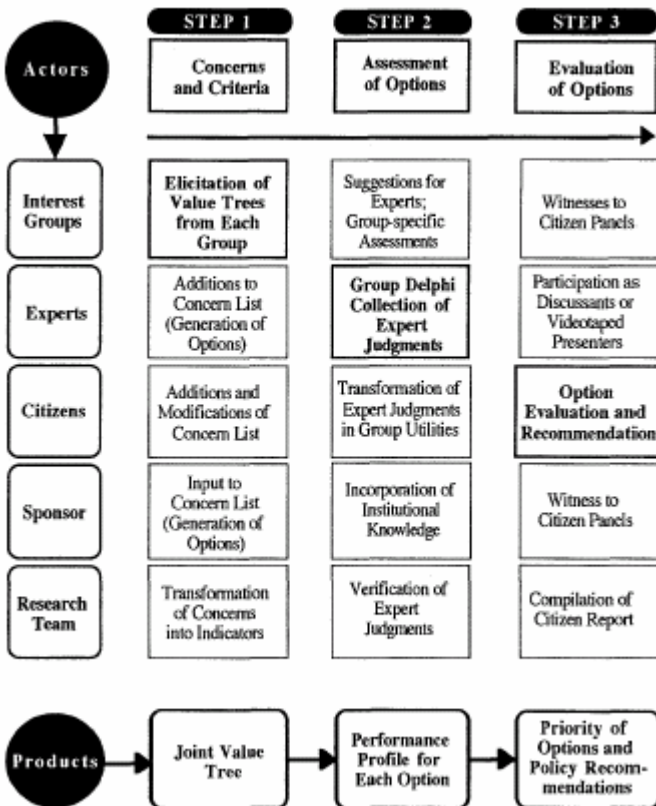


Fig. 2.6 Basic concept and elements of the three – step model.

The three – step model procedure provides three products:

Criteria to evaluate policy options.

Performance profiles for each decision option.

Citizen recommendations. (Renn, O. Webler, T. Rakel, H. Dienel, P. Johnson, B. 1993 p.199)

The three-step of procedure has been implemented several times in West Germany. Most prominent from the projects was national study about energy policies in August 1982. The project was initiated by the Ministry of Research and Technology to investigate the preferences of Germans to four energy policy options. The 3 year project led by Ortwin Renn was carried out according to the three-step procedure.

In the first step in order to elicit values to evaluate energy options, 13 main groups of stakeholders were interviewed. Next, around 30 experts were asked, in the second step, to give their best knowledge for the performance of each of energy scenario on each of 141 criteria's. In the third step 24 citizen panels (each including 25 participants) evaluated the energy scenarios.

The participants were paid for the taking a part in four day meeting. The 20 percent of the invited people did take a part in the process and some of the groups were more represented (low income, house wives, retired, civil servants) than other (self-employed high-income). However except for the income-bias, the other characteristics like educational background, gender and age groups were well represented.

There were three products as an outcome of the process: a value tree (joint for citizens and experts) of evaluative criteria for the purpose of evaluation the energy scenarios and recommendation for policy by 24 citizen panels.

The citizen panels rejected the scenario of high energy supply scenario instead of which they opted for efficient use of energy and energy conservation. The panels did reject nuclear energy as well however desirable for the intermediate time period. They also opted for strict regulation of fossil fuels even it implies the increase of the prices of energy. The panelist also drafted a hierarchical list of policies listed from high priority to low. (Renn, O. Webler, T. Rakel, H. Dienel, P. Johnson, B. 1993 p.201-203)

The main advantage of the three-step procedure model is that it combines the expert knowledge with citizen knowledge into one comprehensive product of recommended policies. (Renn, O. Webler, T. Rakel, H. Dienel, P. Johnson, B. 1993).

2.8 Hard to Reach Groups

One of the biggest disadvantages of participatory management is that some of the groups are overrepresented than others. The "hard to reach groups" are usually

business people, young people and other groups of individuals which simply do not want to participate. There are at least two approaches to deal with this phenomenon. First approach tries to reach the “hard to reach” by attracting them to participate in many ways like: internet, polling etc. Nicholson, L. (2005).

The others say that people are simply not willing to take any action because it is against their attitudes or beliefs. “People are willing to suffer harm if they feel it is justified or if it serves other goals. At the same time, they may reject even the slightest chance of being hurt if they feel the risk is imposed on them or violates their other attitudes and beliefs.” (Renn, 1998)

2.9 “Seveso” accident and its implications for the development of participatory mechanisms over hazards accidents.

The interesting process of construction of citizen’s regulatory system over the nuclear energy and genetically modified food was the “Seveso” case. Seveso incident occurred in 1976 in Lombardy causing the rupture safety disk to burst and toxic cloud release to the air (De Marchi, Ravetz 1999 p. 745). The decision was to remove the chemical materials out of Seveso. The local population was in fear of birth defects and other complications caused by the toxic release. After this accident the awareness and concern of the public has grown really fast and facilitated the process for European regulation towards the unification of protection measures for major accident hazards all over Europe including promotion of public participation. More generally the “right to know” principle, the right to participate in policy decisions has been established in the European Union’s legislation and policy systems (De Marchi, Ravetz 1999 p. 747).

2.10 Participation in Japan – some examples.

Community-based earthquake disaster management, participatory methods and techniques, procedures are very hot topics in Japanese disaster management practices. After the Kobe Earthquake in 1995 local governments realized that they are not any more able to provide sufficient services to the citizens in the time of earthquake occurrence. During the recovery process after the Kobe Earthquake various voluntary organizations: NGO/NPOs – started their activities, and some of the activities have lasted up to now (Shaw, 2004). The purpose of the NPO activities is to raise awareness and preparedness of the citizens in order to increase their coping capacity. Many of the workshops that are being organized are participatory events, aiming at active involvement of “communities” in disaster prevention activities. Also the citizens have their own attitudes and wish to achieve better preparedness but sometimes they do not know how to do it. NPO activities and efforts are to facilitate expected changes toward better earthquake preparedness.

Kobayashi (2005) describes the recent process of reconstructing the relation between “techno-science” and lay people. He claims that recent catastrophes that took place in Japan caused a lack of trust between citizens and government agencies. To overcome this social problem, the participatory methods may be helpful he claims describing some of the participatory initiatives held in Japan since 1990.

The erosion of public trust was caused by the following incidents according to Kobayashi:

The 1995 Sarin gas attack on the Tokyo subway carried out by Aum cult terrorist that consisted of well educated scientists. This terrified public and impaired the opinion about scientist as those who besides their knowledge are ready to trust and follow charismatic guru.

The mentioned before, Great Hanshin Awaji Earthquake at 1995 which caused many deaths and building collapses especially that of the superhighway, also undermined the trust in engineers who, after similar accident in Northridge earthquake (1994), had claimed that something like this is impossible in Japan.

The Kobe earthquake shown the inability of the government and existing system to manage the disaster. Has Tierney and Goltz (1997) mentioned one of the fundamental problems with emergency management was that:

“governmental and other crisis-relevant organizations may have been reasonably well prepared internally for some disasters but not prepared to coordinate with other organizations and groups on key response tasks. For example, organizations providing different lifeline services were reportedly not well-linked with one another, and were generally not well linked with the local governments”.

During and right after the Great Hanshin Awaji Earthquake the number of people engaged in volunteer activities has raised enormously as was shown by Sugiman (2003). The rise of volunteers’ organization is important because it brings: “establishment of a notion of an individual person who has a solid source of decision-making in one’s inner psychic world” because “Volunteers were characterized by decision-making by individual which means denial of traditional collectivism.”

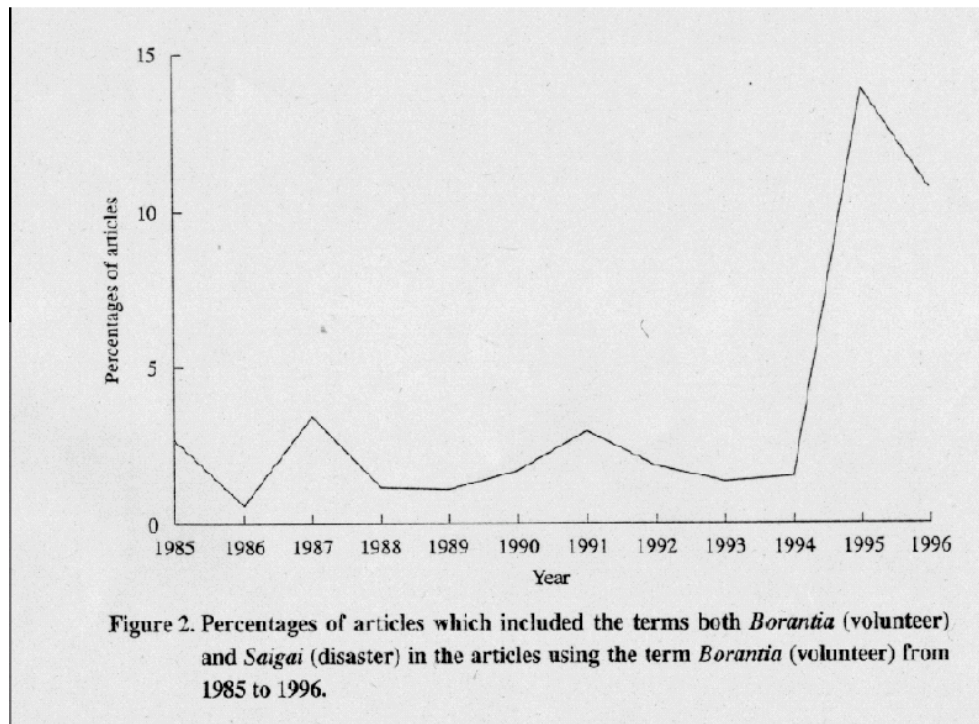


Fig.2.7 Sugiman (2003). Content analysis of newspapers.

The AIDS scandal in 1996 when due to the government and medical elites failures, the HIV-contaminated products were being given to hemophiliacs.

The 1999 - incident that occurred in JCO production center for the nuclear fuel was another case even if the government and companies had been claiming that all of the facilities are under very strict control and regulation.

The latest incident that caused the erosion of trust in “techno-science”, “experts” and the government was the 2001 first BSE case in Japan even if the Japanese government assured that the beef being sold in the country was safe.

The above five accidents affected attitudes of the general public to the government and so called experts. In order to restore the lost of trust in the authorities participatory methods involving general public in the process of deliberation are needed – claims Kobayashi. For this purpose, there were several Consensus Conferences conducted in Japan in the years 1998-2005 (see table number 2). (The Consensus Conference as a participatory method was described previously in this report). The Consensus Conferences described by Kobayashi (2005) were nation-wide or international founded from some grant money by science foundations or government ministries.

Method	Theme	Year	Sponsor
Consensus conference	Gene therapy (feasibility study)	1998	University researchers
	IT technology (feasibility study)	1999	University researchers
	GMOs (nation wide practice)	2000	MAFF (government)
	Human genome	2000	MEXT (government)
	Town planning	2000	NPO
	GMOs	2001	MAFF (government)
	GMOs	2002	MAFF (government)
	River planning	2002-3	Shizuoka (local government)
	GMOs	2003	MAFF (government)
	Water	2003	Kawasaki (local government)
	Peace (Hiroshima)	2005	NPO
Scenario workshop	The future of Sanbanse riffle	2003	University researchers
	Sustainable tourism in Yakushima (world heritage)	2005	University researchers
Dialogue forum	Atomic energy in Aomori prefecture	2002-	University researchers
Hybrid forum	Waste problem in Nagoya city	2003-4	University researchers
Deep dialogue	Brain death and organ plant	2005	University researchers

Table 2.2 (after Kobayashi 2005)

Even though the outputs of the conferences were not rendered into policies and several administrative bodies were reproached for lack of legitimacy during the consensus conferences. The main output and conclusion of those participatory experiments in Japan was that there is public there who is concerned what is going on and who is ready to oppose and criticize the scientists and other “experts”. The only problem is that there are no so many channels through which the concerned public could take a part in the discourse. There is no legal scheme which could make possible expression of worries and concerns and make them influencing the policymaking.

It is worthy to notice and mention that according to what we can see in the table above, 7 out of 16 Consensus Conferences had been sponsored by university researchers, 2 by the NPOs and 7 by the government institutions. This gives us an insight on how participatory management is actually being initiated and led in Japan which is in many cases by university researchers.

Another dimension of how disaster related participatory management is being exercised in Japan is the very local character of it. There are numerous examples of projects, initiated by the NPOs but also by university researchers and local governments, which are relatively small scale (neighborhood) projects unlike the one described by Kobayashi. One of the characteristics of those small scale projects is that the target groups of participants may be non-representative of the whole population of the selected area. As the example may serve the sex vs. age crosstabulation of participants of disaster

prevention workshop held on the beginning of 2006 in Kishiwada City, Osaka Prefecture in Japan (See table below).

