COLLECTIVE ACTION FOR COMMUNITY-BASED HAZARD MITIGATION:

A CASE STUDY OF TULSA PROJECT IMPACT

A Dissertation

by

HEE MIN LEE

Submitted to the Office of Graduate Studies of
Texas A&M University
in partial fulfillment of the requirements for the degree of

DOCTOR OF PHILOSOPHY

August 2004

Major Subject: Urban and Regional Science

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Approved as to style and content by:

Donald A. Sweeney (Chair of Committee)	Dennis E. Wenger (Member)
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ABSTRACT

Collective Action for Community-Based Hazard Mitigation:

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(August 2004)

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During the past two decades, community-based hazard mitigation (CBHM) has been newly proposed and implemented as an alternative conceptual model for emergency management to deal with disasters comprehensively in order to curtail skyrocketing disaster losses. Local community members have been growingly required to share information and responsibilities for reducing community vulnerabilities to natural and technological hazards and building a safer community. Consequently they are encouraged to join local mitigation programs and volunteer for collective mitigation action, but their contributions vary. This research examined factors associated with Tulsa Project Impact partners' contributions to collective mitigation action. In the literature review, self-interest and social norms were identified and briefly discussed as two determinants to guide partners' behavior by reviewing game theoretic frameworks and individual decision-making models. Partners' collective interest in building a safer community and feelings of obligation to participate in collective mitigation action were

also considered for this study. Thus, the major factors considered are: (1) collective interests, (2) selective benefits, (3) participation costs, (4) norms of cooperation, and (5) internalized norms of participation. Research findings showed that selective benefits and internalized norms of participation were the two best predictors for partners' contributions to collective mitigation action. However, collective interests, participation costs, and norms of cooperation did not significantly influence partners' contributions.

DEDICATION

This dissertation is gratefully dedicated to:

my father Sangyoung Lee, Ph.D. and my mother Moonkyung Jun

whose endless support, encouragement, and love have sustained me

throughout my life;

my lovely wife Hyunsook Kim without whose support and tenacity,

not a word would have been written;

my beautiful daughter Kahyun and my son Daamh

for giving me their smiles.

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CHAPTER I

INTRODUCTION

1.1. Problem Statement

In 1997, *Project Impact: Building Disaster Resistant Community* was implemented as one of a few federal mitigation programs designed to facilitate community-based hazard mitigation (CBHM), and promote volunteer collective mitigation action (CMA) at the local community level. Project Impact had inspired local communities to take positive action for change by changing attitudes and behavior and instituting a pre-disaster mitigation program. Under Project Impact, the Federal Emergency Management Agency (FEMA) provided participating communities with technical and financial assistance (e.g., FEMA grants). Participating communities were to initiate their own mitigation programs with the seed money, organize a core group, campaign to mobilize resources from various public and private sectors, set long-term mitigation goals, assess natural and technological hazards, facilitate rational decision-making (e.g., scientific knowledge and social consensus basis), integrate fragmented mitigation efforts with day-to-day community life, fill in the gaps in the patchwork of regulatory enforcements, foster the development of social capital, communicate success stories, and gradually change the ways that communities organize to deal with disasters (Armstrong, 2000a; FEMA 2000; Geis, 2000; Krimm, 1998; Prater, 2001; Wachtendorf, 2001).

This dissertation follows the style and format of *Journal of the American Planning Association*.

Contrary to FEMA's original intention to help local communities initiate their own mitigation programs, local communities continuously struggled to maintain their initial momentum, sustain multiple-stakeholder involvement, and overcome organizational barriers (Nigg, Riad, Wachtendorf, Tweedy, and Reshaur, 1998; Tierney, 2000; Wachtendorf, 2001; Wachtendorf, Riad, and Tierney, 2000; Wachtendorf and Tierney, 2001). The Disaster Research Center (DRC) investigated seven Project Impact pilot communities in 1998, 1999, and 2000. Its research findings showed that local communities commonly identified the critical problems such as competition with other community priorities, partners' commitment to the program goals and activities, interagency communication and action, long-term funding sources, and public apathy. Especially, resource mobilization was one of the most critical issues associated with Project Impact and its implementation. Local communities definitely needed personnel and other type of resources to launch the program and sustain its momentum. The question was who was willing to pay costs for community-based hazard mitigation. For example, time was the critical issue because Project Impact projects were extra jobs for them. Project Impact partners were required to be passionate about the program and contribute significant amount of their time and effort to initiate the program.

Thus, partners' contributions of time and effort were selected to be the primary key issues for this study because many volunteer programs are subject to collective action problems. Theoretically, rational self-interest individuals tend to free ride rather than cooperate. Project Impact was also subject to collective action problems. The Disaster Research Center (DRC) again investigated ten non-pilot communities in 2000

and reported their partnership profiles in 2002 (Wachtendorf, Connell, Monahan, and Tierney, 2002). According to this report, 74% of the total number of partners were identified as active, ranging from only 46% of partners in one community to over 80% of partners in three other communities. Activity levels in the six remaining communities ranged from 63% to 79%. The question stemming from these research findings, then, is what accounts for such differences, i.e., what motivates partners to sustain their contributions to the program activities of Project Impact or what factors create such differences among communities?

In the disaster literature, collective action theory is mainly focused on providing generalizable explanations for some forms of emergent crowd behaviors associated with riots (McPhail, 1971), collective flights (Aguirre, Wenger, and Vigo, 1998) and mass assaults (Wenger and James, 1994) at specific social settings during the disaster or immediate post-disaster periods. Some disaster scholars studied the effectiveness of interorganizational networks on improving local preparedness during the pre-disaster periods (Gillespie, Colignon, Banerjee, Murty, and Rogge, 1993) or the organizational effectiveness of Local Emergency Planning Committee (Lindell 1994; Lindell and Whitney, 1995). However, there were few empirical studies of various forms of collective preventive action at the local community level during the pre-disaster period.

This paper investigates the patterns of partners' contributions to Project Impact which were launched to facilitate community-based hazard mitigation and identify factors influencing their contribution behavior. In the collective action literature, rational choice theorists provided various conceptual models to explain an individual's

contribution behavior. According to them, an individual's decision (D) to volunteer for a collective action program can be defined as a function of three motivational predispositions to act: (1) rational choice; (2) normative conformity; and (3) affective social bonding (e.g., Decision (D) = Rational Choice*b_1 + Normative Conformity*b_2 + Affective Social Bonding*b_3, Knoke, 1988). Tulsa Project Impact (the former Tulsa Partners) was selected as a case for an investigation of collective action because of its reputation as one of the most successful Project Impact communities and its large number of partners - almost 400.

1.2 Research Objectives

This study will examine the relationships of five determinants of collective action (specifically (1) collective interests, (2) selective incentives, (3) internalized norms of participation, (4) norms of cooperation, and (5) participation costs) with partners' contributions to Tulsa Project Impact which was established as a community-based hazard mitigation organization in 1998.

The study objectives are:

- To test the relationships between partners' collective interests and their contributions
- To test the relationships between partners' perceptions of selective benefits and their contributions
- To test the relationships between partners' internalized norms of participation in the local mitigation program activities and their contributions

- To test the relationships between partners' agreement with the norms of cooperation and their contributions
- To test the relationships between partners' perceptions of selective costs and their contributions

1.3 Anticipated Benefits of the Research

Research findings from this empirical study are expected to contribute to the scientific understanding of collective action for community-based hazard mitigation. First, it may help to determine the extent to which predictors better explain partners' contributions to community-based mitigation programs to help estimate and develop contribution models for various forms of collective preventive actions. Predictors can be grouped into three basic schools of rational choice, social bonds, and normative incentives (Oliver, 1993). Almost all research of collective action may fall within these three schools, and the majority of collective action articles argue pro or con against those predictors and models. Many parts of collective behaviors are well documented, scientifically proven, and explained by some important predictors and theories, but they still need more study. Moreover, various collective action problems associated with disaster response or implementing community-based hazard mitigation often demand scientific evidence. Thus, research findings may provide empirical evidence to identify predictors or models which better explain individuals' contributing behaviors in specific community-based hazard mitigation contexts.

In addition to its scientific contribution, this study will also provide practical benefits for local emergency managers, local mitigation program directors or coordinators, or other decision makers. For example, contribution models may help clarify individuals' collective behaviors and set strategies for overcoming collective action problems, mobilizing local resources, coordinating local hazard mitigation efforts, and eventually facilitating community-based hazard mitigation. Thus, the major beneficiaries of this research will be local community-based mitigation program coordinators and emergency managers.

1.4 Organization of the Dissertation

Chapter II will review the literature related to this research. First, this chapter will briefly summarize the general background of community-based hazard mitigation. Second, it will briefly review previous research findings on collective action for disaster-generated or disaster management relevant settings. It will also look into the concepts, theoretical mechanisms, and determinants of collective mitigation action. Finally, this chapter will identify determinants of collective action (e.g., collective interests, selective incentives, internalized norms of participation, norms of cooperation, and participation costs) based on previous research and theoretical mechanisms of collective action and relate them to individual contribution.

Chapter III will introduce and discuss rational choice theories and a collective interest model related to this research, and include social norms as predictors of collective action. It will also develop rationale hypotheses from the literature review

discussed in previous literature and a conceptual contribution model to test these hypotheses.

Chapter IV will address the study design, study area, population, and unit of analysis. This chapter will describe research methods such as survey procedures and statistical analysis and will finish with the discussion of study variables and measurements.

Chapter V will show analyses and findings testing these hypotheses. It will discuss statistical analyses including scale reliability tests, descriptive statistics of variables, correlation analyses, independent-sample t tests, Analysis of Variance (ANOVA) tests, and hierarchical regression analyses to test the hypotheses.

Chapter VI will provide conclusions from the major research findings of this study, contributions, implications, recommendations for future study, and study limitations.

CHAPTER II

LITERATURE REVIEW

2.1 Introduction

This chapter reviews the literature related to collective action for community-based hazard mitigation. It seeks to identify the principal variables thought to influence individual partners' contributions. The first part of the study discusses recent trends in natural disaster losses and social causation of disaster losses. The second section discusses the concept, definition, and characteristics of community-based hazard mitigation. The third section describes the previous research findings associated with collective preventive action and the concept of collective action through game theoretic perspectives.

2.2 Background of Community-Based Hazard Mitigation

2.2.1 Recent Trends in Natural Disaster Losses

Since 1950, the federal government has devoted a significant amount of time and effort to reducing natural disaster losses[1]. A variety of hazard mitigation policies and programs (e.g., Hazard Mitigation Grant Program, Flood Mitigation Assistance Program,

[1] National Research Council (NRC, 1999) identified and discussed four basic concepts for disaster loss estimation: the impacts of a disaster, the losses of disasters, the costs of disasters, and the damages. According to NRC, the impact of a disaster is the broadest concept of loss estimation including both "market-based and non-market effects." For this study, however, this term will not be discussed because it will be treated as a general term defined as "the force or impetus transmitted by a collision" in discussion of the human-hazard interaction model later on. Instead, disaster loss will be discussed in the broadest terms, including disaster cost and damage. NRC defined disaster losses as "market-based negative economic impacts", which consist of direct losses (e.g., physical destruction of buildings and crops) and indirect losses (e.g., unemployment).

Pre-Disaster Mitigation Program, and National Flood Insurance Program) have been formulated, implemented, and renovated to improve intergovernmental governance and reduce disaster losses (Godschalk, Beatley, Berke, Brower, and Kaiser, 1999; Mileti, 1999). Nevertheless, natural disaster losses in the United States have dramatically increased rather than decreased during the past two decades (see Figure 2-1). From 1975 to 1998, natural disasters were estimated to cost over $300 billion in property and crop damage with nearly 9000 deaths (Mitchell and Thomas, 2002). Federal government payouts alone averaged $4 billion between 1988 and 1997. The federal government usually uses multi channels to provide federal disaster assistance effort. Most are federal agencies such as the Small Business Association (SBA), U.S. Army Corps of Engineers (USACE), Department of Transportation (DOT), and the Federal Emergency Management Agency (FEMA). Since 1992, FEMA has taken the leading role in providing federal payouts (National Research Council, 1999). From 1990 to 1999, FEMA alone spent more than US$25.4 billion for declared disasters and emergencies. This amount is almost 6.5 times higher than FEMA's disaster costs (about US$3.9 billion in current dollar value) from 1980 to 1989.

Characteristically, overall death tolls resulting from natural disasters were curtailed between 1975 and 1998 thanks to accumulated scientific knowledge about hazard agents and the development of forecasting, warning, and communication technologies (Burby, 1998; Mileti, 1999). However, property and economic losses have dramatically increased. People can evacuate, but residential buildings and critical facilities remain within hazard prone areas. Disaster losses have increased with the

growing number of properties within hazard prone areas. Kunreuther and Roth (1998) discussed the threshold that Property Claims Services revised to define a catastrophe. According to them, Property Claims Services set $1 million of insured, direct property damage as the threshold for a catastrophic natural event in 1949, but revised it to $5 million in 1983. In 1989, it reset the threshold at $25 million. In 1997 they counted the number of major events only exceeding the thresholds set at the time between 1949 and 1988 and the total amount of their disaster costs. They compared them with those between 1980 and 1989. A total of 933 major events resulted in costs of $22 billion between 1949 and 1988, but the 317 major events between 1989 and 1997 incurred costs of $79 billion.

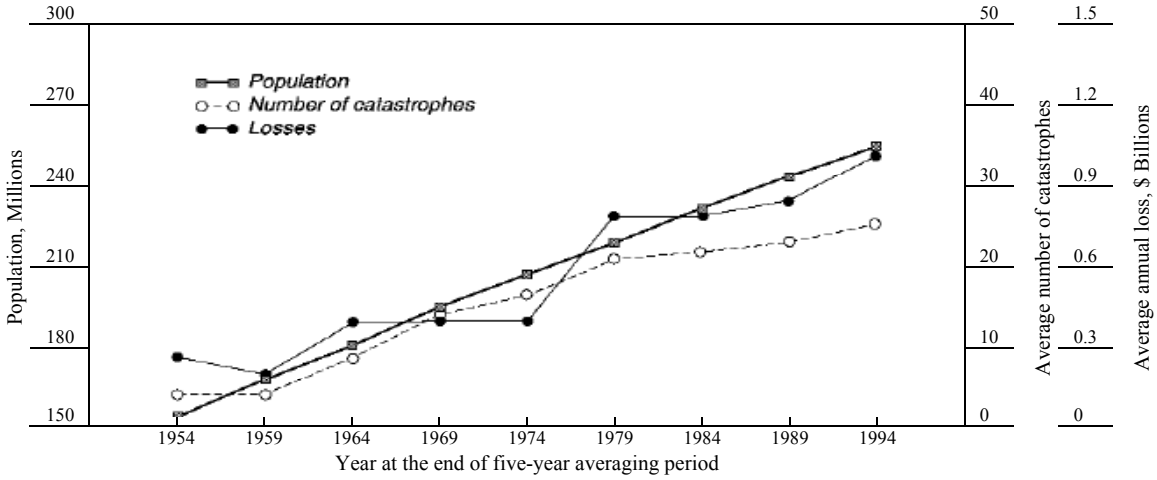

Figure 2-1 Increasing trends – based on catastrophes that caused losses between $10 million and $100 million – for five-year periods include the number of catastrophes, the amount of loss from these catastrophes, and the U.S. population.
Source: Changnon et al. 1997.

During the past two decades, the United States has experienced multi-million dollar disaster losses almost annually and especially suffered from four multi-billion dollar disaster losses between 1989 and 1994: the Loma Prieta earthquake in 1989, Hurricane Andrew in 1993, Midwest Floods in 1993, and the Northridge earthquake in 1994. Of course, a few catastrophic natural events were inevitable and the major reason for recently skyrocketing disaster losses (Armstrong, 2000a). However, overall disaster losses have increased through the decades, and are expected to continue increasing due to social, economic, political, and cultural factors (McEntire, 2000; Mileti, 1999; Mitchell and Thomas, 2001).

2.2.2 Social Causation of Natural Disaster Losses

What is a disaster? What contributes to disaster losses? There are several schools of disaster scholars who have contributed answers to this question. Geographers, political scientists, and social constructionists define disaster based on their own academic perspectives. For example, geographers are primarily concerned about disaster agents' physical entity (e.g., hurricane, flood, tornado, etc.), physical characteristics (e.g., in terms of magnitude, speed of onset, scope of impact, and duration of time), and consequences of physical impacts (e.g., saffir-simpson scale). This paper takes a sociological perspective, viewing disaster as a social indicator of how vulnerable the human system is against natural and technological hazards in terms of hazards, social capacity, and social disruption. If a category four hurricane lands on coastal areas without people or property, it is just a natural phenomenon. Without social disruption,

we cannot see it as a disaster. So Fritz (1961) defined it as any event that is "concentrated in time and space, in which a society or a relatively self-sufficient subdivision of society, undergoes severe danger and incurs such loses to its members and physical appurtenances that the social structure is disrupted and the fulfillment of all or some of the essential functions of the society is prevented." Barton (1969) also defined it as a type of collective stress situation in which “many members of a social system fail to receive expected conditions of life from a system.” Similarly, Quarantelli (1998) defined it as a catastrophic situation by which normal life is severely disrupted.

The human-hazard interaction model provides a useful framework to understand the dynamic mechanisms of disasters. This model views natural disasters as a conflict between the earth’s physical system and the human use system, which can be moderated by hazard adjustments (Mileti, 1999; Mitchell and Thomas, 2002; White, 1974). Disaster occurs when extreme natural events bring massive destructive energy onto the human use system. Those extreme natural events trigger chain impacts: direct and indirect impacts. They cause the primary physical impacts on constructed physical environments such as residential buildings and critical facilities as well as directly generating human casualties. The primary physical impacts are usually followed by secondary social and economic impacts on the human use system. For example, breakdown of infrastructure may cause business disruption or losses, which in return cause an increase in unemployment and a decrease in local tax revenues. So the human use system, with high vulnerability to hazards but low capacity to cushion that energy, is more vulnerable to hazards. Even small natural events can result in catastrophic hazard

consequences (Mileti, 1999). Here, the term vulnerability can be defined as "the degree of loss to a given element at risk or set of such elements resulting from the occurrence of a phenomenon of a given magnitude" (Buckle, Mars, and Smale, 2000, p. 9) and expressed on a scale of 0 (no damage) to 1 (total loss). The problem is that the social and economic sectors in contemporary human society are growing interdependently with each other, continually increasing community vulnerabilities to hazards. Thus, it is critical to continually monitor the interactions and the changes among the earth's physical system, the human-use system, and constructed system, and to inventory and mobilize local resources for hazard reduction.

Decades ago, Gilbert White (1974) pinpointed the social causation of disasters: disaster is a man-made phenomenon. The human use system inevitably collides with the earth's physical system every time people expand their activity areas to meet spatial demands. The growing number of people has steadily encroached on hazard-prone areas. The demographic indicators of social vulnerabilities to natural hazards (e.g., population size, growth rates, composition, distribution, and mobility) confirm this trend. For example, population in the coastal counties of four states (Florida, Louisiana, North Carolina, and Texas, in which almost 60 percent of hurricanes landed from 1900 to 1994) increased by 140 percent: from about 11.6 million people in the 1960 U.S. census to over 27.9 million in the 2000 U.S. census. Many of them have never previously experienced hurricanes, so they tend to regard hurricanes as unlikely emergencies, and often take no action to protect their lives and properties.

Historically, people have settled in hazard prone areas such as riversides, coasts, slopes, and wetlands for transportation, defense, or agricultural purposes. Most big cities and towns have been located and developed along the coasts and rivers because their floodplains provide rich soil for agriculture, flat slopes suitable for easy building construction, and cheap waterborne transport to facilitate trade and commerce (Mileti, 1999). Most of them are in scenic areas which are attractive places for human occupancy. Thus, land development and immigration into these risky areas has always been tempting. However, population growth, development, farming, deforestation, and growing land ownerships have resulted in increasing amounts of wetlands being destroyed. Nationally, more than 50 percent of wetlands have been destroyed or developed for other purposes and in some states, more than 95 percent of wetlands have been affected (Hunt, Krabbenhoft, and Anderson, 1996). Destroyed wetlands cannot function as natural sponges for flood waters. Moreover, deforested lands cannot hold water flows, thus causing sediment induction into rivers raising the river-beds. Urbanization hardens land surfaces, and increase runoff. Increased runoff again contributes to increasing the volume and velocity of water flows (Marsh, 1998; Mileti, 1999). The Midwest Floods of 1993 best demonstrate how unwisely used lands produced catastrophic hazard consequences.

2.2.3 Community-Based Hazard Mitigation

During the past two decades, disaster scholars' and practitioners' primary concerns have slowly shifted to hazard mitigation as the cornerstone for emergency

management: how to facilitate proactive hazard mitigation approaches for substantially and permanently reducing community vulnerabilities to natural and technological hazards. Hazard mitigation (see Table 2-1) is a kind of hazard adjustment aimed at eliminating a source of danger, reducing exposure to a hazard, or minimizing the magnitude of its deleterious impacts on social and economic activities and usually implemented during non-event periods (Burton, Kates, and White, 1978; Lindell, Alesch, Bolton, Greene, Larson, Lopes, May, Mulilis, Nathe, Nigg, Palm, Pate, Pine, Tubbesing, and Whitney, 1997; White, 1974). Community-based hazard mitigation (CBHM) refers to more comprehensive, holistic hazard mitigation approaches which are able to vertically (e.g., federal, state, and local levels) and horizontally (e.g., public, private, and voluntary sectors) integrate potential stakeholders' mitigation efforts at the local community level rather than rely on a few single professional channels related to emergency management for problem solving (Geis, 2000). In fact, it is obviously beyond local emergency managers' ability to inventory social vulnerability indicators, collect and update data, monitor their changes, and guide preventive actions (Gillespie, 1991).

New alternative conceptual models for community-based hazard mitigation (CBHM) have recently been developed and implemented: for example, the sustainable community (Aguirre, 2002; Beatley, 1998; Berke, Kartez, and Wenger, 1993; Mileti, 1999; Schwab, Topping, Eadie, Deyle, and Smith, 1998; Twigg, 2001) and the disaster resilient community (Armstrong, 2000a, 2000b; Geis, 1996, 2000; Krimm, 1998; McEntire, 2000; Prater, 2001; Wachtendorf, 2001). The ultimate goal of these

conceptual models is to make at-risk communities better and safer by changing people's attitudes and behaviors. These models commonly have some basic key elements of community-based hazard mitigation such as people's participation and resource mobilization, hazard assessments, scientific knowledge-based decision making, prioritization of local mitigation needs and tasks, identification of community-specific hazard mitigation measures, plus linkages with outside resource holders (Victoria, 2002).

Table 2-1 Definitions of hazard mitigation

Source	Definitions
The Stafford Act (44 CFR 206:401)	"…sustained action taken to reduce or eliminate the long-term risk to human life and property from natural hazards."
FEMA	"…the ongoing effort to lessen the impact disasters have on people's lives and property through damage prevention and flood insurance."
National Research Council (1991)	"…actions taken to prevent or reduce the risk to life, property, social and economic activities, and natural resources from natural hazards."
Mileti (1999)	"…policies and activities that will reduce an area's vulnerability to damage from future disasters."

2.2.4 Why Community-Based Approaches?

Previously, various hazard mitigation plans and policies (e.g., Hazard Mitigation Grant Program and National Flood Insurance Program) were formulated, implemented, and renovated to improve intergovernmental governance and reduce natural hazards (Godschalk, Beatley, Berke, Brower, and Kaiser, 1999). However, research findings continue to show a gap between the social scientists' recommendations for mitigation planning practices and what has actually been applied to hazard reduction (Alesch and Petak, 2001; Armstrong, 2000a; May and Burby, 1997; May and Williams, 1986; Mileti,

1999). This gap shows that hazard mitigation policies and programs have often failed to overcome local barriers. For example, the National Flood Insurance Program (NFIP) was started by the federal government in 1968 to reduce repeated flood disaster losses. Nationwide more than 19,000 communities joined the National Flood Insurance Program by 2001, but only about 900 of them joined the Community Rating System (CRS), which was designed to encourage communities to comply with FEMA requirements. According to the National Weather Service, flood disasters remain a major problem and cost the United States approximately $5.2 billion annually between 1980 and 1990. Moreover, flood insurance results in officially giving developers and property owners permission to develop within hazard prone areas, encouraging development within those risky areas rather than reducing flood disaster losses (Larson and Plascencia, 2001).

Local government is one of the biggest stakeholders for building safer communities and protecting civilians' lives and properties, but it often fails to comply with federal and state mitigation policies. May and Williams (1986) identified and discussed several reasons for this. First, most local governments lack the capacity to thoroughly implement those policies (May and Burby, 1997). Most local communities are primarily concerned about the impact of hazard mitigation on economic development. They believe that hazard mitigation is "restrictive, costly, and first of all incompatible with their economic development goals" (NRC, 1991). So they prefer disaster relief or structural mitigation, which may create minimum economic impacts. However, disaster relief is costly but does little to control long-run growth of disaster losses. Structural mitigation provides only temporal prevention, but gives people a false

sense of security which can lead to catastrophic consequences. Second, local bureaucrats are afraid of potential blame when mitigation plans and policies fail, while politicians are more interested in other politically sensitive issues such as crime and education. Berke (1998) found that most local decision-makers are aware of natural hazards, but their hazard awareness does not necessarily lead them to taking preventive action. In the private sector, lack of hazard awareness, optimism about hazard consequences, and public apathy also cause inaction (Auf Der Heide, 1989; Mileti, 1999). For example, "a disaster cannot happen to me" attitude accounts for population inaction. Marginally profitable small businesses often lack resources or are too busy to take preventive action. Consequently, hazard mitigation almost always takes low priority in local political agendas (Prater and Lindell, 2000), usually being implemented after disaster strikes (Birkland, 1997; Mileti, 1999).

The very purpose of community-based hazard mitigation models is to overcome such local barriers and encourage stakeholders to take proactive actions for hazard reduction. Two concepts are identified for community-based hazard mitigation approaches. The first one is that hazard mitigation should be implemented with localities, not for localities. This notion stemmed from the growing consensus among disaster scholars and practitioners that local communities should be taken as the primary focus of attention for hazard reduction because: 1) every disaster is local; 2) a local community is often a common unit for responding to disasters; and 3) a local community knows best what it needs for hazard reduction (Henstra, 2003; Mileti, 1999). Thus, local communities should actively take a leading role to facilitate rational hazard management

systems, not just passively join federal mitigation programs. Communities need to conduct hazard assessments themselves, identify and assess local mitigation needs, and develop and implement their own community-wide hazard mitigation plans and policies. The role of the federal government is restricted to providing financial and technical support as a partner for local communities to achieve their common mitigation goals.

The second notion is that all stakeholders in hazard-prone communities should share both risk exposure and mitigation responsibility (Comfort, 1999). This notion stems from the following premises that: 1) today almost all social, economic, and environmental sectors are becoming more and more interdependent, so they are highly vulnerable to hazards; 2) individuals or any single business cannot be safe without community safety (Geis, 2000); and 3) ethically, risk generators and distributors should take the primary responsibility for taking preventive action (Beatley, 1994). For example, a great number of small businesses suffered from the 1994 Northridge Earthquake because they experienced severe business disruption or had to close due to the breakdown of lifelines even when they had no direct physical impact. In the 1992 Hurricane Andrew, building code violation resulted in catastrophic hazard consequences. Such damages could be reduced if appropriate preparedness and mitigation measures were properly implemented or buildings were thoroughly inspected by relevant authorities.

Such notions of community-based hazard mitigation stem from strong ethical grounds in which human activities and uses of natural resources should be compatible with surroundings or adjacent use including future use (Aguirre, 2002; Beatley, 1994,

1998). Historically, urban growth has occurred in hazard-prone areas with little consideration given to its impact on ecological systems and increased vulnerability to hazards. These ongoing destructive patterns of land development collectively generate various types of externalities and liabilities which again contribute to soaring and repetitive disaster losses. The chain of disaster losses generates moral concerns because they are unethical, and localities should take the primary responsibility for them.

Similarly, Beatley (1998) stated that the vision of sustainable development is the moral statement about how we should be living on the planet. Community-based hazard mitigation can facilitate a proactive process capable of regenerating and reproducing a better pattern of disaster management over time to prevent harm. It emphasizes individuals' ethical obligation to the community, the environment, and future generations. Thus, stakeholders should be encouraged to voluntarily participate in collective action as owners and producers for reducing community vulnerability. They can help identify local mitigation needs, prioritize mitigation strategies based on needs identification, mobilize resources to match mitigation needs, channel resources to local mitigation projects, and share accountability (Gillespie, 1991; Mileti, 1999; Schwab, Topping, Eadie, Deyle, and Smith, 1998).

2.3 Collective Action for CBHM

A growing number of local communities have set sustainable community or disaster resilient community as their common mitigation goal to encourage community members to voluntarily participate. Such long-term mitigation goals can be achieved

only when stakeholders: 1) join local mitigation programs as a partner, 2) agree on goals, tasks, and responsibilities, and 3) share the same willingness, motivation, commitment, and desire to openly and steadily share their resources and experiences in concert. Benefits from joining collective action for community-based hazard mitigation (CBHM) are obvious: improved efficiency, cost-effectiveness, and reducing duplicated mitigation efforts (Gillespie, Colignon, Banerjee, Murty, and Rogge, 1993). Thus, stakeholders in hazard-prone communities are encouraged to participate in community-based hazard mitigation programs for making their community safer. This subsection briefly discusses collective action problems associated with such participation.

2.3.1 CBHM as Collective Good

Böhm-Bawerk (1962, p.39) defined goods as "those things which serve human beings as the means and tools for the attainment of their personal well-being." Community-based hazard mitigation (CBHM) as a collective good is implemented to serve local community members as a means to protect their lives, businesses, and properties from disasters and to improve the quality of life. Reddy (2000) argues that hazard mitigation as a collective good can be defined by three elements: non-excludability, jointness of supply, and non-rivalry (Barry and Hardin, 1982; Erev and Rapoport, 1990; Oliver, 1993; Olson, 1965; Burgess and Robinson, 1969; Taylor, 1978). For example, Cowen (1988, p. 3-4) said, "Non-excludability refers to the impossibility of preventing non-paying individuals from enjoying the benefits of a good or service." It is not possible to exclude anyone from sharing in the collective good once it has been

demanded. Community-based hazard mitigation cannot exclude non-contributors from enjoying benefits such as community safety. For example, marginally profitable small businesses, which are assumed to lack time and resources to join community-based hazard mitigation, may still enjoy collective benefits from improvement of lifelines such as water, gas, and electric facilities. Secondly, the costs of private goods must be proportional due to their scarcity and market demands. This is called zero jointness of supply. As seen with bridges or roads, however, a collective good costs the same no matter the number of individuals enjoying it. Similarly community safety does not put an additional charge on stakeholders at risk or disaster victims because safety cannot be reduced by another individual consumption. Finally, Cowen (1988, p. 3-4) again said " Non-rivalrous consumption refers to cases in which individuals' ability to consume a good or service is not diminished by allowing additional individuals to consume it." Rational self-interested individuals compete for private goods, but free rides avoid rivalry for collective goods in the market.

2.3.2 What Is Collective Mitigation Action?

Generally the term collective action refers to anything people do together. Since Olson (1965) in his book *the Logic of Collective Action* defined collective action as actions which provide a shared good, most social scientists have used his definition. For example, Bogdanor (1987, p 113) defined collective action as actions taken by a group of people "to further their common interest." Oliver (1984, 1993) and Oliver and Marwell (1993) defined it as any actions "in pursuit of collective goods." Elster (1985)

also discussed collective action as "the choice by all or most individuals of the course of action that, when chosen by all or most individuals, leads to the collectively best outcomes." He again defined the course of action as "cooperative behavior."

For this study, the term collective mitigation action (CMA) will be defined and used to clarify collective preventive actions because collective action itself refers to any group action. The term needs to be specified for hazard mitigation settings as a specific social setting during the pre-disaster period. This paper defines collective mitigation action as preventive actions taken by a group of people to achieve common mitigation goals such as building a disaster resilient (or resistant) community. So collective mitigation action narrowly means group work in which all disaster stakeholders are invited to participate voluntarily and collectively take preventive actions for reducing community vulnerabilities to both natural and technological hazards or eliminating long-term risks. Broadly, collective mitigation action, however, may imply all the concerted efforts and agreements of federal, state, and local disaster stakeholders in a hazard-prone community, acting both independently and in groups to produce and distribute collective goods and services to all those in the community in order to further their common interests and mitigation needs.

2.3.3 Previous Studies of Collective Preventive Action

In the disaster literature, many disaster scholars studied the non-institutionalized emergent forms of collective behavior such as mass assault (Hull and Wenger, 1992; Mileti and O'Brien, 1991; Wenger and James, 1994) and collective flight (Aguirre,

Wenger, and Vigo, 1998) in the specific social settings generated during disaster or immediate post-disaster periods. It is a well-known social phenomenon that people volunteer for searching and rescuing disaster victims. It was relatively well documented who volunteers or what motivates them. Disaster scholars questioned why people joined such collective behaviors in that specific situation and what made their behaviors different. For example, they studied the demographic characteristics of volunteers and their underlying psychological motivations (Wenger and James, 1994). Some volunteers may coverage on a scene through their proximity to the event. Some disaster scholars, including Dynes and Quarantelli (1980) and Kreps and Borsworth (1994), identified and classified the types of volunteers in the disaster-generated settings in various ways: for example, typologies of the extending, expanding, and emerging forms of volunteers based on their roles and tasks related to disaster response.

However, there were few empirical studies asking why so many individuals and organizations voluntarily participate in collective action for community-based hazard mitigation in social settings during the normal daily pre-disaster period. Although their study was not focused on mitigation settings, Gillespie and his colleagues' (1993) study of interorganizational partnerships for disaster preparedness among disaster service organizations and disaster relevant organizations in the St. Louis metropolitan area provide useful information to guide this study. They identified and discussed critical factors which create and maintain interorganizational relationships. According to them, partners' awareness of hazards, coordination, resources, formal contact, informal contact, and individual personality were critical for forming interorganizational

relationships. Particularly, informal and formal contacts are the two best reasons for organizations to link. Many organizations initiated their relations with informal sporadic verbal contacts, and were more likely to develop formal relations with written agreements later on (Gillespie, Colignon, Banerjee, Murty, and Rogge, 1993; Mulford, 1984). Many organizations also contacted other organizations to obtain hazard information and hazard adjustment information, and clarify issues of legal liability. Some of them developed new relationships developing hazard awareness. In addition, many organizations attempted to formulate new relationships to obtain resources (Galaskiewicz, 1985). Second, they addressed attention to organizational needs, formal and informal contacts, and attitudes of organizational representatives as critical factors for partners to sustain their relationships. If they find no more problems, their relationships are more likely to end; that is to say, their relationships are more likely maintained when partners agree on goals and tasks and share common interests (Mulford, 1984). The relationships are more likely to be maintained if representatives share the same philosophies and values, or have good personal relationships.

In addition, a group of disaster scholars including Lindell (1994) and Lindell and Whitney (1995) studied the program effectiveness of Local Emergency Planning Committees (LEPC) for disaster preparedness. In 1986, the Emergency Planning and Community Right to Know Act (Title III of the Superfund Amendments and Reauthorization Act or SARA Title III) mandated formation of LEPCs to plan for emergency response to catastrophic chemical release. In fact, LEPCs were different from other community-based hazard mitigation programs such as Showcase Community

or Project Impact in terms of goals and purposes for its formulation, hazard types, resource mobilization, and tasks (see Table 2-2). For example, LEPCs were specifically focused on chemical hazards, while Project Impact addressed multi-hazards including technological hazards. The main goal of the LEPC was to protect civilians from a chemical release, while that of Project Impact was to build a safer community. The biggest difference between them was implementation modes: LEPC was mandatory for local communities and local chemical industries, while Project Impact was voluntary for local communities and stakeholders. Thus, the patterns of members' contribution to both programs may be different. Nevertheless, the research of LEPC members' contributions provides opportunities to explore the psychological characteristics of members who participated in the collective preventive action. Both had to mobilize and rely on local resources for program implementation.

Morbley (1977) found that team climate in terms of member's perception of team tasks and conditions is related to job satisfaction. James, James and Ash (1990) also found that team climate had significant impacts on individual behaviors and motivations. An individual's behavior is positively related to his aroused motivation directed toward group goals (Steers and Porter, 1987). Lindell (1994) again emphasized that team climate is important because LEPCs rely on volunteers' contributions of time and resources. Thus, participation costs such as role conflict, role stress, role overload, or family obligation are negatively related with their performance. He also identified reward opportunities such as job challenge, job significance, role clarity, and workgroup cooperation, team pride, and leader supports as critical factors influencing their

performance. Whitney (1993) identified members' organizational commitment, effective leadership, and members' perception of their own competence as other critical factors influencing their performance.

Table 2-2 Comparisons of Project Impact with Local Emergency Planning Committees

	Local Emergency Planning Committee (LEPC)	**Project Impact (PC)**
Year	1986	1997
Causal Accident	Bhopal Chemical Accident in 1984	Natural Disasters in 1990s'
Hazard Type	Technological	Natural Hazards
Agency	Congressional Mandate	FEMA
Current Status	On	Off
Target	Local Community	Local Community
Implementation	Mandatory	Voluntary
Financial Support	No	Yes (but "NOT" to all communities)
Participants	Various	Various
Goals	Protect Civilian from Chemical Release	Building a Disaster Resilient Community
Objectives	To enhance the effectiveness of communities' chemical hazard mgt.	To facilitate community-based approaches for hazard reduction
Tasks	Community emergency plans for catastrophic chemical release	Partnership development, hazard assessment, prioritization of mitigation projects, and communication of success stories as FEMA instructed

In summary, previous research was focused on collective behaviors in specific social settings during the disaster or post-disaster periods or preparedness settings during the pre-disaster period. There was little previous empirical research focused on what accounted for partners' contributions to collective action in a specific social setting of the community-based hazard mitigation program during the pre-disaster period.

2.3.4 Social Settings for Collective Mitigation Action

Individuals' motivation to participate in collective action varies depending on the situational characteristics of social settings. For example, emergent norms may guide volunteers' behavior in the disaster-generated social settings, whereas individual goals and interests more likely influence the same volunteers' decision making to participate in collective mitigation action during the pre-disaster period. In the disaster literature, two specific social settings are identified: society during the disaster or the immediate post-disaster period and society during the pre-disaster period. This section briefly discusses what accounts for differences between the pre-disaster social setting and the disaster or post-disaster social settings. It will help to understand the social settings for collective mitigation action. Ferdinand Tonnies discussed two concepts of society: *Gemeinschaft* and *Gesselshaft* (Flanagan, 1993). In German, *Gemeinschaft* is close to the English term community, which can be characterized by traditional practices and a personal sense of belonging, while *Gesselshaft* is the more individualistic, competitive, and impersonal organization of society. Both coexist in human society, but disaster increases individuals' sense of belonging to their family and community and their sense of responsibility toward others. For example, people usually search and rescue their family members and relatives first, but also expand their sense of responsibility towards other acquaintance or neighbors and volunteer for collective behaviors to search and rescue disaster victims. After a disaster, however, individuals are back to normal, pursuing individual goals and interests.