			Sex * Age Crosstabulation			Total
			Age			
			20-30	40-50	60-70	
Sex	Male	Count	0	4	17	21
		% of Total	0.0%	10.8%	45.9%	56.8%
	Female	Count	2	11	3	16
		% of Total	5.4%	29.7%	8.1%	43.2%
Total		Count	2	15	20	37
		% of Total	5.4%	40.5%	54.1%	100.0%

Table 2.3. Sex vs. Age crosstabulation (Kishiwada Disaster Preparedness meeting 02. 2006)

21 males (56.76 %) and 16 females (43.24%). 20 of them was in the age of 60-70 years old (17 – males, 3 – females). 15 in the age of 40-50 years old (4 males, 11-females). The smallest age group was 20-30 years old people represented by 2 females (5.4%). So residents over 40 years old were strongly represented while other groups had not been on the meeting.

2.11 Social Resilience

2.11.1 Introduction

Resilience seems to be a multidimensional concept which makes it difficult to define, operationalize and measure. Current definitions of resilience imply the notion of Adaptive capacity which “is not bringing any of clarity into the resilience theory (Klein 2003)”. Other researchers claim the significance of operationalization and have proposed methods of quantification of social resilience to disasters based on the definition of resilience which corresponds to the notion of Adaptive capacity (Paton 2006). Paton developed a model to quantify social resilience to disasters, and applied to Auckland, New Zealand. An attempt will be made to apply and refund this model to our Japanese case study later on this thesis (see Chapter 5).

2.11.2 Definitions of Resilience

Holling (1973) defined resilience as i) the ability of the system to “bounce back” to the previous equilibrium state after the disturbance. It is called: engineering resilience ii) as the degree to which the system can absorb the disturbance still remaining in the same equilibrium state. In this case the resilience is operationalized in terms of magnitude of

the disturbance. Pimm (1984) defined the resilience in terms of the time needed by the system to get back to the previous state.

Resilience is seen differently by psychologists as ex.: i) the ability of the person to regain the previous shape after going through the crisis's as well as ii) the ability to cope and to do well in life in spite of the difficulties (Gunnestad 2006), or as an active process of self-righting, learned resourcefulness and growth - the ability to function psychologically at the level far greater than expected given the individual's capabilities and previous experiences (Paton et al 2000). At this point we can see that when the concept is applied to the human world, it may well be related to the notion of society's Adaptive capacity or adaptive coping.

Resilience Alliance the international group of researchers devoted to resilience studies defines the "ecosystem resilience as the capacity of an ecosystem to tolerate disturbance without collapsing into a qualitatively different state that is controlled by a different set of processes. A resilient ecosystem can withstand shocks and rebuild itself when necessary. Resilience in social systems has the added capacity of humans to anticipate and plan for the future. Humans are part of the natural world. We depend on ecological systems for our survival and we continuously impact the ecosystems in which we live from the local to global scale. Resilience is a property of these linked social-ecological systems (SES). "Resilience" as applied to ecosystems, or to integrated systems of people and the natural environment, has three defining characteristics:

The amount of change the system can undergo and still retain the same controls on function and structure

The degree to which the system is capable of self-organization

The ability to build and increase the capacity for learning and adaptation" (Resilience Alliance 2007)

As we can see, resilience when applied to human systems has the added value of adaptive capacity, which is per se another multidimensional concept. Resilience is a concept which has many meanings depending on the area of research it is applied to. This concept of resilience is yet not very well operationalized and there are limited cases made for testing measurement and formalization (Klein 2003). Klein and others proposes distinction between the two concepts, resilience and Adaptive capacity. He proposes to use Adaptive capacity as an umbrella concept that includes the ability to prepare and plan for hazards. Resilience is being proposed to be treated as one property that influences Adaptive capacity (Klein et al 2003)

2.11.3 Quantification of resilience

Since there has been a great deal of research work conducted on ecological resilience, and in contrary the social aspect of resilience has not been well examined enough (Sapirstein 2006)

Therefore we a brief description of case study carried out by Paton (2006), in Auckland, New Zealand is made with a focus on the quantification of social resilience.

The goal of the case study was to identify from a large number of factors a parsimonious and cost – effective generic model of resilience. The model consists of 3 types of variables: Individual, Community and Institutional. The most innovation of this model is that it examines the collective role of all types of variables since other works on social resilience take as the unit of analysis the unit of either household or community.

To achieve his research purpose, Paton defined the resilience in terms of how well people and societies can adapt to a changed reality. This definition of resilience embodies the notion of Adaptive capacity (Paton 2006). As above mentioned, the model consist of three types of variables: Individual (Critical awareness, Self efficacy, Sense of community etc.), Community (Collective efficacy, Participation, Commitment, Information exchange etc.), and Institutional (Empowerment, Trust, Resources, etc.). Each level of the variables corresponds to the scales developed for its measurement. As the predictor of resilience the “intentions” – scale was employed. The questionnaire was administered by telephone survey to 400 households in August 2005. Out of 400, due to the mistake of the company which carried out the survey, 297 cases were available for the model.

The analysis composed of three steps. PCA (Principal Components Analysis) to determine whether scales met the psychometric standards. The development of the resilience model using SEM (structural modeling analysis) which allows to depict the casual relationships between the dependent and independent variables (also non-direct relationships). The third level of analysis aimed in i) identification of prevailing level of resilience and constituent components, and ii) comparing levels of each variable across area of residence and ethnicity to identify whether there were any significant inter-group differences present for this purpose. The analysis requires one-way analysis of variance and post hoc comparisons (Turkey’s Honestly Significant Difference Test) (Paton 2006).

As a result the final model was developed. The model consists of those pathways that depict significant casual relationships between variables. The numbers associated with the lines inform about the strength of the relationships between factors. This number indicates that change in the one standard deviation in the predictor variable will result in x% change in the standard deviation of the target variable. This allows us to target the areas of intervention. Model proved no in-group differences (Paton 2006)

The model has been found to be an effective approach to resilience assessment and planning. It effectively identifies factors that i) affect resilience, ii) are manageable to change, and iii) are under control of planning process.

2.12 Conclusions

In this literature review the process of citizen involvement in environmental risk decision-making, techniques of public involvement, approaches to evaluation of participation, implementation and social resilience to disasters were discussed.

One might claim that the history of the human societies is the history of different forms of participation. However the current phenomena called “public involvement” has grown in the second part of the 20th century mainly in the western democratic societies. Much of the process of public involvement of citizens and its implementation would not be possible without strong endorsement for instance in environmental laws which often enacted in a response to social protests. Anyone who wants to implement participation based governance has to take into account the importance of law regulations and strong support from the government.

There are various techniques of public participation designed to deal with different problems and provide different kinds of insights depending on the context of the problem we deal with.

The evaluation of public involvement is a very difficult task it requires something normative that causes lack of commonly agreed models of evaluation. Having any evaluation we cannot really say to what extent the results of particular participatory process differ from the situation where decision would have been made by “experts” without consultation with the public. The reason is that we cannot establish causal link with the process and its outcomes. Therefore there is no simple and commonly agreed answer to the question: “What is good participation”

Very often, the participatory processes (ex. The German case study) were initiated by the state and governmental agencies. In order to recompense the participation, the participants were paid salary as a reimbursement of the time absent from work and as the salary paid for being value consultants.

However, even when payment was offered, some of the groups were not very likely to participate. We call them “hard to reach”, and other groups (public officials, retired, unemployed) were overrepresented. In such kind of situations there are two approaches. According to the first one, one should try to reach the “hard to reach” with special techniques and methods. Others say that some people will not change their attitudes toward risks if it strikes the other of their values.

The important trigger that had facilitated the legislation of public’s control over the nuclear energy and genetically modified food in Europe was the Sasebo accident. The legislative support guarantee that participation is being exercised and having influence on the policy regulations.

Japanese experiences with participation are to be effective at two levels, national level and local level. They were also provoked by the number of accidents which undermined the authority of scientific and governmental experts, however they have not led to change in legal system as it was in Europe. Tierney and Goltz (1997) claimed that one of the reasons of the failures of the Great Hanshin Awaji Earthquake were because of

lack of coordination between the agencies and groups responsible for providing help to citizens. That lack of coordination, they claimed was caused because of cultural practices that stress in-group solidarity and foster inward orientation Tierney and Goltz (1997). That is why the crucial role was played by volunteers characterized by decision-making by individual which means denial of traditional collectivism as Sugiman pointed out (2003).

The Participatory Consensus Conferences has been carried out in order to regain the public trust and facilitate the dialogue between the experts and citizens. Although the results of those conferences had rarely been translated into the official policies of the government (Because of they were accused lack of legitimacy. See Kobayashi 2005) they proved that there is a strong voice to be articulated by citizens but there are no adequate communication channels to release them.

The other type of participatory management is local scale however often the target groups are in many cases old people while other community members are not (or do not want to be) included into the participatory processes for some reasons.

Therefore it is argued that in order to make participatory management working there is big need for legal support of those kinds of practices to include them into the process of political decision making as it was in the case of Seveso directive.

In order to foster the inter-organizational participation the activities should involve different size – actors, citizens, local government, prefectural government and other organization related to the field.

In case there are several groups of citizens to whom the participation is not the best way of management, local government should try to think of alternative ways to reach them.

Social resilience has been defined and the ways of measurement and modeling have been described. How to evaluate the participatory management and how important role does it play as a factor facilitating social resilience to environmental hazards will be the subject of following chapters.

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CHAPTER 3 – A MENTAL MODEL APPROACH BASED PROCEDURE FOR THE EVALUATION OF IMPACT OF THE WORKSHOPS ON PARTICIPANTS VIEWS.

1. Introduction

In this chapter we will focus on evaluation of the participatory event. Most of the present approaches available for the evaluation of participatory mechanisms are focus on the process itself (Renn, Webler, Wiedemann 1995), or what in the eyes of participants constitutes a good process (Tuler, Webler 2001), or outcomes (Beierle 1998) of the participatory process. Most of the criteria and outcomes tend to be normative, like Fairness and Competence, or six social goals (why six not seven, thirty seven or two?). What seems to be still missing is such a way of what we (or anybody) would like to achieve in a certain context and subject matter.

Given the context of earthquake disaster management particular and effective actions need to be taken timely in advance so that households, communities or societies may become better prepared on earthquake on the earthquake occurrence. Therefore the most important criteria that any management action should be evaluated against is so called *preparedness*.

Therefore in designing our evaluation methodology we need to propose or develop an approach and tool thanks such that we can examine whether our management actions are “producing” better preparedness for particular households or a community at stake. The participatory techniques/mechanisms are seen as platforms for knowledge exchange among different actors. A Mental Model’s based procedure for mapping and measuring preparedness is proposed and its applicability evaluated.

2. Mental Model Approach

In applying any evaluation methods for examining the effectiveness of participatory earthquake disaster management actions we need to include better *preparedness* as an important. As the tool for such an tools for evaluation we propose Mental Models approach (Morgan, Fischhoff, Bostrom, Atman 2002)

The Mental Model Approach to risk communication was introduced by Granger Morgan, Baruch Fischhoff, Ann Bostrom and Cynthia J. Atman (2002).

“an effective communication must focus on the things that people need to know but do not already. Rather than conduct a systematic analysis of what public believes, and

what information they need to make the decisions they face, communicators typically ask technical experts what they think people should be told. Rather than subject draft communications to empirical evaluation by individuals like those who will use them, communicators pass them around to staff or expert committees for approval. Those passing judgment may know very little about either the knowledge or the needs of the intended audience” (Morgan, Fischhoff, Bostrom, Atman 2002 p.19).

In Mental Models Approach we distinct 5 steps as follows (Morgan, Fischhoff, Bostrom, Atman 2002 p.19-21)

1. Create expert mental model

Create the expert mental model by reviewing experts knowledge about the nature of risk, as well as summarize it explicitly from the perspective for what can be done. In case of MM approach the summary of the analysis is represented as an influence diagram. Once it is created it allows experts to review and validate the diagram. The controversial topics/themes should also be reflected in the diagram. (should take into account for example different styles of management and different ways of risk communication and thus participatory management should be thought of as a special way of risk communication)

2. Conduct qualitative interviews in order to get layman perceptions

To conduct open-ended interviews in order to elicit people’s beliefs about the hazard/disaster expressed in their own terms and words. Interview protocols are shaped by influence diagrams so that they can cover the potentially relevant topics. The interview should allow the expression of correct and incorrect answers as well. Responses are analyzed in terms of how they correspond to experts’ model.

3. Conduct confirmatory questionnaire in order to measure distribution of beliefs

Conduct confirmatory questionnaire in order to assess the distribution of the beliefs captured in the expert model as well as in open-ended interviews.

4. Draft risk communications

Use the results from questionnaires to assess the gaps and misunderstandings than draft the communication and subject it to expert review to ensure its accuracy.

5. Evaluate communication

Test and refine the communication with individuals taken from selected population by conducting one-to-one read-aloud interviews, by focus groups, closed form questionnaires, etc. Repeat this process until the communication is attained as intended.