Similarly, Emil Durkheim discussed two descriptive concepts of social formation: a society with mechanical solidarity and a society with organic solidarity (Giddens, 1972). Durkheim defined mechanical solidarity as social cohesion based upon the likeness and similarities among individuals in a society, and organic solidarity as social cohesion based upon the dependence individuals in more advanced societies have on each other. In the less-developed communities, this mechanical solidarity is created on the basis of the consensus of the same value and norm systems (as in religious groups). Organic solidarity arises from mechanical solidarity when certain social segments change their functions because of a growing need to rely on neighboring segments. Reliance on neighboring segments also creates a bond and a moral tie. In modernized society, the growing number of social segments is connected, specialized, and diversified. Each social member plays a distinct role in the functioning of society. Consensus among social members on the same values and norm systems decreases as the society is industrialized and individualized and social functions are diversified and specialized. With disaster impacts, however, modern society constructed on the basis of organic solidarity is drastically changed into a society more oriented to mechanical solidarity. Social distinctions are temporarily leveled out as the society's structure is changed into what Turner (1961) called "*communita*." Each member's social role becomes extremely simplified and unstructured due to the massive social disruption. Rather each member has to deal with unfamiliar tasks and agendas to adjust to both disaster and community generated demands. Consensus among individuals on the values and altruistic social norms grows, and new norms emerge and guide their

behaviors (Turner and Killian, 1972). After the event, however, mechanical solidarity is changed back into organic solidarity. People's concerns about disaster related issues quickly decrease and the window of opportunity for hazard mitigation is shut down. As discussed, it is difficult to implement hazard mitigation measures at the local community level after the window of opportunity closes (Birkland, 1997). Table 2-3 below summarizes and compares these concepts.

Table 2-3 Comparisons of the types of social formation

	Traditional Community	**Modernized Society**
	Disaster/ Post-Disaster Period	***Pre-Disaster Period***
Ferdinand Tonnies	*Gemeinschaft* House or Village Kinship, Inherited Status….	*Gesselshaft* Town, City, Nation, World… Contract, Competency…
Emil Durkheim	*Mechanical Solidarity* Social cohesion based on the same value and norms	*Organic Solidarity* Social cohesion based on the social roles and function
Turner	*Communita* Emotion	*Structure* Reason

2.4 Problems of Collective Action

During the past decades, collective action scholars have been primarily concerned about providing generalizable explanations for why so many rational, self-interested individual actors choose to join voluntary groups and make substantial contributions to producing collective goods while others free ride, and why a certain group of people achieves their common goals while others cannot. Most social scientists had taken it for granted that people collectively act on shared common interests until Olson (1965) made his controversial arguments (Oliver, 1993). According to him,

rational self-interested individuals would not make voluntary contributions to producing collective goods such as roads, dams, bridges, sewage systems, cleaning streets, street safety, hazard mitigation, etc. Rather they are motivated to free ride on the contributions of others because those collective goods cannot be withheld from non-contributors and because individuals always try to maximize their utilities and choose the higher payoffs. Thus, shared interests may not sustain common efforts. Olson again argued that selective benefits are needed to overcome free riding. Collective action is less likely to fail if the group size is sufficiently small, the group is privileged, or tangible selective benefits are offered to participants for collective action. Rational self-interested individuals contribute only because of those selective benefits, and collective goods are by-products of their contribution.

Olson's theories of group size and selective benefits have been under attacks by many collective action scholars and are often criticized as too general to explain different types of complex social phenomena. For example, Olson's theories fail to explain why so many people join voluntary programs, the participation costs of which often exceed payoffs. In reality, the rate of free riding is smaller than expected (Harrison and Hirshleifer, 1989). Data showed that a growing number of U.S. citizens are making more contributions to community-based organizations than expected (Putnam, 2000). In addition, Morrison and Tilock's (1979) empirical findings showed that group size did not influence individual contributions. Research findings showed that social ties or normative incentives are stronger effects on behavior in some specific social settings.

Erev and Rapoport (1994) identified and discussed the three most controversial issues related with collective action in the collective action literature. They are listed below.

- "Individuals act on their interests, choosing actions only when their (expected) benefit exceeds their (expected) cost."
- "Although participation is costly for an individual, the goal that a group can attain if its members cooperate is beneficial for these same members."
- "Individuals take into account the effect of other individuals' choices in deciding."

These issues are relatively well documented in the collective action literature, but still need more confirmation in order to explain collective preventive action in the non disaster-generated social settings. This study will address these three issues especially in the community-based hazard mitigation setting. This section briefly identifies and discusses the problems of collective action through game theoretic perspectives and decision-making perspectives.

2.4.1 Game Theoretic Perspectives

Game theories provide useful theoretical frameworks to understand collective action problems (e.g., why people free ride), and help us identify and anticipate individuals' most likely strategies in their interactions with others for collective action (e.g., why people cooperate rather than defect). These theoretical frameworks also help explain the mechanisms of social norms emerging from the interactions. For this study,

three types of games are identified, reviewed, and briefly discussed. All Tulsa Project Impact partners were assumed to be rational and perceive community safety as a collective good. All of them were also assumed to be equally informed about new projects or coming events and encouraged to volunteer for those activities.

a. Prisoner's Dilemma

Olson's collective action problem is often depicted by the prisoner's dilemma (PD) game, in which two men who are arrested for robbing a bank are placed in separate isolation cells and have to make a decision whether to confess their crime before the prosecutor or remain silent. Table 2-4 shows a typical (symmetric) prisoner's dilemma. Rows and columns represent choices made by two prisoners (A and B). Each cell shows the payoffs from a combination of row and column prisoners' choices. R refers to the "reward" payoff (token sentences on firearms possession charges) that each prisoner receives if both cooperate and remain silent. P means the "punishment" (three years in prison for both early parole) that each receives if both defect and confess. T is the "temptation" (all charges dropped against the confessor) that each receives if he alone defects and S is the "sucker" payoff (seven years in prison alone) that he receives if he alone cooperates. Thus, payoffs have ordinal significance ($T > R > P > S$). Now suppose the prisoner A cooperates. Then, the prisoner B gets R for cooperating and T for defecting, and so is better off defecting ($T > R$). On the contrary, suppose that prisoner A defects. Then, prisoner B gets S for cooperating and P for defecting, and so is again better off defecting ($P > S$). Thus, (P, P) is a unique Nash Equilibrium, in which

both players are worse off than they are in the action profile (R, R), but no player has incentive to unilaterally change his action. Neither player can increase his payoff by choosing an action different from defection. If both players are rational and self-interested, they are better off choosing defection rather than cooperation whatever his opponent does.

Table 2-4 Prisoner's dilemma (PD) game

		B	
		Cooperate	**Defect**
A	**Cooperate**	R, R	S, T
	Defect	T, S	P, P

R: Reward; S: Sucker; P: Punishment; and T: Temptation

b. N-Person Prisoner's Dilemma

Garrett Hardin (1968) considered collective action as a prisoner's dilemma between self and others. He has provided the best example of the collective action problem called "the tragedy of the commons." Suppose that a pasture is open to all neighboring herdsmen. Each herdsman will try to keep as many cattle as possible on the commons and maximize his gains (by adding more animals in the commons and selling them) unless he is irrational. If all herdsmen rush to overgraze their cattle, it will bring ruin to all in the long run. Similar to the Prisoner's Dilemma game, the n-person prisoners' dilemma (NPD) games also make payoffs for each player. It would pay each player R if all cooperate, P if all defect, and, if some cooperate and some defect, it would pay the cooperators S and the defectors T. Table 2-5 shows a typical n-person's dilemma game. Suppose that fewer than n actors cooperate at the early stage of

collective action. This represents a version of what has been called the "volunteer dilemma" (for example, calling the management office to report a power outrage at all units in the apartment complex). Each player here will be better off if other players volunteer: it doesn't matter who does it, but everyone is in trouble if no one does it. The row player (A) has to absorb the high cost, if he cooperates (the sucker payoff). So, player A is better off defecting (0 > C). Suppose that more than n actors cooperate. Each player can achieve some social benefit (B) if a sufficient number of actors pay the cost. The "temptation" here is to get the benefit without the cost (B), while the reward is the benefit with the cost (C + B). The punishment is to get neither B nor C + B. Thus, player A is better off defecting (B > C + B). So the payoffs are ordered: B > C + B > 0 > C. Thus, defection still weakly dominates cooperation for all players just as in the two-actor games such as the Prisoner's Dilemma.

Table 2-5 N-person prisoner's dilemma (NPD) game

		Cooperate	
		***n* or fewer**	**more than *n***
A	**Cooperate**	C	C + B
	Defect	0	B

C refers to the cost, which is assumed to be a negative number, while B means Benefits.

c. N-Person Repeated Game

Both the prisoner's dilemma and the n-person prisoner's dilemma show how rational self-interested individuals have an incentive to choose defection. In reality, however, a lot of people participate in the voluntary programs and contribute to producing collective goods. Erev and Rapoport (1990) also argue that collective good

interactions are more appropriately modeled by other games than the prisoner's dilemma. In fact, models such as the n-person repeated game and a norm game better explain collective mitigation action, not a one-shot game like voting. In those games in which the situation is repeated over time, defection is not a dominant strategy. The payoff (P, P) is no longer the Pareto equilibrium as in the prisoner's dilemma for both players. In the repeated games, both players cooperate rather than defect. They are interdependent and choose counter strategies depending on other actors' moves. Each player reacts to others' strategies with two counter strategies: reward and punishment. Players reward cooperation with cooperation, and punish defection with defection. Thus, conditional cooperation is the best strategy for players in the repeated games. In contrast, cooperation is strategically used as a trigger strategy to enforce cooperation. The best example of conditional cooperation is Tit for Tat.

Voss (2001) discussed the mechanism of internal sanctions: how norms emerge in repeated interactions. He utilized the concept of discount factor a ($1 > a > 0$) what Axelrod (1984) called "the shadow of the future" to discuss it. In the repeated games, players discount their future payoffs with this discount factor. He defined the discount factor as "the actor's (conditional subjective) probabilities that the iteration of the game will be continued for another period." The payoffs for the repeated game can be represented as weighted sums of the payoffs in each period. When the game is repeated without limit, this discount factor becomes constant in each period, and future payoffs will be discounted exponentially.

$$R + aR + a^2R + a^3R + \ldots = R/(1 - a)$$

If the discount factor *a* is large enough, players themselves create endogenous internal sanctions to cooperate: norms of conditional cooperation enforce players to cooperate rather than defect. If the value of this discount factor is not enough to support cooperation, however, no Pareto-improving norm can be enforced. However, cooperation costs those who sanction the defectors (negative or positive). Collective action scholars including Oliver (1980), Axelrod (1986), and Heckathorn (1989) argue that there must be incentives to compensate the costs of cooperation which may generate the second-order collective action problem: who is willing to enforce norm deviators with sanctions. In community-based hazard mitigation, it is volunteers

In addition, players in the repeated game are less likely to cooperate as the group size increases (Olson, 1965; Voss, 2001). In small groups, players tend to do their parts rather than taking advantage of others players' contributions because a conditional cooperator monitors other players' moves. In contrast, it is difficult for a conditional cooperator to monitor other players' moves as the number of actors grows. In large groups, players are less likely to cooperate voluntarily in repeated games as Olson argued (Dawes, 1980; Taylor, 1976). Moreover, a conditional cooperator may misperceive other players' moves in large groups without understanding their underlying strategies. Bendor and Mookerjee (1987) argued that players are more likely to defect in the n-person repeated games because of problems in monitoring, misperception, and uncertainty of the underlying strategies of other actors.

In Hardin's the tragedy of the commons, herdsmen are more likely to cooperate to avoid the tragic consequence rather than defect. They know the results when all defect, and that is the last outcome they want. Norms of cooperation emerge among them and enforce them to set rules to guide their behaviors and conserve resource pools. But norms of cooperation do not occur only among norm beneficiaries. Oliver (1984) identified and discussed those who were very skeptical about collective action more likely joined it. They joined because they were concerned about situations in which no one participated and no collective good was produced. In community-based hazard mitigation, norms of cooperation are expected to emerge among partners with high collective interests to guide partners to participate and cooperate in order to avoid or prevent catastrophic hazard consequences because catastrophic hazard consequences may be the expected outcome if all defect and take inaction. This study will address this cooperation norm issue.

2.4.2 Decision Making Perspectives

Determinants of collective action also vary depending on the nature of collective goods (Oliver, 1984) and individuals' collective interests (Lubell, 2002). The uncertainty of extreme natural events and collective interests (e.g., in terms of belief in program success, perceived collective benefits, and belief in an individual's influence) are expected to influence individuals' decisions to participate in collective mitigation action.

a. Individual Decision Making

In the disaster literature, it is well documented that people are usually less concerned about making hazard adjustments in various social settings (e.g., individuals, organizations, or community) during the pre-disaster period than during the immediate post-disaster period. People often perceive the benefits of hazard adjustments to be lower than their social benefits because they have limited information about hazards and effective hazard mitigation measures (Mileti, 1999). Even the effectiveness of such precautionary preventive actions can only be evaluated by disasters, which rarely strike. These problems naturally lead to the dilemma of mismatches between low social demands (in terms of inaction) and low market supply (e.g., dilemma of disaster insurance companies). Mileti again discussed various reasons (e.g., utility theory and heuristics) influencing individual decisions to take inaction. Interestingly, he regarded the individual as a rational creature relying on norms to make decisions rather than a rational one as economists or rational choice theorists argued. He said:

> Groups of individuals have social expectations about what should or should not be done in specific situations. These norms become collective habits – the right thing to do under the circumstances. They are not the outcome of thoughtful decisions intended to be adaptive adjustments to a particular hazard but are the result of people's tendency to conform to the behavior of those around them. This can lead to the adoption of hazard mitigation actions without any awareness of their value in adapting to the

> physical environment. This behavior is in sharp contrast to the more profound thought processes involved in assessing the expected utility of an adjustment based on the possible negative impacts of the physical environment. This line of reasoning suggests that inducing people to take mitigation action is a problem of overcoming social conformity and encouraging innovation. (Mileti, 1999, p. 143).

In fact, most people conform to social norms without much thinking about it. For example, most people tip in restaurants, raise their hand when wishing to speak in a group setting, or sit down when they eat. While none of these incidences involve formal rules, most people comply with them. However, this notion of conformity to norms is contrasted to other collective action theorists. Zey (1998) discussed the key notion behind rational choice theory as "social interaction is basically an economic transaction that is guided in its course by the actor's rational choices among alternative outcomes" (p. 2). She argued that individuals are purposive and intentional; individuals intuitively try to maximize their utility or satisfy their needs and wants (e.g., usually services and resources). Even much of altruistic behavior is egoistic (Andreoni, 1988; Olson, 1965). A donor may be generous but the act of giving may also produce some individual utility for the donor himself. For example, charitable acts may be undertaken to earn personal prestige, rectitude, friendship, or social acclaim. Coleman (1990) also said that individuals act purposively toward a goal shaped by values or preferences, so the simplest form of rational choice is that an action is taken only when the net benefits outweigh the

net costs. So the question is which predictor better explains partners' contributions to collective mitigation action. This subsection briefly discusses individual decisions related to participating in collective hazard mitigation.

According to rational choice theorists, individual decision making for taking preventive actions can be defined as the process of weighing benefits and risks. Individual decisions may consist of four cells (see Table 2-6). Each cell represents a payoff following a player A's choice. Rows represent the player A's two choices: taking preventive action or inaction. Columns represent the probability of disaster: the probability of a disaster strike (α%) and the probability of no strike ((1-α)%). R, S, P, and T respectively refer to reward, sucker, punishment, and temptation just like the prisoner's dilemma game. Rational individuals are assumed to choose a course of action based on their preferences of payoffs: for example, player A may prefer taking preventive action if he perceives high risk. If player A takes preventive action and a disaster strikes, then he may enjoy the hazard adjustment benefits of minimum or no disaster loss (R); that is to say, hazard adjustment benefits are higher than its costs. In contrast, if player A takes inaction and a disaster strikes, then his damage will be maximized (P); that is to say, he may suffer from a great disaster loss. But if a disaster does not strike long after he takes preventive actions, player A may feel spending money for nothing (S); that is to say, hazard adjustment costs become greater than their benefits; for example, if he spends money on flood insurance based on the given flood information for decades but nothing happens after all. He may see no benefits from purchasing flood insurance because extreme natural events are rare. Moreover, private

homeowners' insurance often fails to fully cover flood loss. He has to purchase flood insurance separately through National Flood Insurance Program, which may not cover earthquake damage. Player A may just save his hazard adjustment costs if he takes risks of inaction and disasters do not occur (T): that is to say, no actions, no costs, no losses, and no benefits. Thus, hazard adjustments reward player A only when disaster occurs, meanwhile natural events with low probability but high hazard consequences punish player A when he takes inaction.

Figure 2-6. Individual decision making for taking preventive action

		Disaster	
		Strike (α%)	**No Strike ((1-α)%)**
A	**Action**	R	S
	Inaction	P	T

R: Reward; S: Sucker; P: Punishment; and T: Temptation

Payoffs do not have ordinal significance because of the uncertainty of natural events and because of players' risk taking behavior. If the probability of disaster is high and he perceives more risks, the player A may prefer R to P (R > P) because punishment is the last payoff he wants and he more likely will take preventive action. If the probability of disaster is low and he perceives low risk, in contrast, player A may prefer T to S (T > S) because he may think hazard adjustments are not worthy making and because he doesn't want to spend money on the uncertain things in the future. He will more likely take inaction when he strongly believes there will be no future events. However, even though disaster did not occur during past decades, it does not necessarily mean it will not occur in the future (e.g., Gamblers' fallacy or Oldest Indian Syndrome).

In addition, players usually have insufficient information (e.g., about outcomes and benefits following their decisions) and lack ability (e.g., planning and calculation for probabilistic reasoning) to compare the net benefits with the net costs. These personal contextual factors influence their risk taking behavior and make their decisions inconsistent and variable, thus irrational. Moreover, the characteristics of hazard mitigation measures (e.g., in terms of effectiveness, duration, utility, affordability, and manageability) also influence players' decisions to take preventive action (Berke, 1998).

b. Problems of Collective Mitigation Action

All group goals and interests are subject to collective action problems, which arise in the context of interaction within whole groups of individuals (Olson, 1965). Collective mitigation action is also subject to such collective action problems (e.g., public apathy and indifference to preventive action for hazard reduction). In collective mitigation action, individuals and organizations may become partners and volunteer for mitigation projects to build a safer community rather than protect their own businesses or properties. So they may voluntarily participate in collective action under the common mitigation interests of building a disaster resilient community or a sustainable community. Four cells in Table 2-7 show payoffs following a community's choice: reward, sucker, punishment, and temptation respectively. Similar to individual decision making, rows represent a community's two choices (for example, taking collective preventive action or inaction), and columns represent the probability of disaster striking a community. However, the program effectiveness or collective benefits of community-

based hazard mitigation programs can only be measured by low-probable, high-consequence events (Wilson, 1989). Moreover, collective hazard adjustments may reward not only contributors but all community members if mitigation measures are successfully implemented and disaster strikes. In contrast, individual rational behavior of defection leads to collectively worse outcomes. Collective inaction may result in punishment of all community members when disasters strike, not only defectors. Community members may experience severe social disruption due to the breakdown of all social services and lifelines, experience the degradation of environmental qualities such as water pollution when flooded, and experience an overall degraded quality of life (Mileti, 1999). Highly vulnerable social and economic sectors may more likely suffer from direct family, business, or property losses.