It is to note that mention that originally the Mental Model approach assumes the adjustment of laypeople's risk perceptions to the risk perceptions of the expert's (Local government leaders, NPO's etc.). In our approach we also intend to observe and evaluate also how the indigenous knowledge held by laypeople, has been released and shared through the participatory process and also to what extent affected expert's risk perceptions.

3. Steps of Mapping and Measurement based on Mental Model Approach for Evaluation Proposes.

1. Generate the data

Before a workshop starts, ask participants to write a "simple narrative story" on what kind of actions people can perform in order to better prepare against earthquake occurrence, what are the main constraints that makes difficult to prepare better etc. (Doyle, Radzicki, Trees 1998.)

Then record the workshop. The workshop itself is a means of "communication" and we can construct mental models through that process.

2. Map and Measure

a. Map: develop from the data the mental models of different group of participants.

b. Measure: measure the MM in terms of their:

- i. complexity: Senge (1990) distinguished two types of MM complexity: *Details Complexity* – amount of content (ex. Number of nodes and links) *Dynamic Complexity* – Number of feedback loops. (not applied in this paper)
- ii. Frequency and/or percentage of concepts which are included in mental models.

3. Re-measure and re-map

Re-measure and re-map the MM of workshop participants after workshop interventions in terms of their change as intended by the workshop organizer. (Our experiment described in this paper ends up here)

4. Organize event

Organize the meeting (participatory event) where you can engage all the people in their mental model, re-shaping by:

- a. Showing your results (especially the MM diagrams) to all of the participants. Use personal computer and projector to display the models. (Vensim freeware):
- b. Ask participants to play with the models and reshape the models by adding the additional nodes and relations.

Record the meeting and measure the *detail complexity*, *dynamic complexity* and *frequency of the concepts mentioned and discussed*.

5. Evaluate the effectiveness

Evaluate the participatory risk communication by comparing the models from different phases of the process in terms of the *detail complexity*, *dynamic complexity* and/or *frequency of the concepts mentioned and discussed*.

The effectiveness of management action is interpreted to be greater as mental models become more complex and new knowledge is added and/or if the mental models of the “communication” and the participants after receiving “communication” are more similar.

This evaluation procedure allows also to test which means of risk communication (lecture, workshop, public meeting etc) are more or less effective in terms experiment of causing better preparedness.

4. An Illustration: Application of Mental Model Approach.

This section gives the illustration of an implementation of Mental Models procedure for evaluating the influence of the presentation/risk communicates on participant's mental models.

4.1. Outline of the Experiment

In April 2006 ten people from a local citizen's organization related to disaster prevention and located in Uji city visited DPRI of Kyoto University in order to get to know more and learn about what kind of research are being carried out in the Institute. The “learning trip” consisted of visiting several laboratories in DPRI. During one of the visits participants were given presentation by DPRI staff (including movies simulating and demonstrating the behavior of the building construction and furniture inside the house) focused mainly on house reinforcement and also furniture fastening.

4.2. Goal

The main goal of the experiment was to map the mental models (related to the ways of preparedness) of participants before and after the presentation in order to assess and evaluate the influence of the workshops on participants thinking as ways represented by the “mental models”.

4.3. Procedure.

Before the presentation participants were given a questionnaire form of paper containing the question:

Please write a short essay (few sentences) on what do you think are best, most effective ways of preparation on the earthquake occurrence? Do you think that such actions as furniture nailing and house reinforcement are really effective ways for earthquake prevention and they can really save the lives of the people?

After the presentation the participants were asked to answer similar question:

After having this presentation could you please once again answer the same question: what do you think are best, most effective ways of preparation on the earthquake occurrence? Do you think that such actions as furniture nailing and house reinforcement are really effective ways for earthquake prevention and they can really save the lives of the people?

The essays *before* and *after* were content analyzed and two outputs of the analysis could be derived. (1) Mental Models maps, visualizing the “thinking ways” of participants. (2) Frequency tables thanks to which we could measure the frequency of the appearance of the concepts that Mental Models are consisting of. Mental Models maps as well as frequency tables were derived from the text analysis of the questionnaires.

4.4 Results

4.4.1 The Mental Models before the presentation – General perspective.

The figure 1 below show the map of mental models representing “the most effective ways of preparedness” held by participants before the presentation. It was found to be very complex and covers different dimensions of preparedness from furniture fastening, allocation of furniture and house reinforcement, through Emergency communication

network, building standards, evacuation roots, and food and water storage to enhancing people attitudes toward preparedness.

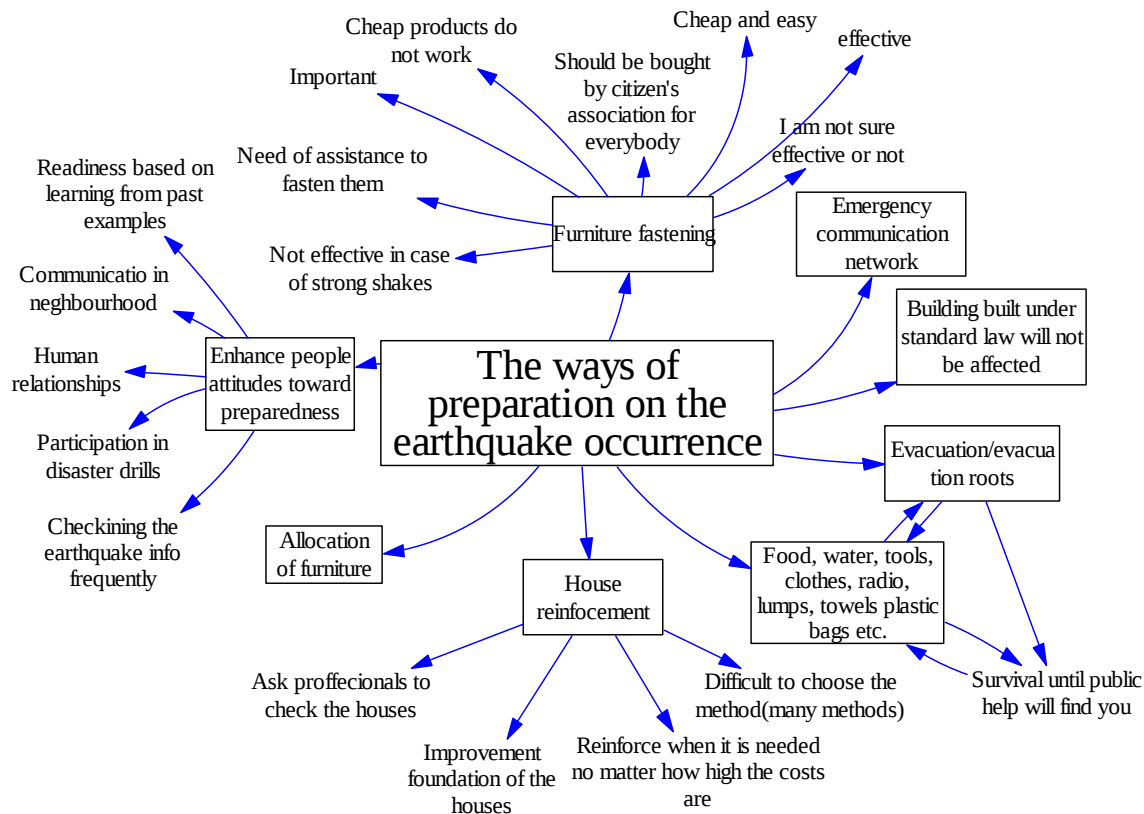


Fig.3.1 Map of Mental Models before the presentation.

Category label	Code	Count	Pct of Responses	Pct of Cases
Furniture fastening	1	8	38.1	80.0
Huse reinforcement	2	3	14.3	30.0
Emergency communication network	3	1	4.8	10.0
Building built under standard law	4	1	4.8	10.0
Storage of food, water, clothes etc.	5	3	14.3	30.0
Enhance people attitudes toward prepared	8	2	9.5	20.0
Knowledge about evacuation root	9	1	4.8	10.0
Furniture alocation	10	2	9.5	20.0
Total responses		21	100.0	210.0

0 missing cases; 10 valid cases

Table. 3.1. Multiple response analysis of “The ways of preparation of earthquake occurrence” before the presentation.

As we can see in the table, the most frequently mentioned ways of preparedness is Furniture fastening mentioned in 80% of the cases, House reinforcement (30%) and storage of food and water (14%). However the result does not say that Furniture fastening *is* perceived as best way of preparedness, The result says that Furniture fastening was mentioned most frequently but we do not know yet whether it was evaluated positively or negatively. This will be the topic of further analysis.

4.4.2 Metal Model of the presentation.

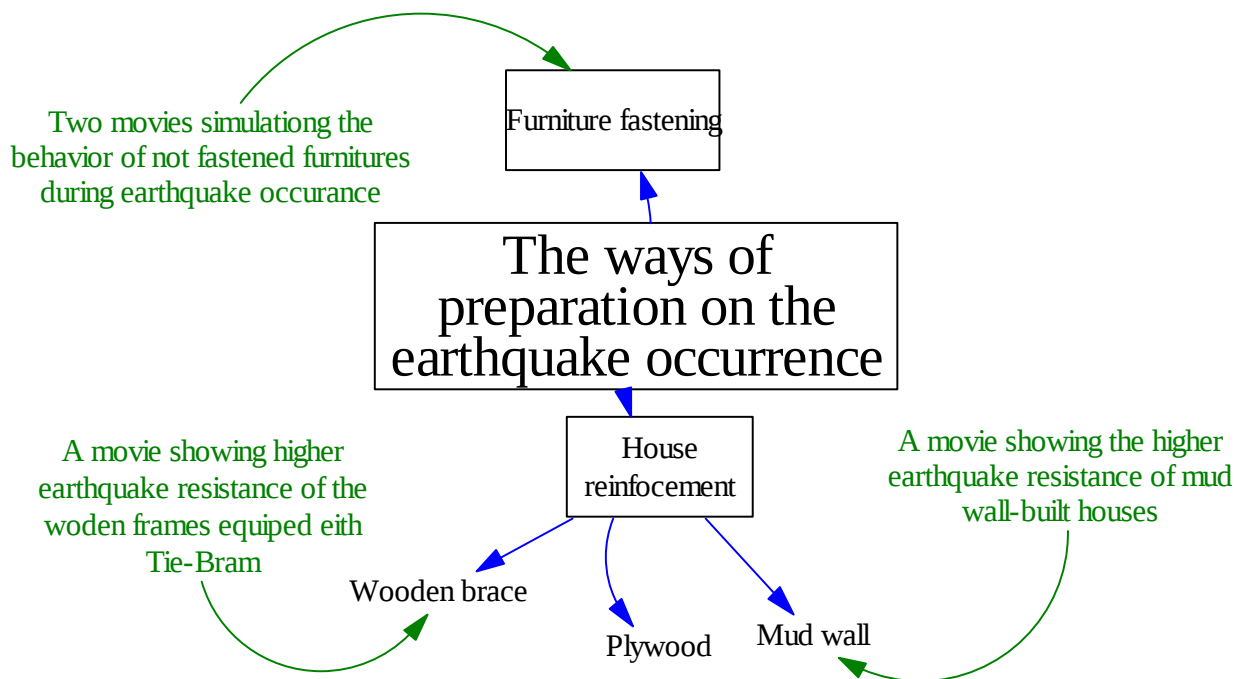


Fig.3.2 Map of Mental Models of the presentation.

The presentation was focused on two among many ways of earthquake preparedness: House reinforcement and Furniture fastening. The core of the presentations was movies simulating and demonstrating the behavior of the different ways of house reinforcement as well as not fastened furniture.

4.4.3 The Mental Models after the presentation – General perspective.

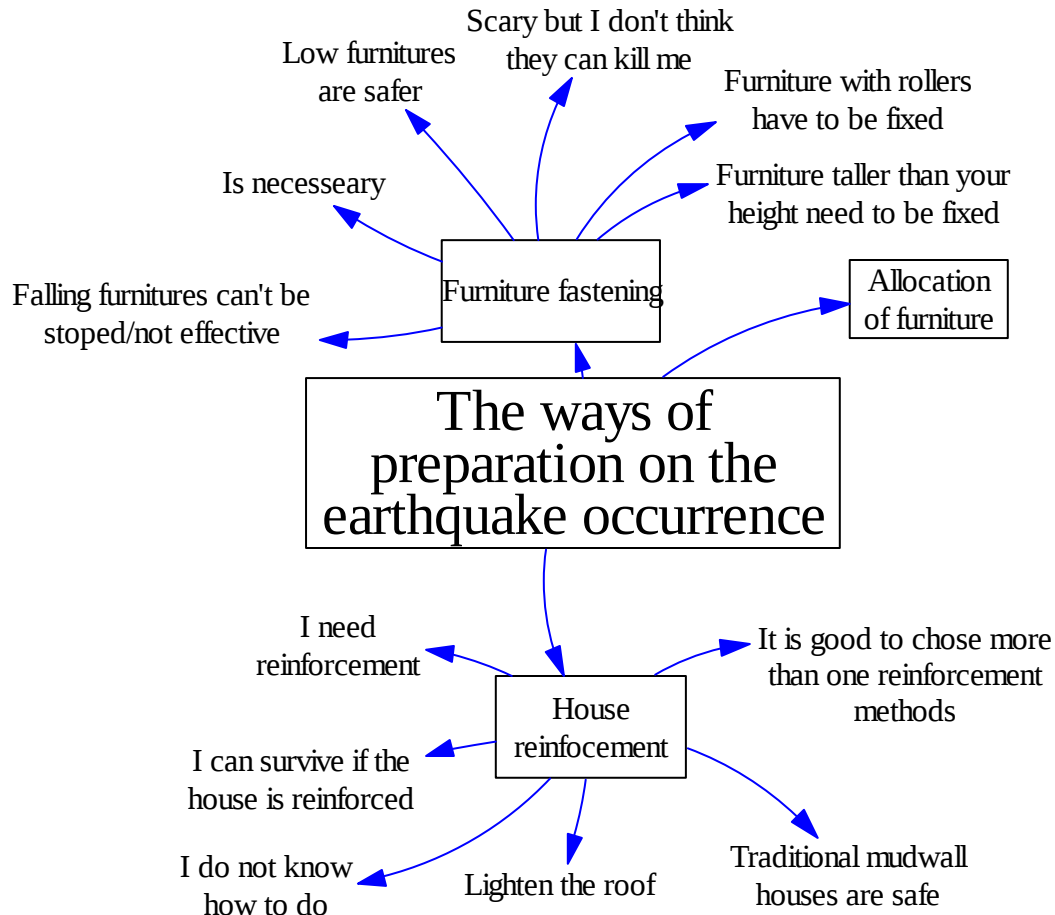


Fig.3.3 Map of Mental Models after the presentation.

The Mental Model of participants obtained after the presentation is much less complex than the one obtained from before the presentation and plainly remains the Model of the presentation by concentrating on House reinforcement and Furniture fastening almost exclusively.

Category label	Code	Count	Pct of Responses	Pct of Cases
Furniture fastening	1	10	50.0	100.0
Allocation of the furniture	2	2	10.0	20.0
House reinforcement	3	8	40.0	80.0
		-----	-----	-----
Total responses		20	100.0	200.0

0 missing cases; 10 valid cases

Table. 3.2. Multiple response analysis of “The ways of preparation of earthquake occurrence” after the presentation.

Everyone has mentioned Furniture fastening as a way of earthquake preparedness and 80% of the respondents mentioned house reinforcement.

From the models and the tables we can clearly see how the presentation has influenced mental models of participants narrowing it down the two ways of focused preparation activities: House reinforcement and Furniture fastening. In the next sections we will see not only how the frequency of mentioned concepts had changed but also how participant’s attitudes regarding the effectiveness of discussed approaches are changing as influenced by the presentation.

4.4.4 “Before” and “After” – detailed perspective.

In this section we will try to show how the mental models regarding effective ways of preparedness have changed under the influence of the presentation.

4.4.4.1 Furniture fastening “Before and After”

Category label	Code	Count	Pct of Responses	Pct of Cases
I am not sure if it is effective or not	1	1	9.1	12.5
Cheap and easy	2	1	9.1	12.5
Should be bought by citizen's associatio	3	1	9.1	12.5
Cheap product do not work	4	1	9.1	12.5
Importnat	5	3	27.3	37.5
Need of assistance to fasten furniture	6	2	18.2	25.0
NOt effective in case of strong shakes	7	1	9.1	12.5
Effective	8	1	9.1	12.5
		-----	-----	-----
Total responses		11	100.0	137.5

2 missing cases; 8 valid cases

Table 3.3. Multiple response analysis. The views regarding “Furniture fastening” before the presentation.

Before the presentation most of the participants were not very sure whether furniture fastening is really effective or not. Most frequent answers were those emphasizing the importance of furniture fastening (37.5%) and need of assistance (25%). The rest of the answers (12.5 % each) emphasized lack of effectiveness of furniture fastening in general, lack of effectiveness in case of strong shakes, effectiveness and the need of buying and carrying out furniture fastening by the citizen's associations.

Category label	Code	Count	Pct of Responses	Pct of Cases
Furniture cant be stopped from falling/n	1	2	18.2	25.0
Necesseary and useful	2	5	45.5	62.5
Low furniture are safer	3	1	9.1	12.5
Scary but do not think they can kill me	4	1	9.1	12.5
Furnitures with rollers have to be fixed	5	1	9.1	12.5
Furniture taller than your height have t	6	1	9.1	12.5
Total responses		11	100.0	137.5

2 missing cases; 8 valid cases

Table 3.4. Multiple response analysis. The views regarding "Furniture fastening" after the presentation.

The Mental Models after the presentation changed in some way. 62% of participants shared the view that furniture is necessary and useful but... only 25% of the participants believe the furniture can be stopped from falling. The rest of the answers (each 12%) emphasized the need of fastening tall furniture and those on rollers. They learnt that lower furniture are safer however some of them thought that falling furniture are scary but can't kill the person.

4.4.4.2 House reinforcement "Before and After"

Category label	Code	Count	Pct of Responses	Pct of Cases
Difficult to chose one method(many metho	1	1	20.0	33.3
Reinforce when it is needed no matter ho	2	1	20.0	33.3
Improvement of foundation of the house	3	1	20.0	33.3
Ask profecionals to check the houses	4	1	20.0	33.3
Important	5	1	20.0	33.3
Total responses		5	100.0	166.7

7 missing cases; 3 valid cases

Table 3.5. Multiple response analysis. The views regarding “House reinforcement” before the presentation.

Only five responses were given to this question which indicates lack of knowledge regarding house reinforcement as a way of earthquake prevention. House reinforcement is seen as important and needed whatever the cost is however it needs professional expertise because it is difficult to chose one among so many methods.

Category label	Code	Count	Pct of Responses	Pct of Cases
I need reinforcement	1	3	16.7	33.3
I can survive if the house is reinforced	2	2	11.1	22.2
I do not know how to do	3	1	5.6	11.1
Lighten the roof	4	3	16.7	33.3
Traditional mudwall houses are safe	5	7	38.9	77.8
It is good to chose more than one method	6	2	11.1	22.2
Total responses		18	100.0	200.0

1 missing cases; 9 valid cases

Table 3.8. Multiple response analysis. The views regarding “House reinforcement” after the presentation.

In case of house reinforcement, the presentation seemed to give a lot of new information to the participants. The number of responses was almost 4 times bigger (18) in comparison to the number of responses given in the essay before the presentation.

First of all, participants were surprised (77.8%) that traditional mud-wall houses are safe. 33.3% recognizes the individual need of reinforcing the house, another 33.3% as the way of increase preparedness emphasized the need for lightening the roof. Reinforcing is the way to survival mentioned 22.2 % and the same percentage articulated the importance of choosing more than one method which is a correction of the “before mental model” that it was “difficult to chose one of so many methods”.

4.5 Summary:

In general, mental models of participants regarding the effective ways of preparedness have changed in accordance to “the mental model of presentation”.

After the presentation, mental models of participants regarding furniture fastening had slightly changed. The participants seemed to recognize the necessity of having furniture fastened however only 2 of the participants admitted that the furniture can be stopped

from falling which indicates lack of confidence in the effectiveness of Furniture fastening. However they learnt that furniture with rollers and higher than one's height furniture have to be fixed. It seems to be safer to buy lower furniture.

In case of House reinforcement participants seemed to have affected the respondents a lot from the presentation which is indicated by the number of responses which is almost 4 times bigger than in case of Furniture fastening. The participants recognized that traditional mud-houses are often safer than concrete-made. But what is most important the participants learnt importance of choosing more than one method of house reinforcement (which was the correction of previously held mental model), lightening the roof.

5. Conclusions

In this chapter we tried to show how a modified Mental Model approach for risk communication may serve as an effective tool to map and measure the change, (or lack of it) caused by actions (workshops etc.) and therefore can be an effective tool for the evaluation of the participatory event in terms of its effectiveness and impact on participants and experts views. Thanks to this approach we can assess and display the indigenous knowledge of the participants however this was not the case of this study.

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CHAPTER 4 – THE ROLE OF ‘IN PROCESS’ VARIABLES IN PLANNING OF PARTICIPATORY PROCESSES.

1. Introduction

A very important issue in the research of evaluation and effectiveness of public participation is what Turaga (2004) has noticed. That is the lack of research on “in process variables”, for example; what stage at which public is involved in the process, level of external communication between the participants and the agency, proposed degree of influence public has in decision-making, and scope for deliberation within the process. Research seems to be needed also to account for outcome variables. Evaluation should be made to link the outcome variable with “in process variables” so that the acceptability of decisions which affects particular outcomes can be examined. This chapter addresses this issue by examining the ‘Fairness and Competence’ approach (Renn et al 1995) which is bringing up and emphasizing many of ‘in process’ variables however their effect on the ‘outcome’ variables isn’t examined. The social scheme of *Jishubosaisoshiki* is examined as a vehicle of participatory management activities in Japan.

Jishubosaisoshiki (*Jishubo* - for short) literally means “autonomous organization for disaster reduction” “a softly mobilized participatory movement in Japan.” (Bajek, Matsuda, Okada 2007) and it originated around 1970 set up by government on the basis of *Chonakai* - a Community Council – which originated around 1900 (Bajek, Matsuda, Okada 2007). It is necessary to mention that these *Chonakai*’s replaced older forms of town management. “Kurata (2000) summarizes the characteristics of *Chonakai* as follows: (1) as a unit of household and compulsory participation; (2) as a traditional and uniform system over the country; (3) as a cooperative relationship between public sectors; (4) as a base unit for daily and basic community events. ” (Bajek, Matsuda, Okada 2007). “*Chonakai*’s rotating representative take the role of *Jishubo* leader. He/she is not necessarily motivated in the sense of volunteering for disaster reduction. Each leader’s term is short so that there is no consistency on their activities. There occurs variation in both enthusiasm and the quality of activity contents among *Jishubo* organizations. The members’ attitudes are rather passive as being “mobilized in *Chonakai* events” than actively “participating to enhance disaster preparedness” (Bajek, Matsuda, Okada 2007).

The number of *Jishubosaisoshiki* organizations has raised rapidly after 1995 Kobe earthquake (Fig. 2.1 and Fig. 4.2) when government of Japan realized that in times of big disaster local governments and related agencies are not able to provide enough of help to affected populations. The *Jishubo* was also considered as an indicator of preparedness. Therefore it is important whether *Jishubo* scheme is (or not) “Fair and Competent” as well as whether “soft mobilization” to participate in the community disaster preparedness related events works.

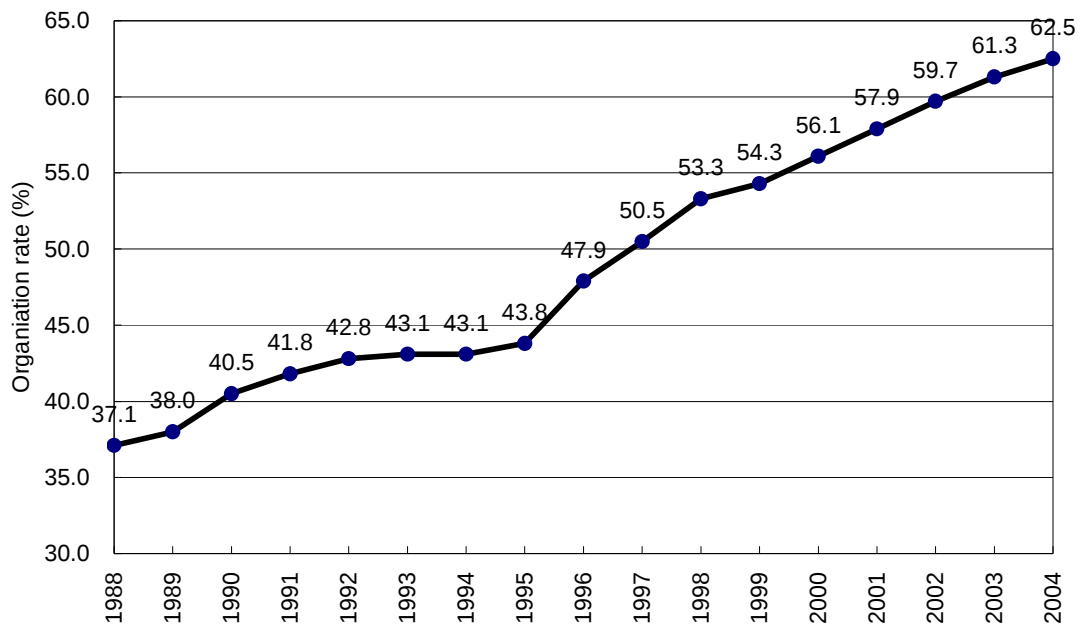


Fig. 4.1 Organization rate of Jishubo (Bajek, Matsuda, Okada 2007)