Figure 2-7 Individual decision making for collective preventive action

Community		***Disaster***	
		Strike (α%)	**No Strike ((1-α)%)**
Collectively	**Action**	R	S
	Inaction	P	T

R: Reward; S: Sucker; P: Punishment; and T: Temptation

In addition to the uncertainty of natural events, collective interests (e.g., in terms of the probabilities of program success, the perception of collective benefits, and the beliefs in individual contributions to changes) may have a strong influence on individuals' decisions to make substantial contributions to community-based hazard mitigation. The number of volunteers may influence individuals' decision making for collective mitigation action just as in the n-person prisoner's dilemma because of the

ratio of P / n, where P equals products and n equals number of volunteers. The growing number of volunteers means relatively less effort per person for the production of goods. If that number is high, then the amount of individual effort can be ignored, individuals may prefer free riding. Meanwhile, volunteers who join collective mitigation action at the early stage usually have to take the leading roles and contribute much more time, resources, and effort to implement the community-based hazard mitigation program than those who join later. Their participation costs may well exceed paybacks. So rational self-interested individuals may be better off with a free ride and enjoy collective benefits of community-based hazard mitigation from others' contributions. According to Heckathorn (1989), however, there always is a critical mass of people who are highly motivated because of their stake in the collective good. This relation may not be automatic, but those who have more at stake are more likely to choose to act as promoters and strong supporters of the specific set of collective action and willing to pay the high initial costs for collective mitigation action. In contrast, Klandermans (1984) argued that the present number of participants influence individuals' decision to join because the size of the group may be perceived as the indicator of program success. According to him, if the probability of program success is perceived high or if more chances of its influence are perceived, individuals are more likely to join. Thus, the question is whether the more serious they perceive problems to be and the more they are concerned, the more likely partners will make contributions.

In addition, Roger and Whetten (1982) also discussed altruistic models to explain why organizations formulate relationships with others: altruistic forces can explain

organizational exchange which cannot be explained by motives of organizational survival or administrative self-aggrandizement. In most cases, organizations are looking for resources and they formulate alliances with other organizations to secure resources or avoid duplication in performing given tasks. They join or maintain partnerships with other organizations to obtain common goals unless their autonomy is threatened by the interrelationship. Gillespie and his colleague (1993) also confirmed this aspect of interorganizational relations for preparedness.

Barnard (1938) defined organizations as "cooperative systems that function to achieve collective as well as individual goals." Organizational interactions occur among groups because of their agreement on altruistic goals and collective interests as well as their individual goals and interests (Dillman, 1970). Thus, those who are highly motivated by collective interests are more likely to make contributions to collective mitigation action.

2.5 Summary

In summary, self-interest and social norms have been widely recognized and well documented by economists and social scientists as the two determinants guiding behaviors. For example, Elster (1989) discussed man as a creature who is conditional and future outcome-oriented (e.g., if you want to achieve Y, then do X) and also sticks to prescribed behaviors (e.g., if others do Y, then do X or do X if and only if it would be good for all). Here, the former represents Hobbesian perspective viewing man as a calculator who is rational and self-interested, always trying to maximize his returns (e.g.,

in Wilson's terms material gain, personal safety, and social reputation). Meanwhile, the latter represents Durkheimian perspectives which try to understand human nature in a social context where social interactions are essentially normative. People stick to most social values whether those values are good or bad and conform to the rules which are usually enforced by norm beneficiaries (e.g., rules of politeness or rules of fairness). These two distinctive lines of thought, self-interest and social norms, will guide this study of collective action for community-based hazard mitigation. The first assumption is that Tulsa Project Impact partners will be very concerned about participation costs because most mitigation projects are extra jobs for them (H3). Their contributions are also expected to vary depending on their perception of selective benefits (H2). Meanwhile, disaster resilient or sustainable community has become a new concept to deal with disasters and accepted as a new social value for local communities to pursue. For example, a growing number of people may agree that taking preventive actions will save money in the long run. Their collective interests are assumed to somehow guide their behavior to join and volunteer for collective mitigation action to build a safer community (H1). A new social value may also lead partners to set rules to guide behavior. Partners' contributions are expected to vary depending on their beliefs in other partners' contributions to collective action (H4). Finally, internalized norms of participation will be tested for this study. People who feel obliged to participate in community-based hazard mitigation activities are assumed more likely to contribute to collective mitigation action (H5).

CHAPTER III

HYPOTHESES

3.1 Introduction

This chapter describes theories and models applied to this research, and also develops research hypotheses that were derived from the literature review. More specifically, the first part of the chapter discusses a rational choice model. The second part states research rationales followed by five hypotheses. The last part introduces a conceptual model that identifies partners' attitudes influencing their contributions.

3.2 Rationale for Hypotheses

Many collective action scholars use individual decision models to debate collective action problems and predict the likely outcomes of collective action at the individual level (Oliver, 1993; Zey, 1998). They provide decision equations for the net payoffs of participating in the various forms of collective action as a function of the benefit of the collective good, the benefit of selective incentives, and the costs of participation (Finkel, Muller, and Opp, 1989; Finkel and Muller, 1998; Oliver, 1980; Oliver, Marwell, and Teixeira, 1985; Riker and Ordeshook, 1968). These decision equations are usually used to identify and discuss the determinants of participation: for example, self-interest, consideration toward others, fairness, fear of becoming a sucker, and desire to make a difference (Oliver, 1993).

This study will utilize individual decision models to explore the mechanisms of collective action for community-based hazard mitigation and develop a statistical model to determine factors influencing a partner's decision to make a contribution. All partners are assumed to continually face individual decisions to make or not to make sustained contributions to community-based hazard mitigation because they are continually informed about events and encouraged by the program coordinators to voluntarily participate in new mitigation projects. Individual institutions, that is, the partners, will be treated as the decision makers, as individual agents, because organizations are also individual in the sense of having one decision to make (Elster, 1989). Rational choice theorists including Buchanan and Tullock (1962), Elster (1985, 1989), and Coleman (1990) tend to view collective action as "no more than aggregate individual action" (Zey, 1998, p. 17), and regard social entities such as groups or organizations as individuals. Zey (1998) again discussed it as "…the mechanisms through which rational choice explanations operate are the preferences and beliefs of individuals, rational choice explanation cannot be predicated upon anything other than individual preferences" (p. 17). Rational choice theorists argue that social entities do not have preference orders, but individuals do (Ibid.).

3.2.1 Rational Choice for Collective Action

Motivation to participate in collective action is defined as a function of the subjective expectation or perceived likelihood that such collective action will yield outcomes and the subjective values of those outcomes (Klandermans, 1984, 1992;

Mitchell, 1974). This value-expectancy product is consistent with rational choice theory. According to this value-expectancy theory, the higher the expectation of collective benefits and the more a partner values the collective benefits (e.g. attractiveness of collective goods), the more likely the individual is to participate in Project Impact. This study will adapt the collective interest model developed by Finkel, Muller, and Opp (1989), to explain the rational choice mechanisms of collective action in Project Impact and discuss the determinants of contribution. Partners are expected to participate in Project Impact to the extent that (1) they have high levels of discontent with the current levels of community vulnerability to natural and technological hazards, (2) they believe that collective mitigation efforts can be successful in building community safety; and (3) they believe that their own contribution will enhance the likelihood of the collective mitigation effort's success (Klandermans, 1984).

The expected value of participation can be calculated by:

$$\mathbf{EV = [(p_g + p_i)*V] - C + B}$$

Where **EV**: the expected value of participation in Project Impact,

$\mathbf{p_g}$: the probability that the program will be successful,

$\mathbf{p_i}$: the marginal influence of the individual's contribution on the probability of success,

V: the value of the collective good,

C: the selective cost of participation,

and **B**: the selective benefit available from participation.

a. Collective Interests

In their model, Finkel, Muller, and Opp (1989) defined the collective interest with the terms in brackets, **[(p_g + p_i)*V]**. First, the estimated value of participation in Project Impact is an increasing function of a partner's valuation (**V** in an equation above) of the collective benefits of successful action (Lubell, 2002). The primary collective benefits of PI are community safety and quality of life (Geis, 2000; Krimm, 1998). Risk perception or safety concern is the major factor facilitating collective action (e.g., opposing the siting of hazardous waste facilities) (Hamilton, 1992). Thus, a partner's contribution to Project Impact will vary with perception of the severity of community vulnerabilities to hazards and the long-term economic benefits of Project Impact. Secondly, a partner's contribution is also assumed to vary with perception of personal efficacy (p_i in the equation above): perception of the personal influence on producing program outcomes (Klandermans, 1984; Nagel, 1987). A partner who perceives individual contribution as making no difference in producing collective goods is less likely to contribute. Thirdly, a partner's contributions will vary with perception of group efficacy (p_g in an equation above) and perception of other partners' contributions (Klandermans, 1984; Nagel, 1987; Oberschall, 1980). Klandermans (1984) argued that a partner's perception of the number of partners and their contributions influences belief in the program success. In addition, a partner's contribution is expected to vary with beliefs about the effectiveness of hazard mitigation for reducing community

vulnerabilities (called "program effectiveness", $\mathbf{p_p}$ in this study). Thus, the collective interest in PI can be defined as $\mathbf{[(p_g + p_i + p_p)*V]}$. The first hypothesis to test is:

- H1: Partners' contributions will increase when the estimated value of collective interest increases.

b. Selective Benefits

Olson (1965) proposed selective incentives to solve the collective action problem, especially in large groups. He said "the incentive must be 'selective' so that those who do not join the organization working for the group's interests, or in other ways contribute to the attainment of the group's interest, can be treated differently from those who do (Olson, 1965, pp. 51)." Knoke (1988) also discussed private goods as selective incentives and their methods of production: for example, by allowing a collective to restrict the private benefits to persons. Project Impact provides partners with material (e.g., resources), information (e.g., task redundancy), and social (e.g., recognition of rewards) incentives (**B** in an equation above). A partner's contribution is expected to vary with perception of such selective incentives. At the interorganizational level, organizations often look for others with resources (Galaskiewicz, 1985), extend network linkages (Pfeffer and Salancik, 1978), and ally to increase control over scarce resources (Gulati, 1995; Mulford, 1984; Oliver, 1990). Similarly, government agencies and non-profit community-based organizations tend to formulate preparedness and mitigation networks in order to secure resources and avoid redundancy in tasks

(Gillespie, Colignon, Banerjee, Murty, and Rogge, 1993). Thus, the second hypothesis to test is:

- H2: Partners' contributions will increase with their perception of selective benefits.

c. Participation Costs

Time, money, and skills are necessary for intensive forms of participation (Nagel, 1987; Oliver, 1984). In Project Impact, partners contribute their time to the program by serving on committees or subcommittees, attending regularly scheduled meetings, participating in mitigation projects, attending workshops or conferences for hazard reduction, and contacting other organizations' staff. Participation in these program activities is a burden to them because most of them have jobs and have to contribute extra time, money, and effort to collective mitigation action. Thus, time in terms of frequency and amount of hours is the most critical cost indicator of participation. Moreover, the cost of time devoted to participating in these program activities reduces the opportunities for a partner to contribute to economic production or other activities. In addition, knowledge and skills are also required for a partner to participate in the planning and implementation of mitigation measures (Wachtendorf, 2001). Thus, partners with resources and previous experience in emergency management are more likely to join Project Impact than marginally profitable partners. The hypothesis to test is:

- H3: Partners' contributions will decrease as their perceived participation costs increase.

3.2.2 Social Norms as Predictors of Contribution

In addition to rational choice, normative conformity is an important motivation independently affecting individual's involvement in collective action (Knoke, 1988). This section will briefly discuss social norms as predictors of contribution.

a. Norms of Cooperation

Game theorists or rational choice theorists argue that rational self-interested individuals comply with or innovate norms based on their cost-benefit calculation of actions for solving problems (Horne, 2001). For example, natural disasters raise public awareness about the norms of safety (e.g., a drought might give rise to norms supporting conservation of water) and prompt governments to establish comprehensive regulatory systems to guide behaviors. Such an exogenous shock creates new social, economic, and environmental conditions leading to changes in cost-benefit conditions which can spur a group of stakeholders to change informal rules and social practices (Ellickson, 2001).

For game theorists, norms are patterns of action which emerge when people frequently and consistently behave in a certain manner. They view cooperative behavior as equivalent to a norm, which guides rational self-interested individuals to behave pro-socially (Horne, 2001). For example, Olson's argument was analyzed with the

prisoners' dilemma game in which defection is the dominant strategy for both players. Hardin also discussed free riding issues in the n-person prisoners' dilemma in which defection is still the best strategy for players. However, repetition of a game changes patterns of action. According to game theorists, rational self-interested players are better off defecting at the first stage of the game with only two options of cooperation and defection, but at the second stage they can react to the first decisions with sanctioning and punishment (Voss, 2001). Sanctions are usually created and enforced by norm beneficiaries. These beneficiaries institutionalize cooperation to enforce norms when they realize the catastrophic consequences of defective action as in the n-person prisoners' dilemma game (e.g., herdsmen's tragedy in sharing a pasture). Similarly, perception of the consequences of inaction leads partners to cooperate rather than defect and contributes to collective action for community-based hazard mitigation. Thus, players discount their future payoffs. If a discount factor is large enough, then cooperation is enforced. In Project Impact, partners are expected to choose strategic cooperation such as conditional cooperation (e.g., I will contribute as long as other partners do) instead of full cooperation (e.g., otherwise organizations would lose autonomy). Thus, norms of cooperation will be measured. The hypothesis to test is:

- H4: Partners' contributions will increase with conformation to norms of cooperation.

b. Internalized Norms of Participation

For some, norms are not simply rules. For some scholars such as Cooter (1998) and Elster (1989), norms should be internalized. They believe that the factor which induces compliance with norms lies within an individual person. Social norms are usually initiated, shared, enforced, and sustained by other people's approval and disapproval of behaviors (Elster, 1985, 1989). They again influence a person's values and norms so as to guide behaviors. Here, values are the most fundamental elements of social norms. Some norms which are deeply held create part of a person's self-image and guide behavior in expected ways (Elster, 1985), therefore social preferences become a part of their self-interest (e.g., an internal obligation). In this way, social norms become individual norms which generate moral attitudes. When violating social norms, people feel embarrassment and shame: violation of moral norms generates guilt (Elster, 1985, 1989). Individuals who feel compelled to obey norms would pay a net price to uphold an internal obligation (e.g., protecting lives and properties from catastrophic natural events), but individual norms do not necessarily lead them to action. For example, consumers believe that buying environment-friendly products benefits all social members, but all of them do not buy such products; and many drivers believe that carpooling is desirable for the reduction of air pollution, but all of them do not carpool. Schwartz (1992) identified two preconditions to generate action: awareness of the consequences and ascription of responsibility. He argued that internalized norms lead to action when these conditions are satisfied (see Figure 3-1). In Project Impact, partners are expected to contribute when they feel an internal obligation to do so to improve

community safety and quality of life. Thus, internalized behavioral norms will be measured. The final hypothesis to test is:

- H5: Partners' contributions will increase with their internalized norms of participation.

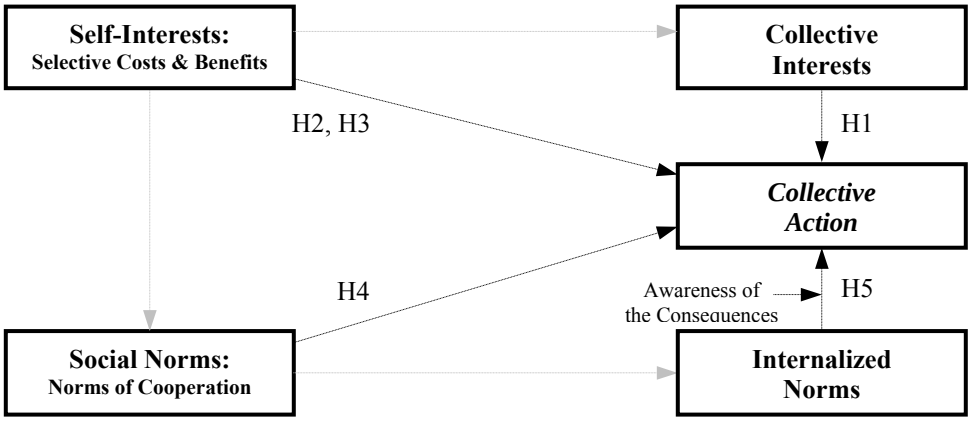

Figure 3-1 Collective action generation mechanisms

3.3 Statistical Model

From the literature review, five explanatory variables are identified: collective interest, selective incentives, participation costs, norms of cooperation, and internalized norms of participation. The statistical model developed to test these hypotheses is:

$$\mathbf{Y = a + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5X_5}$$

Where **a**: intercept

Y: a partner's contribution to PI

$\mathbf{X_1}$: collective interests ($\mathbf{[(p_g + p_i + p_p)*V]}$)

$\mathbf{X_2}$: selective benefits

$\mathbf{X_3}$: participation costs

$\mathbf{X_4}$: norms of cooperation

and $\mathbf{X_5}$: internalized norms of participation

CHAPTER IV

METHODS AND DATA

4.1 Introduction

This chapter consists of three parts. The first part describes the study design including study procedure, community selection, and study area. The second part describes the research methods including survey methods and statistical analyses. The third part describes study variables and measurements including contribution, collective interests, selective benefits, internalized norms of participation, norms of cooperation, and participation costs.

4.2 Study Design

4.2.1 Study Procedure

This research is a one-shot case study. Project Impact communities were carefully reviewed on the basis of their goals, hazard types, preferences of mitigation measures, resource mobilization, and implementation procedures, etc. The best example of a Project Impact community for applying the collective interest model was selected on the basis of these criteria. A mail survey was sent to all partners who joined Tulsa Project Impact, which was selected as the best Project Impact community. Mail survey data on respondents' contributions, collective interests, perception of selective benefits, internalized norms of participation, norms of cooperation, and perception of participation costs were all collected within a conceptual boundary of a community at

one time. The five hypotheses were tested using correlation analyses and hierarchical regression analyses.

4.2.2 Community Selection

The most generalizable results would be obtained by collecting data from a random sample of communities that had adequate variation in community size, local capacity to implement mitigation measures (Burby, May, and Paterson, 1998), local mitigation planning practices (Berke, 1998), and complexity of networks. Other desirable characteristics of such a sample would include the development level of professional communities (Birkland, 1997), type and role of organizations in mitigation systems (Alesch and Petak, 2001), hazard adjustments taken for specific hazard types (Gillespie, Colignon, Banerjee, Murty, and Rogge, 1993), and levels of exposure to hazards (Lindell, Alesch, Bolton, Greene, Larson, Lopes, May, Mulilis, Nathe, Nigg, Palm, Pate, Pine, Tubbesing, and Whitney, 1997). Lacking the ability to conduct such a random sample, careful selection of a test community can provide a reasonable basis for testing the proposed theory. Criteria for selecting such a community will be the presence of a successful Project Impact program, number of partners, profile of partners, hazard types, mitigation measures, and data availability.

Tulsa Project Impact meets these criteria because it won the 1998 FEMA Project Impact Model Community Award, 1999 FEMA Region VI Star Community Award, 2000 Housing and Urban Development “Simply the Best” Award for best practices, 2000 Project Impact Mentoring Community Award, and 2002 FEMA Mentoring

Community for its work with community and faith-based organizations. Moreover, Tulsa Project Impact is recognized as having conscientiously followed FEMA guidelines to build a disaster resistant community and satisfied FEMA's intention to help local communities manage their own programs for hazard reduction. Tulsa Project Impact has the permanent funding sources to support program activities. Additionally, Tulsa Project Impact intended to recruit eventually 500 partners and successfully recruited 385 partners from various social sectors by November 2002 (Tulsa Project Impact, 2002). It has been very successful compared with other communities. Tulsa Project Impact had also dealt with about ten multi-hazards and implemented 14 mitigation and preparedness projects by March 2002. Additionally, addresses, phone numbers, and e-mail addresses of partners are available at Tulsa Project Impact.