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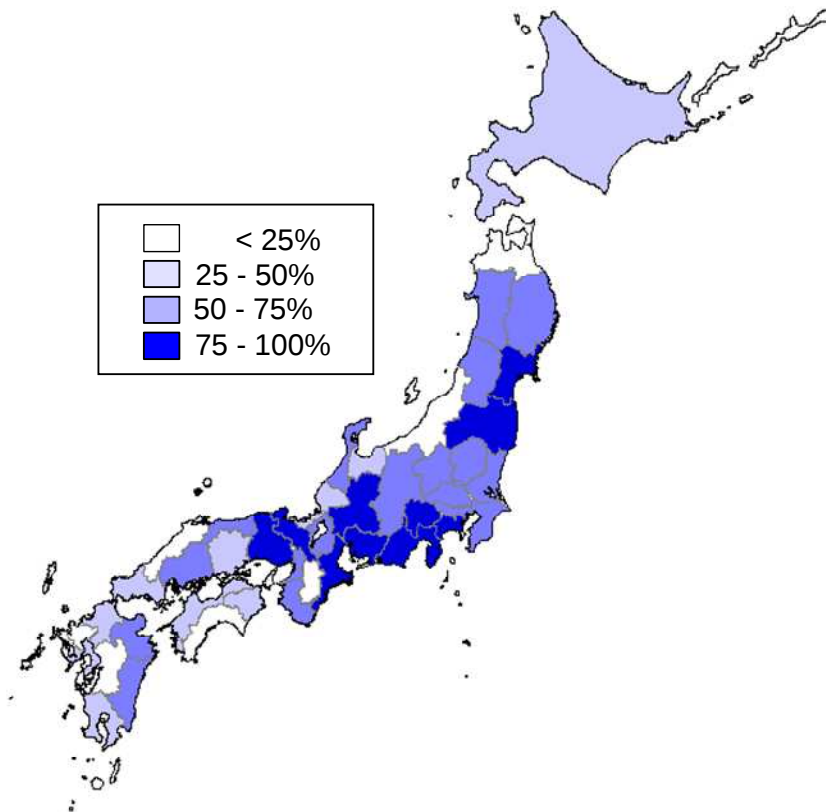


Fig. 4.2

2. What makes people participating?

The local citizens' associations like *Jishubosaisoshiki* (Bajek, Matsuda, Okada 2007) play a crucial role in participatory disaster management in Japan. Thanks to those social institutions it is possible to strongly encourage and to softly mobilize citizens in participation. From the disaster manager's point of view it is sometimes important to keep *Jishubo* members trained, taught, prepared even they were not willing to attend the workshops. Viewed from the other side, what if those who are involved in the workshops even if they were not willing to attend are they not benefiting from it? Probably it may not mean to the participants as well as the organizations not effective. Therefore if participatory management techniques do not work for all of the citizens, then the following question is: who should be targeted?

The next question is what makes people participating successfully in terms of participants seeing benefits (satisfaction, increase of knowledge, skills etc.). Some authors, as it was mentioned before (Renn, Webler, Wiedemann 1995, Webler, Tuler 2001) emphasized the importance of fairness, competence, deliberation and being part of the process as those variables that foster a good participatory process. Are these values equally important when organizing participation in Japan? What variables should be taken into account, when designing successful participatory management process?

2.1 Case study

From December 2005 to February 2006 a total of 3-daylong workshop (1 day every 2-3 weeks) on disaster preparedness was organized by the Kishiwada city government of Osaka Prefecture in Japan. The workshop was planned and operated by both this local government office and the prefectural government of Osaka.

The 3 day workshop consisted of series of lectures, indoor exercises and interactive games and outdoor town watching. Participants consisted of local *Jishubo* members guided by government officials as instructors. Most of the people who participate in the events organized by prefectural and municipal governments were elderly people and this group was biased in age and thus hardly representing the average of the community, in terms of demographic characteristics of the population. Notably this age bias among *Jishubo* members is not particular to the Kishiwada case; it is common in most of cities in Japan.

			Sex * Age Crosstabulation			
			Age			Total
			20-30	40-50	60-70	
Sex	Male	Count	0	4	17	21
		% of Total	0.0%	10.8%	45.9%	56.8%
	Female	Count	2	11	3	16
		% of Total	5.4%	29.7%	8.1%	43.2%
	Total	Count	2	15	20	37
		% of Total	5.4%	40.5%	54.1%	100.0%

Table 4.1. Sex vs. Age Crosstabulation

The purposive sample consisted of 37 members of *Jishubo*. 21 males (56.76 %) and 16 females (43.24%). 20 of them was in the age of 60-70 years old (17 – males, 3 – females). 15 in the age of 40-50 years old (4 males, 11-females). The smallest age group was 20-30 years old people represented by 2 females (5.4%). So residents over 40 years old were strongly represented while other groups had not been on the meeting. (see Table 1)

2.2 Description of questionnaire design

The questionnaire survey was conducted by the authors on the last day of the workshops. The objectives of the questionnaire include the three following variables: (1) the way of getting people involved in the workshops, (2) the scope of deliberation and (3) the sense of involvement (ownership) it has been examined if there can be found any statistically significant relationship among the three variables characterizing perceived satisfaction and benefit from the workshops. The variables are following: (1) perceived satisfaction with the meeting, (2) perceived learning during the meeting and (3) perceived practical use of knowledge that was taught during the workshops. All of the items were evaluated by the participants on the scales from 1 to 5. The Kendalls Tau-b, correlation coefficient has been employed as the method of analysis. Null hypothesis $Tau-b=0$; states that (1) the way of getting people involved to the workshops, (2) the scope of deliberation and (3) the sense of involvement (ownership) are not related to the general satisfaction, perceived learning and perceived practical use of knowledge. Alternative hypothesis $Tau-b \neq 0$ states that (1) the way of getting people involved to the workshops, (2) the scope of deliberation and (3) the sense of involvement (ownership) are related to the general satisfaction, perceived learning and perceived practical use of knowledge.

2.3 Results

2.3.1 Reason of attendance

Kendall's Tau-b			Reason of attendance			
			I was asked by the Local Citizens' Association.	Because I saw the ad.	Because I wanted.	If I could have said no I wouldn't have attended.
General satisfaction from the workshops.	Correlation Coefficient		-.111	-.235	.369	-.438*
	Sig. (2-tailed)		.602	.376	.134	.050
	N		20	13	16	18
Through the series of workshops I think my knowledge, awareness and coping capacity have increased.	Correlation Coefficient		-.143	-.405	.439	-.377
	Sig. (2-tailed)		.490	.116	.068	.085
	N		20	13	16	18
I can make practical use of what I have learnt during the workshops.	Correlation Coefficient		-.067	-.328	.202	-.164
	Sig. (2-tailed)		.745	.204	.402	.454
	N		20	13	16	18

** . Correlation is significant at the 0.01 level (2-tailed)

Table 4.2 Perceived satisfaction, awareness, practical use of knowledge vs. Reason of attendance

As it can be seen in the Table 2, there seems to be no strong relation between the reasons of attendance and “Increase of knowledge/awareness/capacity” and “Practical use of knowledge”. However there is a negative relation significant on the level 0.05 between those who did not want to attend (if I could I would have said no) and the “General satisfaction from the workshops”. It means that those who would like to not attend if they could have said no, is not satisfied through the workshops but at the same time is not significantly different from the others in terms of perceived knowledge and skills increased.

2.3.2 Scope of deliberation

Scope of deliberation, the variable which represents the extent of individual freedom and/or influence that individual may be given in order to influence the participatory process is not correlated to satisfaction nor perceived learning and practical use of knowledge (Table 3).

			Scope of deliberation		
Kendall's Tau-b			I had a strong intention to express my opinions.	My opinion has been understood well, listened and reflected in the discussion	I had an opportunity to set or modify the agenda.
Perceived satisfaction, practical use of knowledge	General satisfaction from the workshops.	Correlation Coefficient	.289	.245	.183
		Sig. (2-tailed)	.167	.245	.382
		N	20	20	20
Perceived awareness	Through the series of workshops I think my knowledge, awareness and coping capacity have increased.	Correlation Coefficient	.322	.220	.262
		Sig. (2-tailed)	.131	.307	.221
		N	20	20	20
Perceived satisfaction, awareness, practical use of knowledge	I can make practical use of what I have learnt during the workshops.	Correlation Coefficient	.245	.192	.132
		Sig. (2-tailed)	.240	.361	.528
		N	20	20	20

Table 4.3. Perceived satisfaction, awareness, practical use of knowledge vs. Scope of deliberation

This means that the scope of individual freedom to express one's ideas and opinions of the participation process is found to be not necessarily important.

2.3.3 Sense of Involvement

			Sense of Involvement		
Kendall's Tau-b			I have been treated as a partner and part of the group.	There was enough time for self-introduction of every participant of the workshop.	Everyone who participated had the same opportunity to express his/her opinion equally.
Perceived satisfaction, awareness, practical use of knowledge	General satisfaction from the workshops.	Correlation Coefficient	.716**	.285	.587**
		Sig. (2-tailed)	.001	.178	.007
		N	20	19	20
Perceived satisfaction, awareness, practical use of knowledge	Through the series of workshops I think my knowledge, awareness and coping capacity have increased.	Correlation Coefficient	.798**	.369	.589**
		Sig. (2-tailed)	.000	.088	.008
		N	20	19	20
Perceived satisfaction, awareness, practical use of knowledge	I can make practical use of what I have learnt during the workshops.	Correlation Coefficient	.716**	.289	.667**
		Sig. (2-tailed)	.001	.172	.002
		N	20	19	20

** . Correlation is significant at the 0.01 level (2-tailed)

Table 4.4 Perceived satisfaction, awareness, practical use of knowledge vs. Scope of involvement

As for the sense of involvement variable, Table 4 shows that, 2 of the 3 questions representing “sense of involvement” variable are strongly (0.01 sig. level) correlated with perceived satisfaction with the meeting, perceived learning during the meeting as well as the perceived practical use of the knowledge taught during the workshops. This kind of sense of involvement is interpreted as a relevant variable to be considered when designing effective organizational frameworks for participatory processes in Japan.

3. Conclusions •

The results of the analysis lead to the following discussions. In the case of the *Jishubo* workshops conducted in Kishiwada, Osaka, people who were not willing to participate were not satisfied with the workshops, interestingly, however the lack of will to participate has not been negatively correlated with the variables: “Increase of knowledge/awareness/capacity” and “Practical use of knowledge”. It means that softly mobilized (thus not motivated) participation per se, may not necessarily contribute to the perceived learning and practical use of knowledge for disaster reduction. It however, does not affect it in the opposite (negative) way.

The “scope of deliberation” that participants are given has been found not to influence the perceived satisfaction with the meeting, nor the perceived learning during the meeting nor the perceived practical use of knowledge taught during the workshops. This result is seemingly opposite to the results of Webler and Tuler (2001) where “scope of deliberation” “and Fairness and Competence” (Renn 1995) were found as very important variable that fosters “good participatory process”.

In contrary to “scope of deliberation”, the “sense of involvement” appeared to be very strongly correlated to the perceived satisfaction with the meeting, perceived learning during the meeting as well as perceived practical use of knowledge taught during the workshops.

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CHAPTER 5 – MODELING SOCIAL RESILIENCE

1. Introduction

In this chapter we would like to focus on discussion of the role of the participatory management as one among many possible factors contributing to community social resilience to earthquakes. For this purpose the community social resilience to earthquakes needs to be quantified and modeled properly. It is worthy to mention that there is not so many research works on quantification of social resilience to environmental and natural hazards as it was mentioned already in the Chapter 1. One of the most promising approaches is the work of Douglas Paton (Paton 2006, 2005) on modeling social resilience to volcanic hazards as well as earthquakes in Auckland, New Zealand. In this chapter the application of Paton's model to Japanese communities in the town of Kyoto represented by Shuhachi and Jouson communities will be presented. The model was modified and extended by adding some new scales in order to meet the social specificity of Japan as well as to extend the theoretical scope of the model.

2. Quantification of social resilience.

2.1 Social resilience model of Auckland, New Zealand

Since there has been a great deal of research work conducted on ecological resilience, and in contrary the social aspect of resilience has not been well examined enough (Sapirstein 2006). Therefore we will first introduce a case study carried out by Paton (2006), in Auckland, New Zealand, with a focus on the quantification of social resilience.

The goal of the case study was to identify from a large number of factors a parsimonious and cost – effective generic model of resilience. The model consists of 3 types of variables: Individual, Community and Institutional. The most innovation of this model is that it examines the collective role of all types of variables since other works on social resilience only take as the unit of analysis the unit of either household or community.

2.2 The components of the model

(subchapter after Paton 2006 p. 13-14)

The components of the model cited by Paton are following:

Critical awareness

The items used for this scale were developed for studies of hazard preparedness in New Zealand (Paton et al., 2005).

Self efficacy

This scale was adapted for work on environmental hazards in Australia (Bishop et al., 2000) and further developed for assessing response to volcanic hazards (Paton et al., 2001).

Action coping

This scale was developed by Carver et al. (1987) and developed for use in New Zealand samples (Paton et al., 2005).

Outcome expectancy

Adapted (Paton et al., 2005) from original items developed by Bennett and Murphy (1999)

Cognitive empowerment/collective efficacy

Adapted from a scale developed by Speer and Peterson (2000)

Sense of community

This scale was adapted for work on environmental hazards in Australia (Bishop et al., 2000) and further developed for assessing response to volcanic hazards (Paton et al., 2001).

Participation

Adapted from a measure developed by Eng and Parker (1994).

Articulating problems

Adapted from a measure developed by Eng and Parker (1994).

Social support

Scale items developed for work on participation in local affairs in Auckland (Paton, 2002).

Diversity

Scale items developed for work on participation in local affairs in Auckland (Paton, 2002).

Empowerment

Scale items developed for work on participation in local affairs in Auckland (Paton, 2002).

Trust

Scale items developed for work on participation in local affairs in Auckland (Paton, 2002).

Intentions

Intentions play an important mediating role in the development of protective behaviors. This scale was adapted (Paton et al., 2005) from original items developed by Bennett and Murphy (1999). The analysis focused on the assessment of intentions. Intention has proven to be a good indicator and actual behavior (Paton et al., 2005) and thus represents an appropriate focus for this analysis.

Each of the components is measured on the scales consisting of items from “strongly agree” to “strongly disagree”. Each of the variables represents the particular concept explained in the table no 5.1.

Indicator	Measure
Personal indicators <i>Refers to the resources and competencies of individual people proposed to predict development of readiness at the person level.</i>	Attitudes and beliefs to change - frequency of thinking and talking about community issues (Critical Awareness) Beliefs regarding personal ability to deal with challenging situations (self efficacy) Belief in confronting problems in life (action coping) Beliefs regarding a) the benefits of (positive outcome expectancy and feasibility of personally dealing with hazard effects (negative outcome expectancy) Intentions – precursor of adoption of adaptive/ protective measures
Community indicators <i>Refers to those resources and competencies that exist collectively within neighbourhoods and relational communities (e.g., religious, sporting or recreational memberships).</i>	Capacity for representative decision making and beliefs regarding collective action within a community to deal with challenging situations (cognitive empowerment & collective efficacy) Commitment to community -Sense of belonging in relation to places and people (sense of community) Contribution to defining and achieving community goals (participation) Ability to describe community views, attitudes, needs and processes and how information is exchanged to derive common goals and meanings (Articulating problems/Leadership) Capacity for tangible or instrumental support in a context of diversity (Social support & Diversity)
Institutional level indicators <i>Refers to the resources and competencies possessed by institutions that have direct contact with communities and individuals/ and which community members believe can influence their capacity to deal with challenging situations</i>	Empowerment Trust Use of resources made available by wider societal institutions to deal with threats and opportunities and institutional mechanisms for assisting community problem solving (To be completed as part of the institutional resilience component of the process)
Collective (personal, community, institutional) model	Integrate data from above measures within a hierarchical model

Table 5.1

2.3 Type of Analysis

The analysis composed of three steps. PCA (Principal Components Analysis) to determine whether scales met the psychometric standards. The development of the resilience model using SEM (structural modeling analysis) which allows to depict the casual relationships between the dependent and independent variables (also non-direct relationships). The third level of analysis aimed in i) identification of prevailing level of resilience and constituent components, and ii) comparing levels of each variable across area of residence and ethnicity to identify whether there were any significant inter-group differences present for this purpose. The analysis requires one-way analysis of variance and post hoc comparisons (Turkey's Honestly Significant Difference Test) (Paton 2006).

2.4 Results

As a result the final model was developed. The model consists of those pathways that depict significant casual relationships between variables. The numbers associated with the lines inform about the strength of the relationships between factors. This number indicates that change in the one standard deviation in the predictor variable will result in x% change in the standard deviation of the target variable. This allows us to target the areas of intervention. Model proved no in-group differences (Paton 2006).

The model has been found to be an effective approach to resilience assessment and planning. It effectively identifies factors that i) affect resilience, ii) are manageable to change, and iii) are under control of planning process.

The Paton's model of social resilience to volcanic eruptions is shown by in the Fig no 5.1 below:

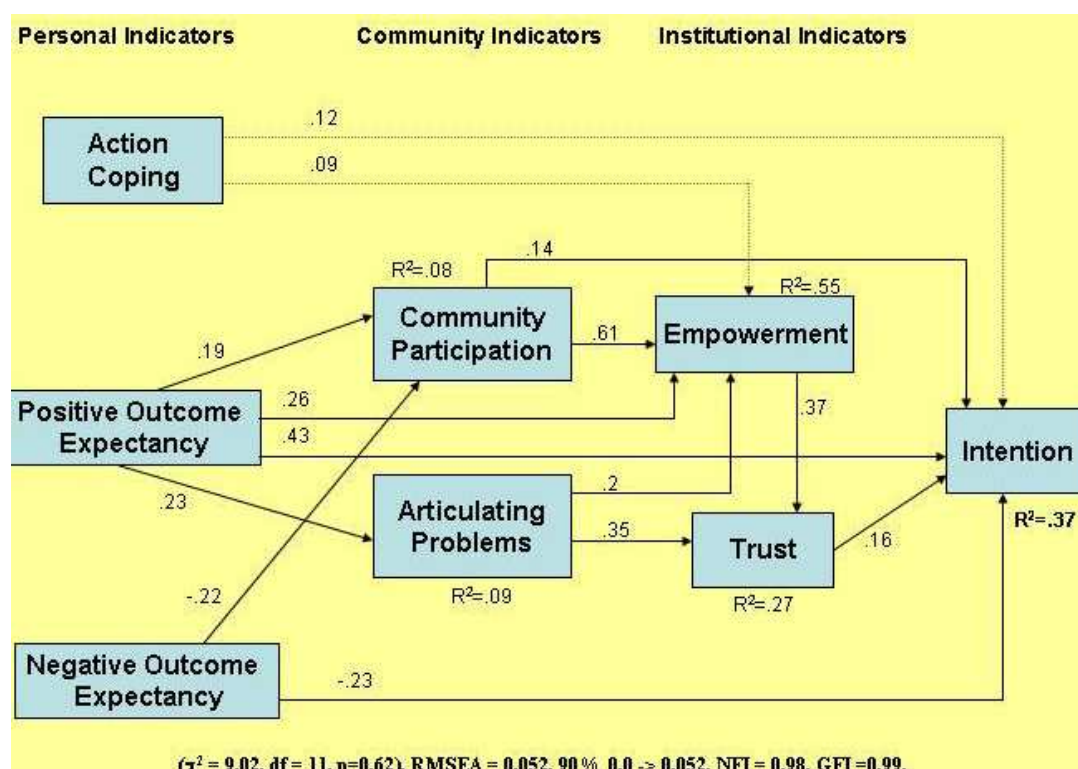


Fig 5.1 (After Paton 2006)

The interpretation of this model is that 37% of the variance of Intentions, which are considered as an indicator of community social resilience, can be explained in by the predictors (the rest of the variables) directly or indirectly. The main conclusion of the model is that we can change the level of resilience by manipulating the predictor variables. For example, by change in one standard deviation of in the predictor variable (e.g. positive outcome expectancy) will result in X (e.g. 19%) change in the standard deviation of target variable (e.g. community participation). However, from the perspective of evaluation of importance of community

participation it is important to notice that overall resilience in Paton's model is caused by many other factors from Individual to Institutional Levels. In such a situation, to increase the overall social resilience to the volcanic disasters the policy should focus not only on participation but on promoting individuals positive outcome expectancy, trust and on the third place, community participation, then action coping, and other variables indirectly influencing the level of social resilience. It is clear from this model that participation is an important but not the most important predictor of social resilience to the volcanic eruptions.

2.5 Kyoto, Shuhachi and Jouson communities' area model of social resilience.

As it was stated in the introduction, the modified Paton's approach is applied in order to assess the role and importance of community-based participatory earthquake risk management among many other potential predictors of resilience. The extension of the model is reflected in creating 2 new scales. The first is called Collective Action Coping of Place, and it reflects the belief in confronting problems in life collectively with the members of residential community (community of place). The second scale is called Collective Action Coping of Interest and it reflects the belief in confronting problems in life collectively with the members of outside community (community of interest) that can be school, work, friends, sports club etc. This distinction was made to capture the potential predictor of social resilience which may originate from outside of residential community. This differentiation makes this research original and distinctive from the others.

The study was carried out in July 2007 in Shuhachi and Jouson communities' area of Kyoto city in Japan. The 1000 questionnaires were distributed randomly in Shuhachi and 950 in Jouson communities respectively to the households. The response rate in Shuhachi was 15.2% (N=152) the response rate in Jouson was 11.4% (N=108).

2.4.1 Shuhachi and Jouson samples characteristics.

Sex * District Crosstabulation					
			District		
			Shuhachi	Jouson	Total
Sex	male	Count	74	51	125
		% within District	48.7%	47.2%	48.1%
	female	Count	69	52	121
		% within District	45.4%	48.1%	46.5%
	mising data	Count	9	5	14
		% within District	5.9%	4.6%	5.4%
	Total	Count	152	108	260
		% within District	100.0%	100.0%	100.0%

Table 5.2. Sex - Crosstabulation

As we can see from the table, the Sex ratio of male and female respondents is almost the same in both communities.

Age * District Crosstabulation					
			District		Total
			Shuhachi	Jouson	
Age	below 30	Count	18	16	34
		% within District	11.8%	14.8%	13.1%
	30-40	Count	12	13	25
		% within District	7.9%	12.0%	9.6%
	40-50	Count	21	15	36
		% within District	13.8%	13.9%	13.8%
	50-60	Count	30	21	51
		% within District	19.7%	19.4%	19.6%
	60-64	Count	12	12	24
		% within District	7.9%	11.1%	9.2%
	65-70	Count	18	10	28
		% within District	11.8%	9.3%	10.8%
	more than 70	Count	35	17	52
		% within District	23.0%	15.7%	20.0%
	missing data	Count	6	4	10
		% within District	3.9%	3.7%	3.8%
Total		Count	152	108	260
		% within District	100.0%	100.0%	100.0%

Table 5.3 Age - Crosstabulation

In terms of the age both samples differ a little for example in Shuhachi the percentage of respondents over 70 years old is 23% while in Jouson only 15.7%. On contrary in Jouson the percentage of people 30-40 years old is bigger than Shuhachi. We can say then that the Jouson respondents are younger than Shuhachi.

Type of house* District Crosstabulation

			District		
			Shuhachi	Jouson	Total
Type of house	house	Count	5	3	8
		% within District	3.3%	2.8%	3.1%
	apartment house	Count	3	3	6
		% within District	2.0%	2.8%	2.3%
	1 storey house	Count	10	3	13
		% within District	6.6%	2.8%	5.0%
	2 storey house	Count	51	26	77
		% within District	33.6%	24.1%	29.6%
	3 storey house	Count	22	12	34
		% within District	14.5%	11.1%	13.1%
	4 storey house	Count	0	1	1
		% within District	.0%	.9%	.4%
	1-4 storey apartment house	Count	20	4	24
		% within District	13.2%	3.7%	9.2%
	5-10 storey apartment house	Count	26	33	59
		% within District	17.1%	30.6%	22.7%
	11- storey apartment house	Count	5	17	22
		% within District	3.3%	15.7%	8.5%
	missing data	Count	10	6	16
		% within District	6.6%	5.6%	6.2%
Total		Count	152	108	260
		% within District	100.0%	100.0%	100.0%

Table 5.4 Type of house- Crosstabulation

When it comes to types of housing there are significant differences between those two communities. Jouson area respondents more frequently declare to live in high buildings (30.6% 5-10 storey building and 15.7% in higher than 11 storey building) while Shuhachi respondents more often declare to live in 1, 2 and 3 storey houses (5.5%, 33.6%, 14.5%) and 1-4 storey apartment houses (13.2%).

Ownership * District Crosstabulation

			District			
			Shuhachi	Jouson	Total	
Ownership	owned	Count	100	67	167	
		% within District	65.8%	62.0%	64.2%	
	rented	Count	44	37	81	
		% within District	28.9%	34.3%	31.2%	
	missing data	Count	8	4	12	
		% within District	5.3%	3.7%	4.6%	
	Total		Count	152	108	260
			% within District	100.0%	100.0%	100.0%

Table 5.5 Ownership – Crosstabulation

In terms of ownership of the housing units 65.8% of Shuhachi respondents declare to own the house while 28.9% declare to rent it. In Jouson 62% of the respondents declare to own the house and 34.3% declares to rent it. In Shuhachi the number of owners is bigger than Jouson however it is not the big difference.