4.2.3 Study Area

Tulsa, OK has a strong hazard management history as well as a long flood disaster loss history (e.g., the 1984 Memorial Day Flooding cost Tulsa 14 deaths, 288 injuries, 7,000 properties damaged or destroyed, and $180 million - $257 million in 1994 dollars). There are four symbolic paradigms: the structural era, regulatory era, non-structural era, and watershed era. The newest era which Tulsa community has recently pursued is characterized by its comprehensive approach to disaster problem solving. It posits fundamental problem solving approaches above and beyond a specific disaster type or a specific context of hazard. It proposes longer and broader scopes of hazard adjustments for dealing with the basic problems of disaster-human causation. The Tulsa

community believes that this new direction is a comprehensive, regional approach to develop long-term solutions based on collaborative partnerships which mirror the best of Tulsa's local goals and priorities.

4.2.4 Study Population and Unit of Analysis

The target population for this study is composed of the partners who joined Tulsa Project Impact. The unit of analysis used to test the hypotheses is "individuals as a decision maker".

4.3 Research Methods

4.3.1 Survey Methods

Non-probabilistic sampling was used for this case study because the size of group was too small to use random sampling. In addition, it was impossible to sort out participation levels and organizational types lacking information about partners and their cooperation. Because of the nature of the available data, all 385 partners who joined Tulsa Project Impact were all included in this survey research.

Due to the involvement of human subjects, this mail survey received approval from the Institutional Review Board (IRB) which specified that information about the research must be explained to the respondents before the survey began. The mailing for those who did not have an e-mail account contained a cover letter (see Appendix 1), a self-administrated questionnaire (see Appendix 2), and a pre-stamped return envelop. The initial mailing for those with e-mail accounts contained only a cover letter listing the

website and encouraging them to participate in an online survey. The cover letter was also sent by e-mail, so the online questionnaire was linked and opened with a click. However, the online questionnaire generated critical problems. Some elderly respondents had difficulty following the instructions. Some of them could not open a questionnaire online or submit answers. Moreover, some answers seemed to lack validity because they did not make sense. For example, one respondent said that she represents a big organization (employees = 4,000) and made more than $100,000 last year, but her final education attainment was listed less than high school.

The letter was sent to inform participants that the online questionnaire would be shut down and hard-copy questionnaires would be sent. The mailing packet was mailed out to all 385 subjects who were named in the list of Tulsa Project Impact partners by November 2003. The packet was sent twice - December 2 and 15. Only 96 subjects responded, so the gross response rate was slightly over 25% - typically defined as the ratio of mail returns to the mail-out universe. Unfortunately, 65 subjects (about 17 percent) were unreachable either by both mail or e-mail because they had moved out of Tulsa or resettled elsewhere. Thus, the adjusted response rate was about 30%. However, the term “response rate” has a specific meaning to many authors with many definitions. For this study, the concept of “completion rate” was used for diagnostic purposes. For example, four out of 96 respondents replied with few answers. One respondent answered twice because he had two different addresses on the list and received the same questionnaire twice by accident. The term “completion rate” can be defined as the extent to which a task has been accomplished. According to this

definition, the completion rate for this study can be defined as the ratio of the number of subjects who completed the questionnaire form (N=91) to the number of subjects who received a questionnaire (N=319). The completion rate was slightly over 28.5%. However, two respondents were hired and working for the Tulsa Project Impact program as full-time employees. Both responded to the survey, but should not be included for this study because they could bias the results. Thus, the final number of cases available for this study was 89.

4.3.2 Statistical Analysis

Statistical analyses employed include scale reliability tests, correlation tests, independent-samples t tests, one-way ANOVA tests, and hierarchical regression analyses. Correlation tests were implemented to empirically test the relationships of respondents' contribution to the program activities with their collective interests, perception of selective incentives, internalized norms of participation, norms of cooperation, and perception of participation costs. Correlation tests were also implemented to empirically test the relationship of respondents' contributions to program activities with their demographic characteristics, as well as the relationship of respondents' demographic characteristics with their contributions and attitudes. Independent-samples t tests were performed to determine whether there were contribution or attitudinal differences among subgroups. One-way ANOVA tests were also implemented to examine whether there would be any difference in means among characteristic groups (such as age, income, and education). Lastly, hierarchical

regression analyses were used to test the collective interest model for explaining partners' contribution and identifying the best predictors of partners' contribution to collective action for community-based hazard mitigation.

4.4 Variables and Measurement

4.4.1 Demographic Characteristics

The mail survey data included social, economic, and demographic features (see Appendix for the survey instrument). The questionnaire included age, gender, ethnic identity, educational achievement, income level, and years in the Tulsa community. All variables except age and years in Tulsa community were measured as categorical variables. Ethnic identity was measured as five categorical variables, African American, Caucasian, Hispanic or Latino, Asian or Pacific Islander, and Others. Educational attainment was also measured as five categorical variables, "Less than high school", "High school or GED", "Some college or vocational school", "College graduate", and "Graduate or professional school". Personal income was measured by "Less than $14,000", "$14,000-$24,999", "$25,000-$34,999", "$35,000-$44,999", "$45,000-$54,999", "$55,000-$64,999", "$64,000-$99,999", and "over $100,000".

4.4.2 Contributions

Contribution is a fuzzy concept, which cannot be clearly defined in a single word. Its meaning varies depending on situations and conditions. Scholars such as Tornblom and Johnson (1985) attempted to find universal principles of match-ups

between a person's outcomes and his inputs in terms of ability, efforts, and productivity: for example, "how well outcomes match inputs of (a) effort extended, (b) ability, innate or achieved, or (c) productivity, the actual results accomplished" (p. 249). However, contribution may simply mean a person's inputs (e.g., amount of money donated), so it occurs when inputs outweigh paybacks. The dictionary refers to contribution as any meaning of share (e.g., any one of a number of individual efforts in a common endeavor) or donation (e.g., as of money, service, or ideas). For example, it could mean an act of giving in common with others for a common purpose, especially to a charity.

For this study, contribution may be defined as a function of activities, time, and efforts. Thus, partners' contribution can be measured with four variables: time invested for program activities, number of projects in which partners participated, number of subcommittees on which partners served, and their evaluation of personal contribution. Time investment was measured with an average of hours per month spent on four program activities. Five items were used to measure a partner's evaluation of personal contribution: donating money, sharing information, providing knowledge or skills, offering materials, and loaning equipment (see Table 4-1). They were measured on a five scale where "No contribution" equals 1, "Median contribution" equals 3, and "Major contribution" equals 5 (see Appendix 2).

4.4.3 Collective Interests

A partner' collective interest in community-based hazard mitigation was the average of an individual's score on five measures of risk perception, perceived level of

community vulnerability, economic benefits, program effectiveness, and individual contribution (see Table 4-1). Respondents were asked to indicate their concern about each issue (0-5 scale). The higher number represents higher levels of overall interest in community-based hazard mitigation.

The questionnaire asked respondents to rate their level of concern about the likelihood of three types of consequences: property loss, injury, and business loss to respondents, family members or neighbors for given types of hazards (flood, winter storm, and tornado) within the next ten years. Each item was measured with a five scale in which "Not at all likely" equals 1 and "Almost a certainty" equals 5. Respondents were asked to rate their perception of community vulnerabilities. Vulnerability can be measured by two variables: respondents' belief in the level of community's exposure to hazards and the level of capacity to cushion hazard impacts. To measure them, nine items were identified: four items addressed respondents' belief in the level of exposure in terms of people, property, utility, and transportation at risk; three items addressed respondents' belief in the individual levels (residential, business, and structure) of hazard adjustments; and two items for respondents' belief in the level of community's resources to deal with hazards. Nine items were measured with a five scale in which "Strongly disbelieve" equals 1 and "Strongly believe" equals 5.

Three items were asked to measure economic benefits which community-based hazard mitigation brings into the community ranging from economic benefits to individuals to benefits to business. They were measured with a five scale in which "Strongly disagree" equals 1 and "Strongly agree" equals 5. The questionnaire included

a list of program activities of Project Impact: program effectiveness on identifying local mitigation needs, providing a variety of hazard mitigation activities, coordinating mitigation efforts, prioritizing mitigation projects, and mobilizing resources. These five categories of program activities were also rated by respondents with a five scale in which "Strongly disbelieve" equals 1 and "Strongly believe" equals 5. Finally, respondents rated the perceived probability that individual contributions can bring about change. Four items were used: two items (in terms of group effectiveness) to measure group efficacy and two items (in terms of single contribution and individual influences) for individual efficacy. A five scale in which "Strongly disagree" equals 1 and "Strongly agree" equals 5, was used as well.

4.4.4 Selective Benefits

The questionnaire asked respondents to rate three types of selective incentives: social, information, and material incentives (see Table 4-1). First, selective incentives were measured with three items of reward opportunity: social respect from family members and neighbors and an award opportunity for performance. Second, information incentives were also measured with three items: hazard information, hazard adjustment information, and information about other partners' roles and mission. Finally, material incentives were measured with three items of opportunity to exchange resources, get financial assistance, and receive technical assistance. All nine items were measured with a five scale in which "Not at all" equals 1 and "Very great extent" equals 5.

4.4.5 Internalized Norms of Participation

The questionnaire asked respondents to rate how much they felt obliged to take preventive action. Five items used to measure were: feeling of obligation to protect family members, participation in decisions to build a safer community, participation in projects to build a safer community, volunteering to help people and businesses at risk, and participation in projects because it is their job to protect people and property (see Table 4-1). They were all measured with a five scale in which "Strongly disagree" equals 1 and "Strongly agree" equals 5.

4.4.6 Norms of Cooperation

Respondents were also asked to rate to what extent they believe other partners should make contributions to the following five items: their contributions are good for all; their contributions help people and business at risk; their contributions share social responsibility; their contributions share common mitigation goals; and their time and resource contribution (see Table 4-1). They were all measured with a five scale in which "Strongly disbelieve" equals 1 and "Strongly believe" equals 5.

4.4.7 Participation Costs

The questionnaire asked respondents to rate participation cost as well. In the collective action literature, time was identified as the best indicator of participation cost (Oliver, 1984). Participation cost was measured with time (e.g., in terms of frequency and length of meetings, number of projects, and distance to meeting places), money, and

task unfamiliarity (see Table 4-1). These were all measured with a five scale in which "Strongly disagree" equals 1 and "Strongly agree" equals 5.

Table 4- 1 Measurement of variables

Variables		Measurement
Collective Interests		
Risk Perception		Potential Loss of Property Potential Injury Potential Loss of Business
Community Vulnerabilities	***Level of Exposure***	*Perceived Level of Risk (People at Risk)* *Perceived Level of Risk (Property at Risk)* Perceived Level of Utility Facilities (Critical Facilities at Risk) Perceived Level of Transportation Facilities (Critical Facilities at Risk)
	Hazard Adjustment Level	*Belief in Residential Hazard Adjustments* Belief in Business Hazard Adjustments Belief in Community Hazard Adjustments
	Community Capacity	Perceived Problem in Internal Resource Capacity Perceived Problem in Access to Outer Sources
Economic Benefits		Perceived Benefits to Individuals Perceived Benefits to Businesses Perceived Benefits to Community
Program Effectiveness		Identifying Local Mitigation Needs Providing Program Diversity Coordinating Local Hazard Adjustment Projects Prioritizing Hazard Mitigation Projects Mobilizing Local Resources
Group/ Individual Efficacy		Belief in Effectiveness of Group Works Belief in Effectiveness of Group Works Belief in Every Single Contribution Belief in Personal Influence on Bringing about Changes
Selective Benefits		
Social Incentives		Award Opportunities Social Respect (Neighbors) Social Respect (Family Members)
Information Incentive		Information about Other Partners' Mission and Tasks Information about Hazards Information about Hazard Adjustments
Material Incentives		Financial assistance (ratio) Technical assistance (ratio)
Participation Costs		
Time		Frequency of Meetings Length of Meetings Distance to Meeting Places Number of Projects
Money		Direct Money Loss
Knowledge or Skills		Familiarity with Tasks

Table 4- 1 (continued)

Variables		Measurement
Norms of Cooperation		
Norms of Cooperation		Doing Good Things for All Helping People and Businesses at Risk Fairness in Sharing Responsibilities Fairness in Sharing Common Mitigation Goals Fairness in Contributing Time and Resources
Individualized Norms of Participation		
Internal Obligation		Protecting Family Members and Relatives Participating in Decision Making Processes Building Community Safer Helping People and Business at Risk Doing Jobs
Contribution		
Time Investment		Attending Meetings Serving on Task Forces Attending Events (e.g., Conferences or Lecture) Attending Programs (e.g., Education or Training)
Individual Contribution		Donating Money Sharing Information Providing Knowledge Offering Materials Loaning Equipment
Program Activities		Number of Projects
		Number of Subcommittees
Organizational Contribution		Personnel Money Material Equipment Facility
Confounding Variables		
Respondent's Characteristics	***Gender***	Male/ Female
	Age	Age
	Race	Ethnic Groups
	Education	Final Educational Attainment
	Income	Annual Income
	Years	Years Living in Tulsa Community
Organizational Attributes	***Type***	Organization's Original Mission
	Size	Number of Fulltime Employees
	Membership Year	Year when Organization Joined the Program

CHAPTER V

ANALYSIS AND RESULTS

5.1 Introduction

This chapter presents analyses testing five hypotheses to determine whether five collective action determinants of collective interests, selective incentives, internalized norms, norms of cooperation, and participation costs are related to partners' contributions. In the first part, the reliabilities of multi-item and individual scales were assessed. The second part presents the descriptive characteristics of survey respondents. The third part discusses the correlations of respondents' contributions with various predictors of collective action. Hierarchical regression analyses were conducted to identify and examine which collective action best predicted partners' contributions.

5.2 Scale Reliabilities

The multi-item measures of partners' contributions were internally inconsistent (see Table 5-1). Time investment items formed a scale of low reliability (4 items, α = .40), while individual contribution items formed a scale with high reliability (5 items, α = .83). When they are all added together to form a composite scale, however, their reliability is relatively low (α = .46). In addition, the questionnaire also measured two contribution variables with a single item: the number of mitigation projects, in which respondents participated, and the number of subcommittees on which they served.

Table 5-1 Questionnaire contents

Items	Mean (M)	Range	Scale Reliability
Collective Interests			**.88**
Risk Perception			.86
Property loss	3.83	1-5	
Injury	3.08	1-5	
Business loss	3.35	1-5	
Community Vulnerability			.81
Level of exposure			
People at risk	3.88	1-5	
Building at risk	3.78	1-5	
Utility facilities at risk	3.54	1-5	
Transportation facilities	3.46	1-5	
Hazard adjustment level			
Residential	3.23	1-5	
Business	3.69	1-5	
Community	3.69	1-5	
Community capacity			
Internal resource capacity	3.14	1-5	
Access to outer sources	2.78	1-5	
Economic Benefit			.78
Benefits to individuals	4.61	1-5	
Benefits to business	4.22	1-5	
Benefits to community	4.41	1-5	
Program Effectiveness			.97
Identifying local needs	4.28	1-5	
Providing various activities	4.25	1-5	
Coordinating projects	4.25	1-5	
Prioritizing projects	4.29	1-5	
Mobilizing resources	4.22	1-5	
Group/ Individual Efficacy			.82
Group works	4.60	1-5	
Every single contribution	4.28	1-5	
Individual influence	3.99	1-5	
Selective Benefits			**.81**
Social Incentives			.68
Award opportunity	1.21	1-5	
Social respect (Neighbor)	1.62	1-5	
Social respect (Family)	1.78	1-5	
Information Incentives			.86
Partners' mission & tasks	3.11	1-5	
Hazard-related information	3.78	1-5	
Hazard-adjustment info.	3.72	1-5	
Material Incentives			.65
Resource exchange	3.65	1-5	
Financial assistance	1.71	1-5	
Technical assistance	2.74	1-5	

Items	Mean (M)	Range	Scale Reliability
Internalized Norms			**.85**
Protecting family	4.28	1-5	
Participating in decisions	3.92	1-5	
Building community safer	3.92	1-5	
Helping people/ business	3.68	1-5	
Doing jobs	3.47	1-5	
Norms of Cooperation			**.93**
Doing good things for all	4.04	1-5	
Helping people/ business	4.04	1-5	
Sharing responsibilities	4.05	1-5	
Sharing mitigation goals	3.96	1-5	
Contributing time/ efforts	3.89	1-5	
Participation Costs			**.71**
Time (Frequency)	2.74	1-5	
Time (Length)	2.80	1-5	
Time (Distance)	2.65	1-5	
Time (Project Number)	2.72	1-5	
Cost	1.98	1-5	
Familiarity with tasks	2.21	1-5	
Organizational Profile			**-.050**
Membership year	4.65	1-7	
Number of employees	467.89	1-8000	
Resource contribution	42		.69
Personnel	.68	0-1	
Money	.21	0-1	
Material	.34	0-1	
Equipment	.28	0-1	
Facility	.43	0-1	
Contribution			**.46**
Time Investments			.40
Attending meetings	2.04	0-40	
Serving on take forces	2.94	0-160	
Attending events	1.05	0-16	
Attending programs	.62	0-8	
Individual Contribution			.83
Donating money	1.48	1-5	
Sharing information	2.82	1-5	
Providing knowledge	2.63	1-5	
Offering materials	1.75	1-5	
Loaning equipment	1.47	1-5	
Number of Projects	2.57	1-12	
Number of task forces	.97	1-12	

Analysis of collective interest scales indicated adequate levels of reliability: risk perception (3 items, $\alpha = .86$), community vulnerabilities (9 items, $\alpha = .81$), economic

benefits (3 items, α = .78), program effectiveness (5 items, α = .97), and group/ individual efficacy (3 items, α = .82). Originally, two items were measured to determine group efficacy and two items for individual efficacy. The effectiveness of group efficacy was measured with two items with the same meaning. Respondents were given two different questions to rate their agreement on: "The activity of a single person cannot reduce community vulnerabilities to hazards" and "Working together is more effective than individually working for hazard reduction." But the first item was inconsistent with the other item, and their reliability level was unrealistic (α = -.15). Measurement error was assumed. Respondents were assumed to rate it in reversed order, so all the scores of the first item were reversed (for example, 1 equal to "Strongly disagree" was switched to 5 equal to "Strongly agree" and 2 to 4). However, the reliability level calculated with the reversed scores of the first item was not improved (α = .13), so the first item was deleted.

After deletion of that problematic item, the collective interest measures were all highly correlated so they were summed to form a composite scale (α = .88). Similarly, analysis of selective incentive scales showed that social incentive items and material incentive items formed scales with modest reliability: social incentive (3 items, α = .68) and material incentive (3 items, α = .65). Both scales were acceptable considering the heterogeneous groups of partners in terms of their goals and interests. But information incentive items formed a scale with high reliability (3 items, α = .86). They were added together to form a composite scale with an adequate level of reliability (α = .81).

Internalized norms of participation were measured with five items which formed a scale of high reliability (α = .85), and norms of cooperation items also formed a scale of high reliability (α = .93). Participation cost items were also measured with six items. They formed a scale of modest reliability (α = .71).

5.3 Descriptive Analyses

5.3.1 Demographic Characteristics of Respondents

Table 5-2 shows the demographic characteristics of respondents. 23 respondents were females (25.8%) and 62 males (69.7%). 33 respondents (37.1%) answered that they individually participated in the program whereas 50 respondents (57.3%) represented organizations. Only five respondents (5.6%) participated in the program at both individual and organizational levels. Among the 23 female respondents, eight females (34.8%) individually participated in the program, whereas 14 females (60.9%) represented organizations. Only one female participated at both levels. Among 51 male respondents, 12 males (23.5%) individually participated, whereas 33 males (64.7%) represented organizations. Two males participated at both levels.