Type of building * District Crosstabulation					
Type of building			District		Total
			Shuhachi	Jouson	
wooden	Count		77	33	110
	% within District		50.7%	30.6%	42.3%
concrete made	Count		66	69	135
	% within District		43.4%	63.9%	51.9%
missing data	Count		9	6	15
	% within District		5.9%	5.6%	5.8%
Total	Count		152	108	260
	% within District		100.0%	100.0%	100.0%

Table 5.6 Type of building - Crosstabulation

In terms of type of building Shuhachi and Jouson differ significantly. Almost 51% of the houses of Shuhachi respondents are wooden while only 30.6% of Jouson respondents live in this type of building.

Length of inhabitation * District Crosstabulation					
Length of inhabitation			District		Total
			Shuhachi	Jouson	
less than 1	Count		14	15	29
	% within District		9.2%	13.9%	11.2%
1-3	Count		12	16	28
	% within District		7.9%	14.8%	10.8%
3-10	Count		25	30	55
	% within District		16.4%	27.8%	21.2%
10-20	Count		24	8	32
	% within District		15.8%	7.4%	12.3%
20-30	Count		24	5	29
	% within District		15.8%	4.6%	11.2%
30-40	Count		13	2	15
	% within District		8.6%	1.9%	5.8%
40-50	Count		10	7	17
	% within District		6.6%	6.5%	6.5%
more than 50	Count		23	21	44
	% within District		15.1%	19.4%	16.9%
no data	Count		7	4	11
	% within District		4.6%	3.7%	4.2%
Total	Count		152	108	260
	% within District		100.0%	100.0%	100.0%

Table 5.7 Length of inhabitation - Crosstabulation

In terms of length of inhabitation Shuhachi and Jouson communities differ too. In Shuhachi there are 16.4% respondents declare to live there 3-10 years 15.8% declare to live there 10-40 years. In case of Jouson the most frequent groups recruit from those who declare to live there from less than 1 year (13.9%) 1-3 (14.8%) and 3-10 27.8%. People who declare to live more than 50 years in their respective communities comprise of 15.1% in case of Shuhachi and almost 20% in case of Jouson. It can be concluded that Jouson community may be characterized by numerous number of respondents who live there relatively short period of time while opposite situation can be observed in Shuhachi.

Occupation*District Crosstabulation					
		District			
			Shuhachi	Jouson	Total
Occupation ^a	company employee	Count	15	25	40
		% within District	9.8%	22.3%	
	government official, teaching staff	Count	7	5	12
		% within District	4.6%	4.5%	
	businessman	Count	25	23	48
		% within District	16.3%	20.5%	
	farmer	Count	2	0	2
		% within District	1.3%	.0%	
	housewife	Count	14	9	23
		% within District	9.2%	8.0%	
	part-time job	Count	12	5	17
		% within District	7.8%	4.5%	
	unemployed	Count	12	9	21
		% within District	7.8%	8.0%	
	a pensioner	Count	35	16	51
		% within District	22.9%	14.3%	
	student	Count	15	10	25
		% within District	9.8%	8.9%	
	other	Count	7	4	11
		% within District	4.6%	3.6%	
	missing data	Count	9	6	15
		% within District	5.9%	5.4%	
Total		Count	153	112	265

Percentages and totals are based on responses.

a. Group

Table 5.8 Occupations – Crosstabulation

Another dimension to see the differences between Shuhachi and Jouson communities is 'Occupations'. Jouson can be characterized by huge number (22.3%) of company employees and businessmen (20.5%) while Shuhachi by bigger percentage of pensioners (22.9%) and part-time workers (7.8%).

Affiliation to local organizations*District Crosstabulation

			District		
			Shuhachi	Jouson	Total
Affiliation with local organizations ^a	Town citizen's organization (Chonaikai)	Count	47	38	85
		% within District	29.6%	32.5%	
	Women organization (fujinkai)	Count	3	1	4
		% within District	1.9%	.9%	
	Welfare commissioner (minseiin)	Count	1	1	2
		% within District	.6%	.9%	
	Old people organization (roujinkai)	Count	2	6	8
		% within District	1.3%	5.1%	
	Local organization for disaster prevention (jishubosaisoshiki)	Count	6	6	12
		% within District	3.8%	5.1%	
	others	Count	12	6	18
		% within District	7.5%	5.1%	
	I do not belong	Count	28	19	47
		% within District	17.6%	16.2%	
	NPO	Count	1	0	1
		% within District	.6%	.0%	
	missing data	Count	59	40	99
		% within District	37.1%	34.2%	
Total		Count	159	117	276

Percentages and totals are based on responses.

a. Group

Table 5.9 Affiliation to local organizations – Crosstabulation

In terms of affiliation to local citizens organizations both communities doesn't seem to be very different. Around 30% of respondents from both communities declare affiliation with Chonaikai mentioned in the previous chapters. 3.8% of Shuhachi respondents and 5.1% of Jouson respondents declare affiliation with Jishubosaisoshiki. What is worthy to emphasize is the big percentage of respondents declaring that they do not belong to any organization (around 17%) as well as big number of missing data (over 30%). It is especially interesting because in the questionnaire respondents did not have an option "I do not belong" to check out. The "I do not belong" data comes from free answers to the option "others" where respondents wrote "I do not belong" ("shitenai" in Japanese).

Willingness to belong to local organizations*District Crosstabulation

			District		
			Shuhachi	Jouson	Total
Willingness to belong to local organizations ^a	Town citizen's organization (Chonaikai)	Count	33	30	63
		% within District	20.8%	25.9%	
	Women organization (fujinkai)	Count	2	3	5
		% within District	1.3%	2.6%	
	Welfare commissioner (minseiin)	Count	3	0	3
		% within District	1.9%	.0%	
	Old people organization (roujinkai)	Count	2	3	5
		% within District	1.3%	2.6%	
	Local organization for disaster prevention (jishubosaisoshiki)	Count	2	5	7
		% within District	1.3%	4.3%	
	others	Count	17	6	23
		% within District	10.7%	5.2%	
	I will not	Count	26	19	45
		% within District	16.4%	16.4%	
	NPO	Count	1	0	1
		% within District	.6%	.0%	
	missing data	Count	73	50	123
		% within District	45.9%	43.1%	
Total		Count	159	116	275

Percentages and totals are based on responses.

a. Group

Table 5.9 Willingness to belong to local organizations – Crosstabulation

20.8% of Shuhachi and 25% of Jouson respondents declare willingness to join Chonaikai. Only 1.3% of Shuhachi respondents declare to join Jishubo while over 5% of Jouson respondents declare the same will. Again the number of responses “I will not join” and missing data is very big in both communities. The respondents who admit to not to join any organizations and activities in their neighborhoods wrote this comment in the “others” field as it was in the case of “I do not belong” reported before.

In summary we may conclude that both samples are not different in terms of sex of the respondents. The age structure tells that Jouson is a little bit younger community. Significant differences can be found in housing. In Jouson the number of high-rise buildings appears to be bigger while in Shuhachi the bigger number of one, two and three – storey houses. More but not much more of the respondents who live in Shuhachi owns their housing units (65.8% vs. 62%). In contrary more but not much more of respondents from Jouson area rents their houses than in Shuhachi (34.3% vs. 28.9%). Buildings in Shuhachi are not only smaller but also very often wooden made unlike Jouson characterized by high 5-10 and over 11 – storey buildings. In terms of length of inhabitation Jouson community may be characterized by bigger number of respondents who live there relatively short period of time while opposite situation can be observed in Shuhachi area. The respondents of Jouson are more often company employees and businessman while respondents of Shuhachi are more often part-time workers and pensioners. When it comes to affiliation with local

organizations there are more similarities than differences. Around 1/3 of respondents in both communities declare affiliation with Chonaikai. Big number of missing data and answers “I do not belong” indicates that many people may not care about local activities in their communities. From the other side many over 20.8% of Shuhachi and 25.9% of Jouson respondents declare willingness to participate in local citizen’s organization in the future. In the contrary big amount of missing data and response “I will not belong” indicates that there are still many people who may do not care and have no will to join any community activities.

2.5 The components of the model

The initial model which consisted of those variables listed in the previous sections plus 2 additional scales has been developed with the intention of meeting the standards of Japanese social structure as well as to operationalize the definition of community by Webber (1963) who as a first sociologist differentiated between the ‘communities of place’ and ‘communities of interests. The importance of this differentiation lies in hypothesis that some groups of people in urban settings may be perceived as not resilient because of the fact that they do not tend to participate in any of their resident community (community of place) activities. They may be resilient by the tie with non-residential community (community of interest). To the best to author’s knowledge no one has tried to quantify and has shown the relationship between the above-mentioned 2 types of communities and social resilience to the earthquakes or other natural disasters. Therefore the 2 scales to quantify these concepts were created. Collective Action Coping with regard to Community of Interests and Collective Action Coping with regard to Community of Place, both variables represent the belief to collectively confront the problems in life with regard to the two types of communities, respectively.

2.6 Type of analysis

The type of analysis undertaken was as follows: First we used the Cronbach’s Alpha reliability test to check the psychometric qualities of the scales (SPSS->scales reliability test). The scales who met the psychometric standards (Cronbach’s Alpha bigger than 0.7) were included into the model and Structural Equations Models were created separately for Shuhachi and Jouson communities were created.

2.7 Results

The models of community social resilience to the earthquakes is shown in Fig. 5.2 and 5.3 The results of the modeling shows that in case of Shuhachi - 32% and Jouson - 29% (the number over the Intentions - box) of variance of the ‘Intentions’ – the variable that indicates the social resilience, is predicted by the predictor variables proposed in the model, and the rest of the variance is not explained by the model predictors.

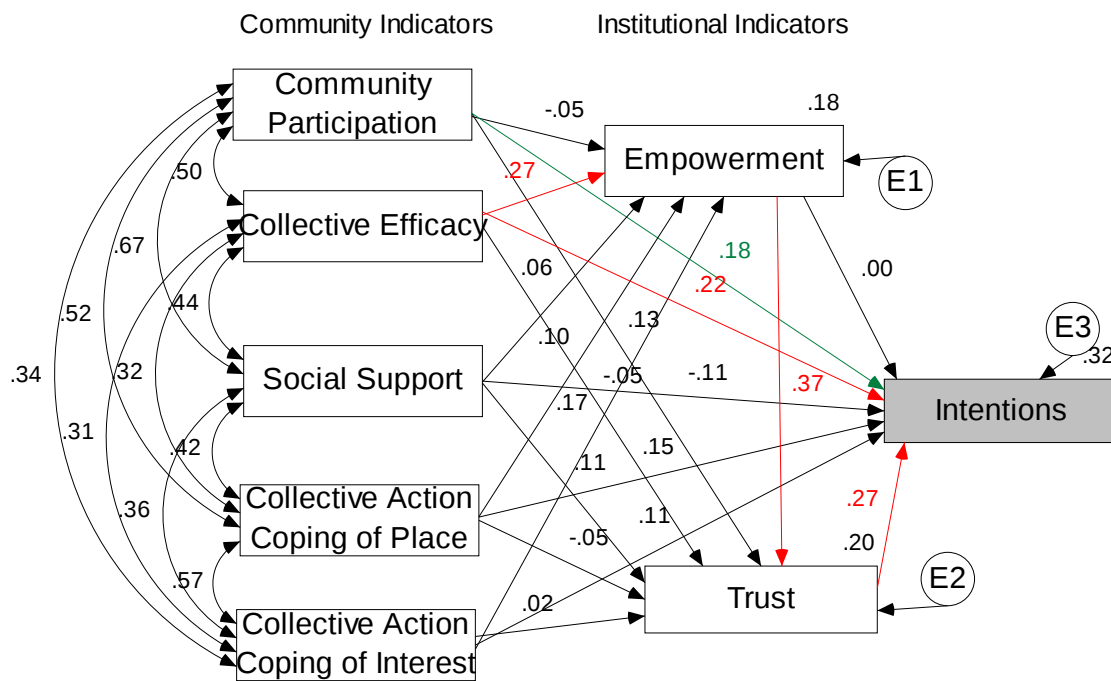


Fig. no 5.2 Social resilience model for Shuhachi area in Kyoto Japan.