Respondents' demographic characteristics did not have a significant influence on their contribution, but there was a gender difference in respondents' personal contribution. Male respondents tended to rate their personal contribution higher (M = 2.70) than female respondents did (M = 2.09). Leven test showed that both gender groups had approximately equal variance (F = 5.708, sig. = .019), but independent-samples t test results showed significant gender difference (t = - 2.787, p < .01) in the

rates of personal contributions. However, there were no significant gender differences in collective interests, selective benefits, internalized norms, norms of cooperation, and participation costs.

Table 5-2 Demographic characteristics of respondents

Variables	n	%	Variables	n	%
Gender			***Education***		
F	23	25.8	College/ Vocational School	10	11.2
M	62	69.7	College Graduate	37	41.6
Missing	4	4.5	Graduate Degree	40	44.9
			Missing	2	2.2
Participation Level					
Individual	33	37.1	***Income***		
Organization	50	56.2	Less than $14,000	1	1.1
Both	5	5.6	$25,000-$34,999	6	6.7
Missing	1	1.1	$35,000-$44,999	6	6.7
			$45,000-$54,999	6	6.7
Age			$55,000-$64,999	5	5.6
30s	4	4.5	$65,000-$74,999	12	13.5
40s	28	31.5	$75,000-$99,999	16	18.0
50s	31	34.8	Over $100,000	29	32.6
60s	12	13.5	Missing		
70s	6	6.7			
Over 80s	3	3.4			
Missing	5	5.6	***Years in Tulsa Community***		
			Less than 9 years	10	11.2
Ethnic Identity			10 – 19 Years	15	16.9
African American	2	2.2	20 – 29 Years	23	25.8
White	77	86.5	30 – 39 Years	13	14.6
Hispanic	2	2.2	40 – 49 Years	15	16.9
Asian	1	1.1	50 – 59 Years	7	7.9
Others	1	1.1	60 – 69 Years	1	1.1
Missing	6	6.7	Over 70 Years	1	1.1
			Missing	4	4.5

There was also a significant participation level difference in the perception of participation cost. Organizational representatives rated higher participation costs (M = 2.63, SD = .61) than individual participants did (M = 2.31, SD = .72). Levens' test of quality of variance showed F value was 2.970 and the significance level was .89. That

means the variances of the two groups were approximately equal. Independent-sample t test results again showed that there was a significant participation cost difference ($t = -2.097$, $p < .05$) in comparison of both participation level groups. However, there were no significant differences between the two participation groups in collective interests, selective benefits, internalized norms of participation, and norms of cooperation. There were no significant differences between the groups in their level of contributions either.

By age, the respondents were broken into six age groups from a group of 30s to a group of 80s. The majority of respondents were 40s (31.5%) and 50s (34.8%). The arithmetic mean of respondents' age was 54.1 years old with a standard deviation of 11.4 years old. The youngest respondent was 31 years old and the oldest respondent was 87. Individual participants' average age was 58.59 with a standard deviation of 2.44, while representatives' average age was 50.33 with a standard deviation of 1.14. In addition, female respondents' average age was 49.90 with a standard deviation of 9.89, while male's average age was 55.31 with a standard deviation of 11.46. For reference, the median age of the Tulsa community is 34.5 years old.

The distribution of respondents' ethnicity was White (86.5%), Black (2.2%), Hispanic (2.2%), Asian (1.1%), and Others (1.1%). Others include American Indian and those who declined to report their ethnicity. The distribution of ethnicity was White (73.9%), Black (16.5%), American Indian (7.7%), and Asian (2.2%). Hispanic of any background was 7.2%. Educational attainment consisted of five groups, but three top groups accounted for 97.8% of the sample. The group with graduate school degrees had the highest number (44.9%), followed by the group with college degrees (41.6%).

11.2% had some college or vocational school education. For reference, 49.1% of the Tulsa population had more than some college education or vocational school diplomas. 50.8% of males had more than college degrees or vocational school diplomas compared to 57.3% of females. Only 9.2% of the Tulsa population had graduate or professional degrees. 11% of males had graduate or professional degree compared to 7.5% for females.

The respondents were divided into eight income groups. 57 respondents (64%) had an income of over $65,000. Almost half of them (29 respondents; 32.6%) revealed that their income was over $100,000, whereas only one (1.1%) had an income of less than $14,000. For reference, per capita income in Tulsa was $21,534 in 1999. A male full-time year-round worker made an average income of $32,779, whereas a female full-time year-round worker had an average income of $25,587. Those who had an income of over $100,000 accounted for 9.7% of Tulsa's population in 1999. A Chi-square test also confirmed that there were gender differences in respondents' incomes (Chi-square 13.139, Sig. .041).

The arithmetic mean of years lived in the Tulsa community was 28.05 years with a standard deviation of 15.8, ranging from 1 to 77 years. The respondents were again broken into eight groups by years lived in Tulsa. The group of those who lived in Tulsa for 20-29 years had the highest number (N = 23) and accounted for 25.8% of the sample. In summary, the majority of respondents were white males with higher education and high income whose age was between 40 and 50.

5.3.2 Organizational Characteristics of Respondents

53 of 55 representatives (two were missing) answered organizational types. 15 organizations joined the program from the government sector, 12 from community-based organizations sector, 11 organizations from business and industry, 6 from education, 4 from infrastructure, 1 from health, 1 from the workforce, and 3 from others. However, there were no significant differences among three big organizational groups (government, community-based organizations, and business and industry) in collective interests, selective benefits, internalized norms of participation, norms of cooperation and participation costs. There were no significant differences among those groups in their level of contributions either. Average years of membership was 4.63 years with a standard deviation of 1.42, ranging from 1 to 7 years. Median length of membership was 5 years. Average number of employees was 414.42, ranging from one to 8000, but median was 26.

5.3.3 Descriptive Contribution of Respondents

Research findings showed that each respondent spent an average of 6.65 hours per month on program activities; the median was one hour with a standard deviation of 22.04 hours, ranging from zero, the minimum hour, to 190 hours, the maximum hours. In detail, each respondent spent an average of 2.04 hours (SD = 5.43) attending regularly scheduled meetings, an average of 2.94 hours (SD = 17.39) serving on subcommittees, an average of 1.05 hours (SD = 2.49) attending events such as conferences or workshops

held by Tulsa Project Impact, and only an average of .62 hours (SD = 1.35) attending education or training programs held by Tulsa Project Impact (see Table 5-3).

Table 5-3 Descriptive analyses of respondents' contribution

Contribution	**N**	**Mean**	**Min.**	**Max.**	**SD**	**Skewness**	**Kurtosis**
Time Investments		6.65	0	190	22.04	7.309	60.523
Attending meetings	85	2.04	0	40	5.43	4.985	26.926
Serving on take forces	85	2.94	0	160	17.39	8.974	81.872
Attending events	85	1.05	0	16	2.49	3.841	17.457
Attending programs	85	.62	0	8	1.35	3.064	11.435
Individual Contribution		2.54	1	5	1.15	.990	.567
Donating money	85	1.48	1	5	.96	2.081	4.524
Sharing information	85	2.82	1	5	1.31	.086	.962
Providing knowledge	85	2.63	1	5	1.45	.322	-1.210
Offering materials	85	1.75	1	5	1.09	1.392	-.986
Loaning equipment	85	1.47	1	5	1.04	2.351	3.774
Number of Projects	85	2.54	0	12	2.89	1.581	2.317
Number of task forces	85	.97	0	12	1.67	3.873	21.608
Organizational contribution		.39	0	1	.31	.517	-.618
Personnel	53	.68	0	1	.47	-.820	-1.379
Money	53	.21	0	1	.41	1.514	.301
Material	53	.34	0	1	.48	.638	-1.655%
Equipment	53	.28	0	1	.45	.992	-1.058
Facility	53	.43	0	1	.50	.274	-2.002

Survey findings also show that each respondent participated in an average of 2.57 Tulsa Project Impact program projects with a standard deviation of 2.89, ranging from none to 12 projects. The median was 2 projects. Similarly, each respondent served on an average of .97 subcommittees with a standard deviation of 1.67, ranging from zero to 12. The median was zero subcommittee. Both had the same range from zero to 12, but the number of subcommittees on which respondents served varied more than the number of projects, in which they participated. Skewness and kurtosis of the number of subcommittees were 3.873 and 21.608 each. Distribution of the number of

subcommittees was skewed to the right with very thin tail. Meanwhile, skewness and kurtosis of the number of projects were 1.581 and 2.317. Distribution of the number of projects was also skewed to the right and had thicker tails compared to the normal distribution.

Respondents were also asked to rate their individual efforts for facilitating community-based hazard mitigation. For reference, 1 stood for "No contribution", 3 for "Medium contribution", and 5 for "Major contribution." They contributed two items of sharing information with other partners for building a safer community (M = 2.82, SD = 1.31) and providing knowledge or skills needed to implement Tulsa Project Impact projects (M = 2.63, SD = 1.45) more than the remaining three items. Meanwhile, three items including donating money to support program activities (M = 1.48, SD = .96), offering materials needed to implement Project Impact projects (M = 1.75, SD = 1.09), and loaning equipment needed to implement Project Impact projects (M = 1.47, SD = 1.04) were rated relatively lower by respondents. These five items formed a composite scale with an average score of 2.54 (SD = 1.15). Skewness and kurtosis of the composite scale were .990 and .567 each. Thus, distribution of the composite scale indicating personal contribution was also skewed to the right with thicker tails.

Organization's resource contribution was classified into five categories, and measured with a binominal scale (0-1) respectively: providing personnel resources (M = .68), giving direct funding support (M = .21), offering materials (M = .34), loaning equipment (M = .28), and providing organizational facilities (M= .43). Personnel varied the least and was most commonly contributed by organizations. In contrast, money

varied most and was least commonly contributed by organizations. In addition, Pearson Chi-square test was used to find patterns in organizations' resource contributions. Table 5-4 shows test findings. Personnel resource type had relationships with material (Chi-square = 13.469, $\alpha < .005$) and facility (Chi-square = 6.755, $\alpha < .01$) resource types. Material, equipment, and facility had relationships with each other: material had a relationship with equipment (Chi-square = 9.977, $\alpha < .01$), equipment with facility (Chi-square = 11.411, $\alpha < .01$), and facility again with material (Chi-square = 6.009, $\alpha < .025$).

Table 5-4 Chi-square test about organization's resource contribution

	Personnel		Money	Material		Equipment	
Money	1.133 (.287)						
Material	13.469 (.000)	**	3.267 (.195)				
Equipment	3.373 (.061)		5.831 (.054)	9.977 (.003)	**		
Facility	6.755 (.009)	*	1.356 (.508)	6.009 (.015)	†	11.411 (.001)	**

Chi-square (Probability); ** refers to $\alpha < .005$; * refers to $\alpha < .010$; † refers to $\alpha < .025$.

5.4 Test of the Proposed Model

The collective interest model described in the five hypotheses and summarized in Figure 3-1 was tested by inspecting the correlations (see Table 5-5 and Table 5-6), and by conducting hierarchical regression analyses, a specialized form of multivariate analysis. Hierarchical regression analyses were used because dependent variables could not be added together to form a composite scale for a dependent variable and because the number of observations was not large enough to add all predictors into the regression equation. First, time investment was considered as the most reliable and valid indicator

of partners' contribution. But it turned out to be the least reliable variable and inconsistent with other contribution indicators. Time investment was strongly correlated with personal contribution ($r = .416$, $p < .01$), but when these items were added together to form a composite scale, their reliability was low ($\alpha = .46$) as discussed above. Second, R square may be overestimated when the data sets have few cases (N) relative to number of predictors (p). For this study, the number of cases was 89, so the maximum number of predictors was 8 including constant ($N/p > 10$).

The most critical problem might be the measurement of time investment. Less than half of respondents (42 out of 88) answered that they served on more than one subcommittee, but when they were asked to rate the best estimate of the number of hours per month, their estimate of time investment serving on subcommittees indicated zero: that is to say, they were not active at the point of survey, but still said they had served on subcommittees before. Some people might answer zero for their time contribution when they were not active, whereas the number of subcommittees was a fact, which could not be changed, and so was reliable. Similarly, some partners answered that they participated in a few projects, but their time investment was measured as zero. So another critical problem might come from omitting items, which must be considered in the measurement of partners' time investment in program activities. In addition, poor question wording might have contributed to this validity problem. In summary, there was critical inconsistency in measuring time investment items.

Table 5-5 Correlation coefficients of contributions with collective action determinants

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. TIME	1.000														
	.														
2. NOPR	.244*	1.000													
	.022	.													
3. NOSC	.266*	.631**	1.000												
	.012	.000	.												
4. PSCO	.416**	.647**	.426**	1.000											
	.000	.000	.000	.											
5. RIPC	.074	.005	-.012	.049	1.000										
	.501	.967	.912	.654	.										
6. CMVU	.007	.115	-.111	.162	.387**	1.000									
	.951	.299	.317	.144	.000	.									
7. ECBN	.010	.262*	.164	.293**	.456**	.275*	1.000								
	.927	.014	.128	.006	.000	.012	.								
8. PREF	.175	.174	.062	.326**	.434**	.325**	.727**	1.000							
	.105	.108	.567	.002	.000	.003	.000	.							
9. INEF	.175	.299**	.242*	.363**	.314**	.240*	.753**	.685**	1.000						
	.104	.005	.024	.001	.003	.029	.000	.000	.						
10. SOIN	.071	.144	.048	.120	-.022	-.102	.211	.100	.217	1.000					
	.512	.183	.659	.268	.843	.357	.050	.356	.044	.					
11. IFIN	.231*	.407**	.249*	.448**	.310**	.225*	.490**	.436**	.506**	.343**	1.000				
	.032	.000	.021	.000	.004	.042	.000	.000	.000	.001	.				
12. MTIN	.039	.201	.091	.329**	.292**	.090	.444**	.231*	.392**	.305**	.526**	1.000			
	.722	.064	.404	.002	.007	.422	.000	.032	.000	.004	.000	.			
13. INNO	.239*	.327**	.163	.460**	.413**	.275*	.636**	.580**	.615**	.206	.472**	.407**	1.000		
	.028	.002	.137	.000	.000	.012	.000	.000	.000	.059	.000	.000	.		
14. NOCO	.056	.260	.191	.311**	.458**	.142	.659**	.599**	.575**	.224*	.473**	.385**	.646**	1.000	
	.612	.017	.084	.004	.000	.207	.000	.000	.000	.042	.000	.000	.000	.	
15. COST	-.126	-.281*	-.247*	-.273*	-.201	-.080	-.338**	-.342**	-.265*	-.092	-.347*	-.105	-.444**	-.479**	1.000
	.255	.010	.024	.012	.069	.474	.002	.002	.016	.406	.001	.345	.000	.000	.

1. time investment; 2: number of projects; 3: number of subcommittees; 4: personal contribution; 5: risk perception; 6: perceived community vulnerability; 7: economic benefit; 8: program effectiveness; 9: individual effectiveness; 10: social incentive; 11: information incentive; 12: material incentive; 13: internalized norms of participation; 14: norms of cooperation; 15: participation cost.

* $p < 0.05$. ** $p < 0.01$. N = 81 to 88

Table 5-6 Spearman's correlation coefficients of contributions with collective action determinants

	1	2	3	4	5	6	7	8	9	10	11	12	13
1. NOPR	1.000												
	.												
2. NOSC	.533**	1.000											
	.000	.											
3. RIPC	-.032	.001	1.000										
	.768	.995	.										
4. CMVU	.132	-.051	.373**	1.000									
	.234	.647	.001	.									
5. ECBN	.310**	.144	.407**	.234*	1.000								
	.003	.184	.000	.033	.								
6. PREF	.191	.074	.307**	.217*	.667**	1.000							
	.077	.497	.004	.049	.000	.							
7. INEF	.297**	.273*	.256*	.235*	.606**	.614**	1.000						
	.005	.010	.017	.033	.000	.000	.						
8. SOIN	.170	.162	-.041	-.049	.213*	.126	.195	1.000					
	.116	.133	.711	.658	.048	.243	.070	.					
9. IFIN	.448**	.347**	.288**	.238*	.488**	.478**	.509**	.346**	1.000				
	.000	.001	.008	.031	.000	.000	.000	.001	.				
10. MTIN	.250*	.177	.237*	.111	.523**	.294**	.423**	.332**	.406**	1.000			
	.020	.103	.029	.320	.000	.006	.000	.002	.000	.			
11. INNO	.381**	.277*	.388**	.279*	.615**	.615**	.657**	.206	.489**	.410**	1.000		
	.000	.010	.000	.011	.000	.000	.000	.059	.000	.000	.		
12. NOCO	.257*	.254*	.421**	.144	.605**	.550**	.614**	.231*	.488**	.361**	.671**	1.000	
	.019	.021	.000	.198	.000	.000	.000	.036	.000	.001	.000	.	
13. COST	-.220*	-.231*	-.194	-.223*	-.375**	-.376**	-.405**	-.132	-.443**	-.305**	-.613**	-.469**	1.000
	.046	.036	.079	.044	.000	.000	.000	.233	.000	.005	.000	.000	.

1. number of projects; 2: number of subcommittees; 3: risk perception; 4: perceived community vulnerability; 5: economic benefit; 6: program effectiveness; 7: individual effectiveness; 8: social incentive; 9: information incentive; 10: material incentive; 11: internalized norms of participation; 12: norms of cooperation; 13: participation cost.

* $p < 0.05$. ** $p < 0.01$. N = 81 to 88

Considering this measurement problem, I decided to drop time investment as the dependent variable and use other contribution indicators for regression analyses. This decision was supported by the correlations calculated among multi-item scales and individual items displayed in Table 5-5, which shows that few predictors were significantly correlated with time investment. Only information incentives (r = .231) and internalized norms of participation (r = .239) were significantly correlated with time contribution at the level of .05, but these predictors did not explain time investment in the regression analysis (R^2 = .059 for both variables).

Meanwhile, the number of projects and the number of subcommittees were better presented by Spearman's Rho than Pearson's correlation coefficient because neither had a normal distribution (Norusis, 2000). Analyses show that, overall, the size of Spearman's correlation coefficients were larger than that of Pearson's correlation coefficients, but their correlation coefficients were similar in size order. For example, both analyses identified information incentives as the variable with the highest correlation: Spearman's correlation coefficient was .347 at the .01 level (see Table 5-6) and Pearson's correlation coefficient of it was .249 at the .05 level each (see Table 5-5). But entry of information incentives into the regression equation did not significantly raise the predictable variance (R^2 change was .068).

Both correlation analyses show that the number of projects and personal contribution was significantly correlated with predictors and used for testing the five hypotheses. The first hypothesis - that partners' contributions will increase when the estimated value of collective interest increases - was not supported by the correlation of

respondents' contribution with collective interests (r = .091). Collective interests were defined as a function of problem severity (measured by risk perception, community vulnerability, and economic benefits), program effectiveness, and individual efficacy in solving problems as previously discussed. The first assumption was that the more serious people are about problems, the more likely they will join and take preventive action (as in environmental movements or protest against nuclear power uses). Risk perception and perception of community vulnerability were considered as indicators of problem severity. Surprisingly, however, risk perception and community vulnerability among collective interest variables had no significant relationship with either the number of projects or personal contribution. In contrast, economic benefits ($r = .310$, $p < .01$) and individual efficacy ($r = .297$, $p < .01$) were significantly correlated with the number of mitigation projects in which respondents participated (see Table 5-6). Economic benefits (r = .293), program effectiveness (r = .326), and individual efficacy (r = .363) were significantly correlated with respondents' personal contribution at the .01 level. These three variables were significantly correlated with each other: economic benefits had a significant relationship with project effectiveness (r = .727) and individual efficacy (r = ..753), while project effectiveness correlated with individual efficacy (r = .685) at the .01 level. Thus, they were all added together to form a composite scale ($\alpha = .88$) and used as a collective interest variable which was significantly correlated with the number of projects ($r = .224$, $p < .05$).

Spearman's correlation analysis identified economic benefit as the variable with the third highest correlation, but its entry to the equation did not raise R^2 (by .000) at all.

Individual efficacy, which was the variable with the fourth highest correlation, also barely raised R^2 (by .003). The regression analysis shows that collective interest did not significantly influence respondents' participation in projects, barely raising R^2 (by .006). Similarly, no collective interest variables significantly influenced respondents' personal contribution (individual efficacy raised R^2 by .001 and program effectiveness by .000). The collective interest variable with a composite scale alone explained the variance in personal contribution by .092. But individual efficacy and program effectiveness variables better explained the variance when they were entered into the regression equation alone: R^2 was .126 with the entry of individual efficacy alone and .106 with the entry of program effectiveness. This analysis indicated rather that they had a direct effect on personal contribution. When it was added to the equation with four predictors of information incentives, internalized norms, individual efficacy, and material incentives in correlation size order, economic benefits created in the biggest change (by .017) from $R^2 = .290$ to $R^2 = .307$ ($F(6, 77) = 5.679$, $p < .01$). But economic benefit alone explained the variance in personal contribution ($R^2 = .089$): that is to say, it also had a small direct effect on personal contribution. Consequently, the first hypothesis was not supported by any correlations with collective interests.

However, correlation and regression analyses show that the second hypothesis – that partners' contributions will increase with their perceptions of selective benefits - was supported by a significant correlation between personal contribution and predictors: information incentives ($r = .448$) and material incentives ($r = .329$) at the .01 level. Information incentives ($\beta = .463$), which was the variable with the second highest

correlation, made its entry into the equation, raising R^2 by .214, but material incentives (β = .087), which had the fourth highest correlation, barely raised R^2 (by .005). Both were significantly correlated ($r = .526$, $p < .01$) and added to form a composite scale (α = .81). Selective benefits raised the predictable variance in personal contribution from R^2 = .203 for internalized norms alone to R^2 = .282 ($F(2, 81) = 15.885$, $p < .01$). In addition, selective benefits had a significant relationship with the number of projects (r = .353, $p < .01$), and the variable with the highest correlation with it. Selective benefits explained the predictable variance in the number of projects by R^2 = .124 ($F(1, 84)$ = 11.937, $p < .01$). So selective benefits better explained respondents' personal contribution than their participation in the number of projects. Multiple regression analyses with stepwise inclusion also supported the hypothesis that selective benefits was the best predictor for respondents' personal contribution (R^2 = .222, β = .471, $p <$ .01). Moreover, the size of the correlation with personal contribution (r = .448, $p < .01$) was larger than with the number of projects (r = .353). This finding indicated that this analysis might have a possible confounding effect on correlated methods variance.

Lindell and Whitney (1995) discussed this problem. They said: "correlated methods variance can arise from common sources, response format similarity, and social desirability" (p. 442). This problem occurs because subjects were asked to do a self-estimate of their contribution, and they tried to make a good impression. Table 5-7 shows the comparisons between the correlations of the number of projects with predictors and that of personal contribution with the same predictors. Interestingly, correlation coefficients in both columns had a similar order, but the size of the

correlations of personal contribution with predictors was larger than that of the number of projects with the same predictors. This is the evidence that correlated methods variance presented in the data.

Table 5-7 Comparison of correlation coefficients

	Contribution Indicators	
	Number of Project	***Personal Contribution***
Collective Interests	.210	.303**
Risk Perception	.005	.049
Community Vulnerability	.115	.162
Economic Benefit	.262*	.293**
Program Effectiveness	.174	.326**
Group/ Individual Efficacy	.299**	.363**
Selective Benefits	.353**	.448**
Social Incentives	.144	.120
Information Incentives	407**	.448**
Material Incentives	.201	.329**
Internalized Norms	.327**	.460**
Norms of Cooperation	.260	.311**
Participation Costs	-.282*	-.273*

* $p < 0.05$. ** $p < 0.01$.

The third hypothesis – that partners' contributions will decrease as their perceived participation costs increases - was not well supported by the least significant correlations between participation costs and two contribution indicators: the number of projects (r = - .281) and personal contribution (r = - .273) at the .05 level. As expected, it was significantly and negatively correlated with both contribution indicators. But its entry into the regression equation did not raise R^2. Participation costs alone explained the predictable variance in the number of projects by .079 and in personal contribution by .075. With its entry into the equation, participation costs raised the predictable variance in the number of projects by .015 (from $R^2 = .195$, $F(3, 78) = 6.308$, $p < .01$ for

internalized norms, information incentives, and individual efficacy to $R^2 = .210$, $F(4, 77) = 5.127$, $p < .01$ for them all), but its standardized coefficient was -.139 at $p > .25$. Thus, it did not adequately explain the variance in the number of projects. In addition, participation costs barely raised the variance in personal contribution (from $R^2 = .291$, $F(2, 79) = 16.182$, $p < .01$ for both internalized norms and information incentives to $R^2 = .293$, $F(3, 78) = 10.767$, $p < .01$ for them all) when it was added to internalized norms and information incentives.

However, there was a significant participation level difference in the perception of participation costs. Participation costs alone explained the variance in organizational representatives' personal contribution, raising R^2 by .75, but its standardized coefficient was -.274 at the .05 level. Meanwhile, participation costs alone explained the variance in individual participants' personal contribution by .084, but its standardized coefficient was -.291 at $p = .113$. Consequently, the third hypothesis was well supported by the model when it was applied only to organizational representatives.

The fourth hypothesis – that partners' contributions will increase with their conformation to norms of cooperation - was supported by a correlation between norms of cooperation and predictors: the number of project ($r = .257$, $p < .05$) and personal contribution ($r = .311$, $p < .01$). But norms of cooperation did not raise the variance in the number of projects a bit (by .000) when it was added to predictors of information incentives, internalized norms, economic benefit, and individual efficacy in correlation size order. Instead, adjusted R square shrank by .009. Norms of cooperation explained the variance in personal contribution by .004 when it was added to predictors of

internalized norms, information incentives, individual efficacy, material incentives, and program effectiveness (all explained the variance by .288, $F(5, 77) = 6.220$, $p < .01$). However, norms of cooperation alone explained the predictable variance in the number of projects by .068 and personal contribution by .097. Interestingly, norms of cooperation alone explained the variance in organizational contribution by .179 ($F(1, 48) = 10.463$, $p < .01$). Internalized norms ($r = .480$), norms of cooperation ($r = .423$), and individual efficacy ($r = .409$) were the variables with the top three highest correlation with organizational contribution in order, and together they explained the variance in organizational contribution by .250. Norms of cooperation raised R square by .021 (from $R^2 = .227$, $F(1, 48) = 18.084$, $p < .01$ for internalized norms alone to $R^2 = .248$, $F(2, 47) = 7.734$, $p < .01$ for both variables). Consequently, norms of cooperation provided a better explanation for organizational resource contribution than the individual level of contribution.

The fifth hypothesis – that partners' contributions will increase with their individual norms when their risk perception is high - was supported by a significant correlation between the internalized norms variable and variables from two categories of contribution variables. The internalized norms variable was significantly correlated with number of projects ($r = .327$) and personal contribution ($r = .460$) variables at the .01 level. Interestingly, it was also correlated with time investment ($r = .239$, $p < .05$). Internalized norms was the variable with the second highest correlation with the number of projects and the highest correlation with personal contribution and with organizational contribution. It alone explained the variance in the number of projects ($R^2 = .018$, $\beta =$

.155, $p < .20$), personal contribution ($R^2 = .200$, $\beta = .448$, $p < .01$), and organizational contribution ($R^2 = .227$, $\beta = .476$, $p < .01$). When using composite scales, its entry into the regression equation raised the variance of the number of projects by .023 (from $R^2 = .136$, $F(1, 82) = 12.989$, $p < .01$ for selective incentives alone to $R^2 = .160$, $F(2, 81) = 7.702$, $p < .01$ for both variables). Multiple regression analyses with stepwise inclusion also supported internalized norms as the second best predictor for respondents' personal contribution ($R^2 = .064$, $\beta = .292$, $p < .01$). Similar to norms of cooperation, internalized norms of participation better explained the predictable variance in organizational contribution than the other two variances.

Finally, the complete collective interest model explained the predictable variance in respondents' personal contribution by .303 ($F(5, 75) = 6.531$, $p < .01$). As discussed, selective incentives ($\beta = .360$, $p < .01$) and internalized norms ($\beta = .332$, $p < .05$) were identified as the two best predictors of respondents' personal contribution.

Statistical diagnostic tests were conducted to determine if the assumptions of that regression model have been met: if the assumptions are correct, the distribution of the residuals should be approximately normal with constant variance. Histogram of standardized residuals in Figure 5-1 shows that despite its shape not being ideally symmetrical, its curve was almost normal. First, multicollinearity analysis was conducted to test if there was a significant multicollinearity problem: that is to say, if any of the tolerances were small (less than .1). Analysis showed all tolerance levels were over .1 and all VIF values were below 10 (see Table 5-8). Second, residual plot analysis was conducted to test for heteroskedasticity – a condition in which the errors in

the regression model do not have common variance. Scatterplots of residuals in Figure 5-2 show a residual scatter plot with a divergent or convergent fan shape, which implies heteroskedasticity which often occurs when cross-section or time series data are collected with samples varying greatly in size (Gupta, 1994). Tulsa Project Impact recruited partners from various social and economic sectors, and this heterogeneity in terms of different self-interests and goals may cause heteroskedasticity.

Table 5-8 Characteristics of determinants

Model	Unstandardized Coefficients B	Std. Error	Standardized Coefficients β	t	Sig.	Tolerance	*VIF*
(Constant)	1.048	1.061		.988	.326		
Collective Interests	-.110	.265	-.059	-.414	.680	.453	2.209
Selective Incentive	.464	.152	.360	3.053	.003	.668	1.497
Internalized Norms	.426	.185	-.123	2.298	.024	.445	2.247
Norms of Cooperation	-.147	.188	-.115	-.784	.436	.434	2.302
Participation Costs	-.213	.196	-.332	-1.085	.281	.723	1.384

VIF refers to variance inflation factor.

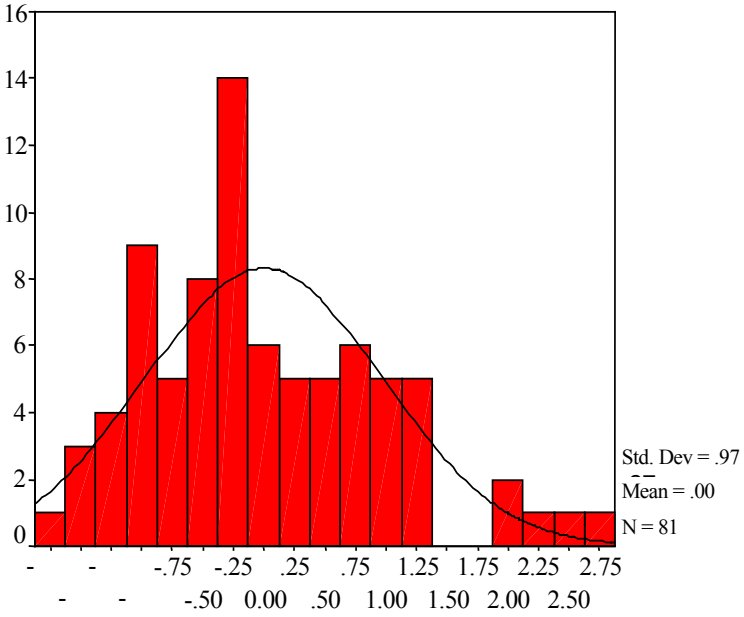

Figure 5-1 Standardized residuals

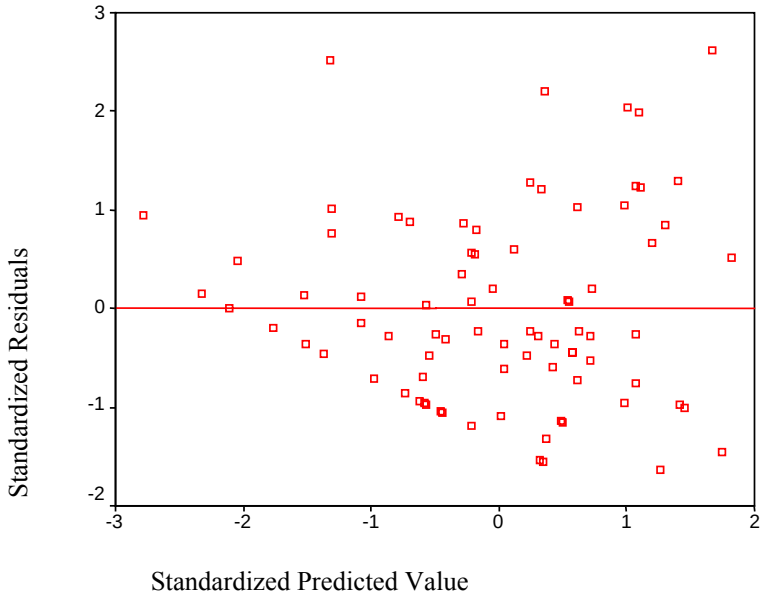

Figure 5-2 Scatterplots of standardized residuals

CHAPTER VI

CONCLUSIONS

6.1 Introduction

This research investigated the relationship between partners' contributions to the program and collective action variables including collective interests, selective incentives, internalized norms, norms of cooperation, and participation costs. This study tested the collective interest model. Correlation analyses were conducted to identify predictors for partners' contributions. Both independent-sampled t tests and Analysis of Variance (ANOVA) tests were performed to investigate mean differences over determinants among groups with different respondents' demographic characteristics. Finally, hierarchical regression analyses were conducted to test hypotheses and discuss findings and statistical meaning.

6.2 Research Findings and Discussions

This study examined the collective interest model, which predicts partners' contribution from their collective interests (in terms of problem severity, program effectiveness, and individual efficacy), perceived selective benefits, internalized norms, norms of cooperation, and participation costs. Table 5-9 shows the results of an equation predicting partners' contribution. The model shows that two of the five independent variables were statistically significant predictors of future partners' contributions to collective action for community-based hazard mitigation. They are

selective incentives and internalized norms of participation. These variables had standardized regression coefficients between -.414 and 3.053 and taken together the model explains about 30% of the variance in partners' contributions.

Since there are 80 observations, the relevant t value for evaluating the significance of the six estimated coefficients (including constant) at a 95% level of significance is 1.658. Thus, coefficients, which have t value larger than 1.658, are statistically significant.

6.2.1 Collective Interests

In the early collective action literature, the relationship between collective action and collective interests was regarded as automatic. It was natural to think that those who have high stakes related to collective goods would join actions. But all those who are interested in collective goods do not necessarily participate in collective action. Instead some of them may free ride. So the first hypothesis was whether partners' contributions were related to their collective interests.

Research findings show that there were no statistically significant relationships between partners' contributions and their collective interests. Correlation analyses showed that collective interests were significantly correlated with personal contribution ($r = .303$, $p < .01$). In the contribution model to test the hypotheses, however, collective interests did not explain the variance in personal contribution at all (R^2 change = .000). Its standardized coefficient was -.059 and t value was -.414 at $p = .680$ (see Table 5-8). Its t value was much smaller than 1.658, so it was not statistically significant.

Partners may be continually informed about multi-hazards and community vulnerabilities through meetings, news, training programs, and events such as workshop or conferences. So the relationship between partners' contribution and their risk perception or perception of community vulnerabilities was expected to be significant. Contrary to expectation, risk perception and community vulnerability were not significantly correlated with any contribution variables, and could not explain any variance in respondents' contribution variables. But that does not mean both did not influence partners' contribution. Correlation analyses show that both had significant relationships with other independent variables including the two best predictors of contribution: information incentives and internalized norms (see Table 5-5). That means both variables may indirectly influence partners' contributions.

To identify further the relationship of their perceived level of problem severity with contribution, the first four items in community vulnerabilities which were selected to measure perceived level of exposure (people, property, utility facilities, and infrastructure) were combined to form a composite scale ($\alpha = .85$). Interestingly, perceived level of exposure was significantly correlated with personal contribution ($r = .216$, $p < .05$), and alone explained 4.7% of the variance in personal contribution. Its t value was 2.018 at the 95% level of significance, so it was statistically significant. That means partners' contributions can be partially explained by their perceived level of problem severity. Other subvariables such as perceived level of hazard adjustments or community capacity were not significantly related to partners' contributions.

Project Impact continually provided partners with information related to goals and values. Tulsa Project Impact also provided its partners with the 2020 vision of a disaster resilient community to give them hope. Aguirre (2002) also discussed such a strong vision as functioning as a magnet to draw stakeholders into the collective action. Economic benefit was the incentive to join the program. It was correlated with both the number of projects ($r = .262$, $p < .05$) and personal contribution ($r = .293$, $p < .01$). It alone explained 6.95% of the variance in the number of projects and 8.6% of the variance in personal contribution.

Klandermans (1984) argued that the probability of program success increases individuals' participation. So partners' perception of program effectiveness was expected to have a relationship to their contributions. Correlation analyses show that it was significantly correlated only with partners' personal contribution ($r = .326$, $p < .01$), and it alone could explain 10.6% of the variance in personal contribution. But it raised R square by .016 when it was added to individual efficacy. Program effectiveness alone better explained the variance in personal contribution.

Klandermans (1984) again argues that individuals' participation is related to their perception of individual influence on change. Other research findings have also confirmed his argument. In this study, individual efficacy was found to be the variable with the highest correlation to personal contribution ($r = . 363$, $p < .01$), and it alone could explain 12.6% of the variance in personal contribution.

There were no participation level differences and demographic differences in contribution and collective interests. When these five collective interest variables were

all combined to test the first hypothesis, none of them was statistically significant. All together they could explain 16.7% of the variance in personal contribution, 11.7% of the variance in the number of subcommittees, and 10.3% of the variance in the number of projects.

6.2.2 Selective Benefits

If collective interests was not a good predictor to explain the variance in partners' contributions, what else motivates them to contribute? They need incentives or norms to trigger action. Olson (1965) argues that selective incentives was the best predictor of participation. So the second hypothesis was whether partners' perception of selective incentives was related to their contributions.

Three types of incentives were identified: social, information, and material incentives. The social incentives alone explained only 2.1% of the variance in the number of projects and 1.4% of the variance in personal contribution. But they were not statistically significant. That means social respect or award opportunities for performance did not influence partners' contributions.

Information incentives alone explained 20.1% of the variance in personal contribution. That was the largest explanation for a single variable. This research finding confirmed Gillespie and his colleague's findings that organizations join alliances because of their interests in other partners' missions and tasks and DRC's research findings that partners join a program to obtain hazard or hazard mitigation information. Its t value was 4.593 ($p < .05$), and it was statistically significant. Research findings also

show that those who were more interested in information participated in a greater number of program projects. For reference, 25 out of 89 respondents answered that they did not participate in any projects. Their mean score in information incentives was 2.97, while those who participated in more than one project showed higher interests in material incentives ($M = 3.77$). Independent-sample t test results supported this argument ($t = 3.400$, $p < .01$). Thus, the argument that information incentives influence partners' contribution was supported.

In the interorganization literature it was well documented that organizations always look for resources and formulate alliances to secure resources. The research findings confirmed this theory. Material incentives alone explained 10.8% of the variance in personal contribution, but only 4% of the variance in the number of projects or .8% of the variance in the number of subcommittees. That does not mean partners who were looking for resources were necessarily led to participation in projects or serving on subcommittees. However, it seems those who are more interested in material incentives are more likely to contribute. As discussed above, those who did not participate in projects had a mean score in material incentives of 2.34, while partners who participated in more than one project showed higher mean score in material incentives ($M = 2.84$). Independent-sample t test results also support this argument ($t = 2.148$, $p < .05$).