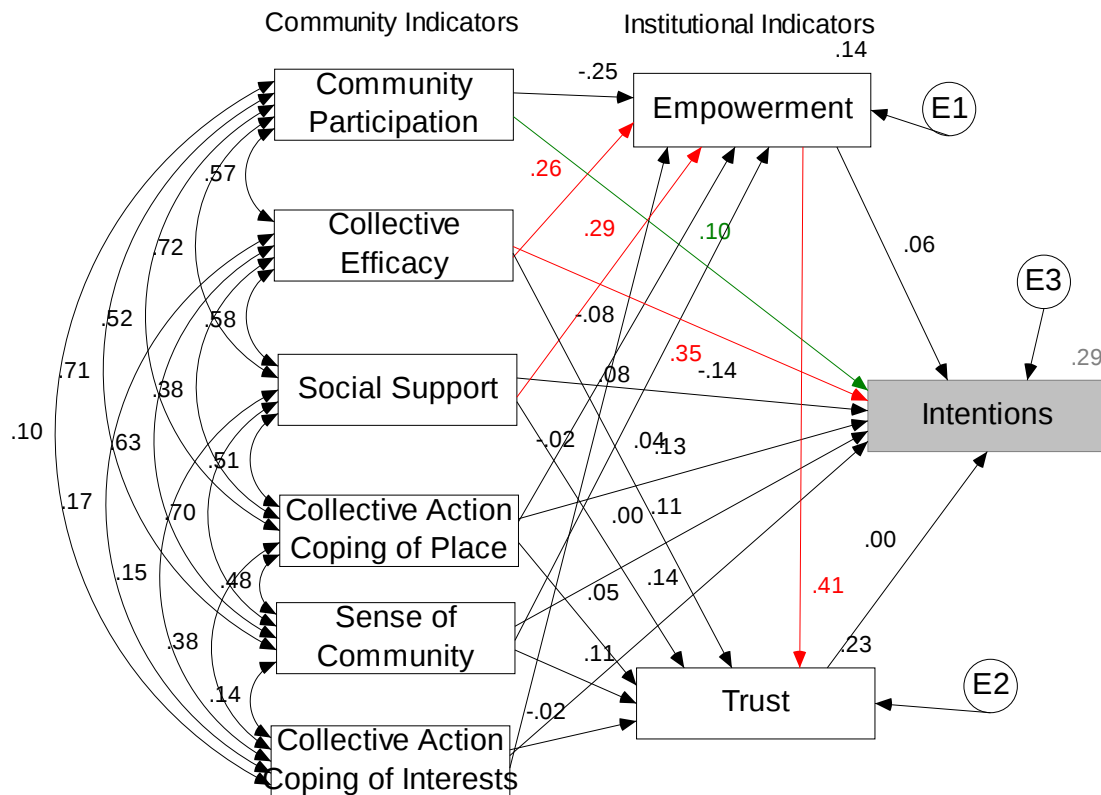


Fig. no 5.3 Social resilience model for Jouson area in Kyoto Japan

The numbers next to the arrows represent the standardized regression coefficient. Only the red arrows represent the statistically significant regression weights. The

green arrow represents the Community Participation direct influence on Intentions which is non-significant statistically (Shuhachi $P=0.071$, Jouson $P=0.090$).

As it was in previously explained Paton's model (Paton 2006), the main conclusion of the model is that we can change the level of resilience by manipulating the predictor variables. For example, by change in one standard deviation of in the predictor variable (e.g. collective efficacy) will result in X (e.g. 27%) change in the standard deviation of target variable (empowerment).

What is interesting in both models is lack of the Individual level variables. None of the individual level variables scored high enough on Cronbach's Alpha reliability test. This might have happened due to collective character of Japanese society (Hofstede (1980a p. 315.) However it also has to be said that both of crucial individual level variables scored not high enough but very close to pass the Cronbach's Alpha (Positive Outcome Expectancy and Negative Outcome Expectancy) which is an indicator that there is certain notion of growing individualism of Japanese society at least when it comes to the context of earthquake risk management. It also has to mentioned that Positive and Negative outcome Expectancies, when included to the model caused the bad model fit.

Instead of personal indicators we have numerous numbers of Community Indicators, five in case of Shuhachi and six in case of Jouson. When it comes to the Institutional Indicators, Empowerment as well as Trust were included in both models as well as in Paton's model of social resilience.

2.7.1 Main predictors of the social resilience in Shuhachi area.

The social resilience to the earthquake in the Shuhachi is predicted directly and indirectly by Collective Efficacy, indirectly by Empowerment and directly by Trust (Fig. no 5.2). Especially Collective Efficacy seems to be crucial in predicting social resilience to the earthquakes in Shuhachi area. Let us remind the definitions of predictor variables. Collective Efficacy has been defined "as social capital among neighbors combined with their willingness to intervene on behalf of the common good" (Sampson, Raudenbush, & Earls, 1997). It is conceptualized as the aggregate of individual willingness and intention to act. It may be a bridging construct between psychological empowerment and organizational empowerment (Peterson, Zimmerman 2004). Collective Efficacy as a belief does needs an organizational scheme to be exercised. Empowerment and Trust are defined as an institutional ability to use of resources made available by wider societal and institutional mechanisms for assisting community problem solving" (Paton 2006). The interpretation of the model would be that the notion of Collective Efficacy influences the preparedness decisions directly so and indirectly. It means that by increasing the Collective Efficacy by policy acts the overall social resilience to the earthquakes will increase too. Collective Efficacy affects Intentions also in indirect way through Empowerment and Trust in Local Government and Governmental Agencies which appear to be institutional vehicles for Collective Efficacy to finally to adopt earthquake hazard preparedness measures. This result stand in line with other research on Trust and Empowerment (Paton 2007) found to be good predictors of social resilience.

2.7.2 Main predictors of the social resilience in Jouson area.

Similarly to the Shuhachi model of social resilience in case of Jouson the main predictor of resilience is Collective Efficacy which affects Intentions directly and which affects Empowerment as in previous model of Shuhachi. The new variable to affect Empowerment is Social Support which may be defined as “capacity for tangible and instrumental support” (Paton 2006). However the difference between the Shuhachi and Jouson models is that besides very high and significant standardized regression coefficient between Empowerment and Trust, Trust has no significant effect on Intentions. The interpretation of this model would be that the notion of Collective Efficacy has no institutional mechanism to result in adopting earthquake hazard preparedness measures. It means that in order to increase Jouson social resilience to the earthquake disaster, management actions should create appropriate institutional schemes to facilitate this process. Particularly by working on regaining Trust in Local Government and related agencies

2.7.3 Role of Community Participation in overall social disaster resilience.

Finally the role of Community Participation in facilitating overall earthquake resilience will be examined. As it was mentioned before the Community Participation direct influence on Intentions is non-significant statistically (Shuhachi $P=0.071$, Jouson $P=0.90$). In other words the regression weight of Community Participation in the prediction of Intentions is not significantly different from zero at 0.05 level (two tailed). It does not mean that Community Participation has completely no influence on social resilience to the earthquakes. As it was mentioned before the responses to the questions regarding affiliation with local citizen's organizations as well as willingness to join local citizen's organizations and activities seemed to split the respondents, regardless of the residential area, into those who declared participation those who declared strong lack of interest in participation and also those who intended to join local organization's and activities.

3. Conclusions

In this chapter the way to quantify and assess the main predictors of social resilience to volcanic and earthquake disasters was described. It was done for the purpose of assessing the role of community participation as a predictor of resilience in order to design the appropriate policies to increase the overall community resilience to disasters.

In case of Auckland, New Zealand's case, overall resilience seems to be a function of several variables starting from individual, through community to institutional level predictors where community participation is an important predictor.

In the case of Shuhachi and Jouson, Kyoto, Japan the model of resilience seems to largely differ from the Paton's Auckland case. Firstly, because none of individual level predictors does not seem to be a valid predictor of social resilience to earthquakes, secondly, because of the fact that Community Participation has not proved to be a statistically significant predictor of social resilience to the earthquakes in Shuhachi neither Jouson area. The most important predictor, which makes Japanese case studies different from New Zealand case is Collective

Efficacy defined as “as social capital among neighbors combined with their willingness to intervene on behalf of the common good” (Sampson, Raudenbush, & Earls, 1997). In case study of Shuhachi it directly as well as indirectly influences the Intentions through two institutional level variables: Empowerment and Trust. Empowerment and Trust were found to be solid predictors of social resilience to the earthquakes also by others (Paton 2007). In case of Jouson area in spite of the fact that Trust does not predict the Intentions in anyway the role of Collective Efficacy is very similar.

Unlike in Auckland, the management actions in Shuhachi and Jouson areas should not yet focus on individual level variables but Institutional and community level variables especially Collective Efficacy, Empowerment and Trust. Community Individual level variables were not included to the model because of too low scores on Cronbach’s Alpha reliability test; however they almost reached the minimum which may mean that in the future they may play an important role as predictors of social resilience to the earthquakes in Japan. Participation is an important however not yet significant predictor of social resilience to the earthquakes in Japan. It also may play an important role as predictor in the future. Besides, the respondent’s answers to the participation related questions split them into distinctive groups of those who declare affiliation, those who declare the willingness to affiliate those who declare reluctance to it and big number of those who ignored this questions which may also imply reluctance toward participation. If so, Community Participation should not be the only management tool used by risk policy makers and managers.

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CHAPTER 6 – SUMMARY

1. Summary of the thesis

The aim of this thesis is to describe, evaluate a selected type of community – based participatory earthquake risk management approach, and the major focus is placed on the development of evaluation methods especially in terms of earthquake social resilience.

This thesis addresses two different but mutually complementary scopes.

- 1) community-based management (neighborhood scale),
- 2) overall evaluation of the social system which community (neighborhood) is a part of.

This thesis consists of 5 chapters. The first chapter introduced the background, research problem, methods employed to solve the research problem and the structure of the thesis.

Chapter 2 was devoted to literature review on participatory management and resilience. It discussed the purposes of using participatory management approach, and provided adequate definitions and key concepts. It describes also the history of participation, methods to evaluate the participation and some case studies which have already been performed by other authors. At the end of the chapter it discussed participatory processes in Japan, particularly in the context of disaster management.

In Chapter 3 we proposed a Mental Model Approach-based procedure for the evaluation of the impact of the workshops on participant's views. This chapter discussed the methodological issues on evaluation of events, workshops etc. The application of modified Mental Model Approach – based procedure to evaluate was described. The approach has been tested empirically and proved to serve well in the process of mapping and measuring the participant's views for the purpose of evaluation of workshop's effectiveness.

In Chapter 4 we examined the participatory management as a process that implies several 'in process variables' as 'Fairness', 'Competence', 'Sense of Community' and others. In this chapter we also examined the "Fairness and Competence" approach to the evaluation of participatory events, and we found that it may not have universal validity as it has been claimed in the preceding research work by others in Europe. We also examined the Jishubosaisoshiki role in the participatory management and found that within this scheme people are sometimes softly mobilized to join the meetings even if they did not wish to. Even so we found that they can benefit from the meetings as they perceived the value of learning through joining the meetings. Even if not truly 'Fair and Competent', the Jishubo scheme seemed to be effective in facilitating community resilience to the disasters.

Chapter 5 has discussed the role of the participatory management as one among many possible factors contributing to community social resilience to earthquakes. In this chapter we proposed to apply the Douglas Paton's approach to model disaster resilience. Scrutiny of his model has shown that in his model the Community Participation scores high but is not the main predictor of social community resilience. The main predictor of the community resilience is an individual level variable, Positive Outcome Expectancy. In contrary in the case studies from Shuhachi, and Jouson areas in Kyoto, Japan, Community Participation seems not to be a significant predictor of social resilience. Instead, the Collective Efficacy, Empowerment and Trust appear to be the strongest predictor of social resilience to earthquakes in Japan. Individual level variables as well as Community Participation however not statistically significant yet, they may be a good social resilience predictor in the future. The obtained results motivates us to think that the policy strategies for changing the level of social resilience to disasters should set up different priorities, dependent on geophysical and socio-cultural contexts, and therefore, globally assessed resilience policies for community-based disaster reduction in different areas and countries should take into account cultural differences. The new developed scales, Collective Action Coping of Interests and Collective Action Coping of Place have proved to be a good way of operationalization of theoretical construct proposed by Weber (1963). It is very important for planners, practitioners, community leaders in big cities to understand that residential community is not the only important factor to have influence on citizen's choices and behaviors related to disaster reduction.

2. Future research

The future research on evaluation of participatory approach and resilience should focus on:

- 1) Implementation of proposed methods by way of involving potential stakeholders in the same and other case study areas for the better assessment and evaluation of participation. This also requires continuous field works with enduring efforts by us researchers to develop and maintain communication channels with community key persons and other local residents
- 2) In terms of resilience modeling the future research should focus on expanding and integrate the social resilience model with other models (economical, infrastructural, business continuity management) to develop a more integrated approach for earthquake resilience.
- 3) Another advance in developing the model of social resilience will be differentiation among the importance of the disaster management related variables and disaster – management unrelated (ex. disaster related and disaster unrelated Community Participation) behaviors as a potential predictors of social resilience.

Continued attempts should be made to carry out field works in different areas and countries so that comparative analysis can be further made internationally and cross-culturally.

- 4) In this thesis outside help has not been taken account as a predictor of resilience. By outside help is meant ex. the sympathy or sentiment to some towns and places as was the case with one of the towns after the Great Hanshin-Awaji earthquake disaster in 1995