Consequently, selective incentives explained the variance in partner's personal contribution. A series of social, information, and material incentives were identified. Correlation analyses show that social incentives was inconsistent with the other two

variables and dropped in the regression analyses. The remaining two variables were added into the predictive equation, and selective incentives alone explained 12.4% of the variance in the number of projects and 20% of the variance in personal contribution. Its entry into the contribution model raised R square by .079, and its t value was 3.053 at the 95% level of significance. It was considerably larger than 1.658, and statistically significant.

6.2.3 Participation Costs

In the previous research of collective action, participation costs was consistently related with people's participating behavior (in protest or political events) in the expected negative direction. That means people tend to balance net benefits from their participation with net costs. So the third hypothesis was whether partners' contribution was related to their perception of participation costs.

The results of correlation analyses support the hypothesis that participation costs had a significant relationship to partners' contribution ($r = -.273$, $p < .05$). However, the results of hierarchical regression analyses show that participation costs did not totally explain the variance in partners' personal contributions. It had smallest correlation with personal contribution (see Table 5-5). Its entry into the equation did not raise R square significantly. R square change was .011, but even that change was larger than R square change by other variables (norms of cooperation raised R square by 0.005 and collective interests by .002) in the model.

Consequently, participation costs was not a good predictor for partners' contributions to community-based hazard mitigation. Previous analyses show us three things. First, the majority of respondents were white males, who were well educated and earned high income. Second, there was a significant gender difference in their personal contribution. Independent-sample t test results show that males contribute more than females. There was also a significant gender difference in income (Chi-square = .13.139, $p < .05$) and education (Chi-square = 8.561, $p < .05$). Third, there was also a significant participation level difference in their perception of participation costs. Organizational representatives perceived more costs than individuals. These findings do not necessarily explain why participation costs was significantly related with partners' contribution, but they may provide an indicator that participation costs can possibly influence contribution.

6.2.4 Norms of Cooperation

Meanwhile, many social exchange theorists and game theorists have discussed various models to explain why people or organizations cooperate. They commonly argue that cooperation provides in more benefits to both parties than defection, and norms are generated among parties. Emergent norms are reproduced and (negatively or positively) reinforced by norm beneficiaries. Such norms are the kind of game rules which monitor, guide, or enforce behaviors for maximizing mutual benefits. Not every norm necessarily sanctions violators. So the fourth hypothesis asked whether partners' contributions were related to the norms of cooperation.

Research findings show that norms of cooperation alone explained 9.7% of the variance in partners' personal contribution. Its t value was 2.947 at the 99% level of significance, and larger than 2.660. So it was statistically significant. Partners may participate because they believe it is fair to participate as much as others do. When it was added to other entries in the equation, however, norms of cooperation did not explain the variance in personal contribution. Its entry raised R square only by .005. So it did not support the hypothesis in the collective interest model.

6.2.5 Internalized Norms of Participation

Mileti (1999) argued that social expectation or norms are more likely to guide individuals' hazard adjustments, rather than their rational judgment of vulnerabilities or the effectiveness of hazard mitigation measures. This has been sharply contested by other rational choice theorists' argument that individuals act purposively. So the fifth hypothesis asked whether partners' contributions were related to their internalized norms of participation. In addition, Schwartz (1992) argued that internalized norms do not necessarily lead to action. It needs mediates such as problem severity. Thus, the assumptions state that those who perceive problem severity more likely feel obliged to participate and those who feel obliged to participate are more likely to contribute.

First, correlation analyses show that there was a significant correlation between problem severity and internalized norms. The size of the correlation was the highest among all correlations for this study. Regression analysis results also supported the first assumption. Collective interests alone explained 43.7% of the variance in partners'

feeling of obligation to participate ($F(1, 80) = 61.978$, $p < .01$). That means partners' perception of problem severity may possibly influence their feelings of obligation to take action.

Second, regression results again show that individualized norms alone explain 21.2% of the variance in partners' personal contribution. Its addition to selective incentives in the equation raised R square by .061. Its t value was 2.621 at the 99% level of significance so it was statistically significant. But this does not mean partners' internalized norms necessarily influence their contributions.

Hierarchical regression analyses show that both variables together explained 21.6% of the variance in personal contribution. But internalized norms alone explained 21.6% of that variance. The entry of collective interest into the equation did not raise r square at all (by .000). Instead, both adjusted R square and F value dropped by .06 and 11.157 respectively as result of its entry. However, their $F(2, 79)$ value was still 10.901 at the 99% level of significance and much larger than $F(2, 60, p < .01) = 4.98$. Thus, this model was statistically significant. That means both variables together may possibly influence partners' personal contribution. Schwartz's (1992) action theory was also confirmed.

6.3 Conclusion and Limitations

Selective benefits and internalized norms of participation were the two most important variables that influenced Tulsa Project Impact partners' contributions to collective mitigation action. These two key findings have considerable implication for

collective mitigation action issues. First, the majority of respondents said they participated in Tulsa Project Impact because they wanted to learn about other partners' mission and tasks, obtain hazard or hazard adjustment information, or have opportunities to exchange resources with other partners. Partners' contributions are strongly correlated with their perception of selective benefits. In fact, many Project Impact communities attempted to develop incentive packages in order to recruit partners (Wachtendorf, 2001). Tulsa Project Impact also developed and provided financial and technical incentives for recruiting partners and facilitating mitigation projects (e.g., tax incentives to encourage safer shelter). Thus, this finding may indicate that the Tulsa Project Impact program successfully used incentives for recruiting partners and encouraging them to contribute.

Second, many respondents felt obliged to participate in collective mitigation action. Their conformation to internalized norms of participation increased contribution, but the causal relationship of internalized norms with contribution is unclear because we do not know exactly what aroused their feelings of obligation. For example, the majority of respondents were characteristically well-educated and middle-aged white male community leaders with a high income. They are community leaders and may volunteer for community-based hazard mitigation in order to play their social roles as leaders. Other enforcing factors may be education through campaigns, conferences, or workshops. Education about hazard and hazard adjustments may change people's values, preferences, interests or advantages related to community-based hazard mitigation. So incentives for contributions may be collective interest in terms of

problem severity and economic benefits. Actually, the causal relationship of partners' collective interest to their contributions was mediated by internalized norms of participation. Collective interest did not directly influence partners' contribution, but it is highly correlated with internalized norms of participation. Thus, research findings imply that education may influence partners' feelings of obligation to participate and contribute.

There are also some limitations to my study of collective action for community-based hazard mitigation. First, this study's most critical problem came from the cross-sectional, one-shot research design. Cross-section study is not a good method to infer cause and effect relationships. Finkel and Muller (1998) discussed this causal inference problem in the cross-sectional. They said "Causal inference in the cross-sectional case has been hampered by the inability to use perceptions of the costs and benefits of participation at a given time to predict behavior that necessarily occurred in the past and by ambiguities associated with analyzing behavioral intentions instead of actual protest participation (p. 46)." Considering this limitation of the cross-sectional data, all statistics and research findings present only the potential presence of relationships. For example, research findings indicating that partners' perceived selective incentives and internalized norms of participation had a significant relationship to their contributions do not necessarily mean both caused their contribution.

The second critical problem came from the rational choice model itself. Most rational choice models were based on the belief that human nature is rational and possesses perfect information (Zey, 1998). In reality, humans do not always act

rationally and it is impossible to obtain perfect information to calculate net benefits and net costs. Rather most individuals rely on bounded rationality to judge, so rational choice is already theoretically flawed. These facts explain why most rational choice models do not empirically explain complex behaviors of players. For this study, however, the collective interest model was selected for the purpose of identifying predictors of collective action and their basic relationships, not for mathematical purposes to prove that their causes and effect relationships are true.

The third critical problem came from the unit of analysis. Rational choice is a way of explaining collective action on the basis of individual behaviors. So rational choice theorists perceive individuals as the basic unit of analysis because only individuals correctly present preferences or beliefs in order (Zey, 1998). Organizations or groups do not have preferences as individuals do. Otherwise, rational choice cannot be predicted. For example, Elster (1982) treated an organization as one decision maker. Theoretically, however, it may be controversial to apply findings at the micro level such as individual attitudes to social phenomena at the macro level such as collective mitigation action. Such an individual methodology has long been criticized by other scholars. According to them, organizational decisions cannot be the same as individual ones because organizational decisions require more complex procedures in terms of power structure, communication networks, etc. Thus, social collectivities such as dyads are the more appropriate unit of analysis for collective action.

This one-shot case study is subject to research design problems. Nevertheless, this study provides empirical data and, although very limited, research findings provide

information for scientific understanding of collective action for community-based hazard mitigation.

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APPENDICES

APPENDIX 1: Mail Survey Cover Letter

Texas A&M University
College of Architecture
Landscape Architecture and Urban Planning

November 17, 2003

Dear Tulsa Project Impact Partners

Tulsa Project Impact is one of the most active community-based hazard mitigation programs in the nation, the aim of which is to enable communities to protect themselves more efficiently and effectively against hazards. Thus, it is critical for stakeholders to participate in the program. We are conducting a study to examine the factors influencing the decision of participants in the Tulsa Project Impact to participate in this noteworthy endeavor to build a safer community.

You are one of the participants we have selected to provide their opinions on this issue. We hope you will participate in our study, which will take approximately 10 minutes of your time. For the results to truly represent the thinking of partners, it is important that each questionnaire be completed and submitted as quickly as possible.

In order to ensure anonymity, no names will be identified with questionnaires. Instead, an identification number will be used for mailing purposes only. This is so that we can remove your name from the mailing list when you submit your survey online. There are no risks associated with your participation, and, of course, you may refuse to answer any question that makes you uncomfortable. Your response is important for this study of citizen participation in community-based hazard mitigation/ disaster preparedness, so we hope you will choose to participate.

This research has been reviewed and approved by the Institutional Review Board-Human Subjects in Research at Texas A&M University. For research related problems or questions regarding subjects' rights, you can contact the Institutional Review Board through Ph.D. Michael W. Burkley, Director of Support Services, Office of the Vice President for Research at (979) 458-4067.

Please mark your answers to all questions on the questionnaire. The online version of it is also available at http://archfile.tamu.edu/hlee/survey/loginpage.asp. If you want to receive a summary of the results of this study, please check up the box "study results requested" at the bottom of questionnaire. We thank you in advance for investing your valuable time in this study.

If you have any questions, feel free to contact us. Thank you for your help.

Sincerely yours,

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APPENDIX 2: Survey Instrument

Collective Action
for Community-Based Hazard Mitigation:
Tulsa Project Impact

The purpose of this survey is to examine the factors influencing the decision of Tulsa Project Impact partners to participate in this noteworthy endeavor to build a safer community.

Hee Min Lee, Ph.D. Candidate,
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Tell: (979) 845-1046 (Dept.)
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APPENDIX 2 (continued)

Please respond to all of the questions in this questionnaire. It will take you about ten minutes to fill out this questionnaire. If you have suggestions on any questions, people feel free to use the space in the margins. Thank you.

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1. Are you an individual member of Tulsa Project Impact or do you represent a certain group, community, or organization? …..…… Individual □ Representative □

If you answered that you are a representative member, then please respond to all questions.
If you are an individual member, please skip to the question **6** and answer all following questions.

Organizational Profiles

2. What is **the best description** of the original mission of your organization?

Community-Based Organizations □ Education □ Government □ Health Care □ Workforce □
Industry & Business □ Infrastructure: Transportation □, Utilities □, & Housing □ Other _____

3. What year did your organization join the Project Impact program? …..…….…….…….. _____

4. What is **your best estimate of the number** of people who are working for your organization? ……... _____

5. Has your organization ever contributed the following monetary or in-kind resources to program activities since your organization joined Tulsa Project Impact?

	Yes	No
a. Providing staff resources to support program activities ……..	□	□
b. Giving direct funding support to Tulsa Project Impact …..……	□	□
c. Offering materials needed to implement the Project Impact projects. ……	□	□
d. Loaning equipment needed to implement the Project Impact projects. ….	□	□
e. Affording your organization facilities to support program activities …….	□	□

Contributions to Tulsa Project Impact

6. What is **your best estimate of the number** of hours per month you **personally** devote to Tulsa Project Impact activities?

a. Attending regularly scheduled meetings …….. ____hours per month
b. Serving on subcommittees or task forces ……. ____hours per month
c. Attending events such as conferences or workshops held by Project Impact …….. ____hours per month
d. Attending education or training programs held by Project Impact …….. ____hours per month

7. How many **Tulsa Project Impact projects** have you participated in since you joined the program? …… _____

8. How many **subcommittees or task forces** have you served on since you joined the program? ……..… _____

APPENDIX 2 (continued)

9. Indicate your **personal level of contribution** of the following monetary or in-kind resources to Project Impact program activities since you joined Tulsa Project Impact.

	No contribution		Medium contribution		Major contribution
a. Donating money to support program activities	①	②	③	④	⑤
b. Sharing information with other partners for building a safer community.	①	②	③	④	⑤
c. Providing knowledge or skills needed to implement the Project Impact projects	①	②	③	④	⑤
d. Offering materials needed to implement the Project Impact projects.	①	②	③	④	⑤
e. Loaning equipment needed to implement the Project Impact projects.	①	②	③	④	⑤

Problem Severity (the Perceived Level of Exposure and the Lack of Capacity)

10. How likely do you think it is that in the next ten years there will be natural disasters such as a flood, winter storm, or tornado that will cause:

	Not at all likely		Un-determined		Almost a certainty
a. Property loss to you, your relatives, or your neighbors.	①	②	③	④	⑤
b. Injury to you, your relatives, or your neighbors.	①	②	③	④	⑤
c. Business loss to you, your relatives, or your neighbors.	①	②	③	④	⑤

11. How much do you believe that Tulsa community is vulnerable to natural hazards due to the following:

	Strongly disbelieve		Un-determined		Strongly believe
a. Many people still live within hazard prone areas.	①	②	③	④	⑤
b. Many buildings and structures are still located within hazard prone areas.	①	②	③	④	⑤
c. Many utility facilities are still located within hazard prone areas.	①	②	③	④	⑤
d. Many transportation facilities are still located within hazard prone areas.	①	②	③	④	⑤
e. Many residents do **not** have home insurance.	①	②	③	④	⑤
f. Many small businesses **lack** resources to adopt hazard adjustments.	①	②	③	④	⑤
g. Many buildings and structures are **not** elevated or retrofitted.	①	②	③	④	⑤
h. Tulsa community has limited number of resources for implementing mitigation plans.	①	②	③	④	⑤
i. Tulsa community has limited amount of access to external resource sources.	①	②	③	④	⑤

Economic Benefits

12. Indicate **your level of agreement** with each of the following statements.

	Strongly disagree		Un-determined		Strongly agree
a. Investment in preventive actions will save money when a disaster strikes.	①	②	③	④	⑤
b. No business is safe without building a safer community.	①	②	③	④	⑤
c. The safer a community is, the more attractive it is for businesses.	①	②	③	④	⑤

APPENDIX 2 (continued)

Personal, Group, and Program Effectiveness for Hazard Reduction

13. **How much do you believe** that Tulsa Project Impact can successfully reduce community vulnerabilities to natural hazards by:

	Strongly disbelieve		Un-determined		Strongly believe
a. Identifying local hazard mitigation needs and demands.	①	②	③	④	⑤
b. Providing a variety of program activities for hazard reduction.	①	②	③	④	⑤
c. Efficiently and effectively coordinating local hazard adjustment efforts.	①	②	③	④	⑤
d. Prioritizing hazard mitigation projects based on local mitigation needs.	①	②	③	④	⑤
e. Mobilizing resources needed to implement hazard mitigation measures.	①	②	③	④	⑤

14. Indicate **your level of agreement** with each of the following statements.

	Strongly disagree		Un-determined		Strongly agree
a. The activity of a single person **cannot** reduce community vulnerabilities to hazards.	①	②	③	④	⑤
b. Working together is more effective than individually working for hazard reduction.	①	②	③	④	⑤
c. Every partner makes small contributions to building a safer community.	①	②	③	④	⑤
d. You can influence the decisions that make your community safer.	①	②	③	④	⑤

Incentives

15. To what extent is your participation in Tulsa Project Impact due to the following?

	Not at all		Un-determined		Very great extent
a. You may receive an award for Project Impact related performance.	①	②	③	④	⑤
b. Your neighbors may recognize that you are working hard to help build a safer community.	①	②	③	④	⑤
c. Your family members will be proud of you for volunteering to build a safer community.	①	②	③	④	⑤
d. You may learn about other partners' missions and tasks.	①	②	③	④	⑤
e. You may learn hazard-related information.	①	②	③	④	⑤
f. You may learn hazard-adjustment related information.	①	②	③	④	⑤
g. You may have an opportunity to exchange resources with other partners.	①	②	③	④	⑤
h. You may get financial assistance.	①	②	③	④	⑤
i. You may get technical assistance.	①	②	③	④	⑤

Obligation

6. Indicate **your level of agreement** with each of the following statements that you feel obliged to:

	Strongly disagree		Un-determined		Strongly agree
a. Take preventive actions for protecting your family members or property from disasters.	①	②	③	④	⑤
b. Participate in the decisions that make Tulsa community safer.	①	②	③	④	⑤
c. Participate in hazard mitigation programs for building a safer community.	①	②	③	④	⑤
d. Volunteer hazard mitigation program activities to help people or businesses at risk.	①	②	③	④	⑤
e. Participate in mitigation programs because your job is protecting people and property.	①	②	③	④	⑤

APPENDIX 2 (continued)

Expectation of Other Partners' Contributions

17. **How much do you believe** that other partners should make contributions to Tulsa Project Impact program activities due to the following:

	Strongly disbelieve		Un-determined		Strongly believe
a. The fact that their contributions are good for all community members.	①	②	③	④	⑤
b. The fact that their contributions can help people or businesses at risk.	①	②	③	④	⑤
c. Fairness in sharing social responsibilities for building a safer community.	①	②	③	④	⑤
d. Fairness in sharing common mitigation goals for building a safer community.	①	②	③	④	⑤
e. Fairness in contributing time and resources to building a safer community.	①	②	③	④	⑤

Participation Costs

18. Indicate **your level of agreement** with each of the following statements.

	Strongly disagree		Un-determined		Strongly agree
a. Project Impact meetings are too frequent. ……..….	①	②	③	④	⑤
b. Project Impact meetings take too long. ……..…..	①	②	③	④	⑤
c. The meeting place is far away from your place of work. ……..…	①	②	③	④	⑤
d. There are too many mitigation projects to implement. ……..…..	①	②	③	④	⑤
e. Participation in the Project Impact program costs you too much money. ……	①	②	③	④	⑤
f. Lack of emergency experience or knowledge costs you a great deal of time and effort. ...…….	①	②	③	④	⑤

Background Information

19. Please indicate your:

a. Age: _____years old
b. Gender: ① Male ② Female
c. Ethnic/rational identity: ① African American ② Caucasian ③ Hispanic
④ Asian or Pacific Islander ⑤ Others _____

20. What is your level of educational attainment?
① Less then high school ② High school/ GED ③ Some college/ vocational school
④ College graduate ⑤ Graduate/ professional school

21. Your yearly household income before taxes last year.
① Less then $14,000 ② $14,000-$24,999 ③ $25,000-$34,999 ④ $35,000-$44,999
⑤ $45,000-$54,999 ⑥ $55,000-$64,999 ⑦ $65,000-$74,999 ⑧ $75,000-$99,999
⑨ Over $100,000

22. How many years have you lived in your community? _____ Years _____ Months

Do you want to receive a summary of the results of this study? Yes □ No □

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