

Dynamics between Community Safety and Development*

- A Dynamic Simulation Study -

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지역사회 안전과 개발간의 역학*

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ABSTRACT : This study aims to examine how community goals of safety and development are interrelated over time. It also seeks to understand how stakeholders of safety and development are organized around their own goals and to explore how community organization for safety can affect the actual levels of safety and development. One small to medium-sized community in Illinois, USA was selected as a test community. The hypothesis drawn from conflict theory was first tested with archival and key informant data over the baseline period, and then tested by extending the baseline policy parameters over a 36-year period of time(2007-2043). The interviews with key informants revealed that development stakeholders were better organized to advocate for their own interests than those of safety. For development an active partnership between the public and private sectors was prominent, while for safety city government was the only main stakeholder group. The results of dynamic simulations supported conflict theory over the baseline period, but failed to support it over the extended period. The initial inverse relationship between safety and development shifted to a positive downward trend from a long-term perspective, in contrast to the hypothesis of conflict theory. Further, community organization for safety helped to increase the actual levels of development as well as safety. These findings inspired additional tests to discover policies promoting safety and development in communities.

Key Words : community goals, safety, development, dynamic simulation

요약 : 이 연구는 안전과 개발이라는 지역사회 목표가 시간이 지남에 따라 어떤 상관관계가 있는지를 고찰하는데 목적이 있다. 또한, 지역사회의 안전과 개발 이해관계자 집단들이 그들의 목표를 중심으로 어떻게 조직화되어 있는지, 안전을 중심으로 한 지역사회조직이 안전과 개발의 성취도에 어떤 영향을 미치는지를 탐구하고자 한다. 이 연구를 위해 미국 일리노이주의 한 중·소도시가 선정되었다. 갈등이론에서 도출된 가설이 기록자료와 주요 정보제공자 면접자료에 근거하여 기초선(1990-2007)에서 검증되었고, 36년간(2007-2043)의 연장선에서 다시 검증되었다. 주요 정보제공자 면접결과, 개발 이해관계자 집단이 안전 이해관계자 집단보다 더 잘 조직화되었음이 밝혀졌다. 개발의 경우 민·관 파트너십이 두드러졌으나, 안전

* 본 논문은 저자의 George Warren Brown School of Social Work, Washington University in St. Louis 박사학위 논문(2006년 8월)의 일부를 확장·보완한 것임. 이 연구는 미국 National Science Foundation(NSF 65198)으로부터 연구비를 지원받아 수행되었음.

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의 경우 시정부가 유일한 이해관계자 집단이었다. 또한, 다이내믹 시뮬레이션 결과, 기초선(1990-2007)에 서는 갈등이론이 지지되었지만, 연장 기간(2007-2043)에서는 이 가설이 지지되지 않았다. 초기의 안전과 개발간의 부(-)의 관계는 장기적으로 안전과 개발 모두 감소하는 정(+)의 관계로 변화하였다. 또한, 안전을 중심으로 한 지역사회조직은 안전의 수준뿐만 아니라, 개발의 수준도 증가시켰다. 이런 연구결과에 근거하여 지역사회 안전과 개발의 수준을 증진할 수 있는 정책 발견을 위한 추가적인 연구들이 필요할 것으로 보인다.

주제어 : 지역사회 목표, 안전, 개발, 다이내믹 시뮬레이션

1. Introduction

Natural disasters such as hurricanes, floods, earthquakes, and tornadoes disrupt and even destroy communities. Thus, all communities pursue the goal of safety, along with a wide range of other goals such as development, transportation, health, education, environment, and the like. Despite the threat of natural hazards, safety is generally not considered a top priority in most communities until disasters cause problems(Prater and Lindell, 2000). In other words, safety issues and disaster mitigation policies do not draw much attention during periods of stability. One survey in California found that the earthquake hazard was ranked by local decision-makers and residents as the seventh out of eight local problems. This is noteworthy because California is the most pioneering and highly developed state in seismic risk mitigation in the United States(Rossi et al., 1982).

Further, safety is most strongly emphasized immediately after damaging events take place. Concern spikes upward rapidly when a disaster strikes. Unfortunately, this event-based emphasis on safety tends to dissipate quickly. This is illustrated with the outpouring of concern about the hurricanes that hit the Gulf Coast in the United

States in 2005. Hawkins(2006) reported between 250-300 news stories a day in the immediate aftermath of Hurricane Katrina. One problem with this event-based foundation of safety concern is that the concern dissipates rapidly right after disasters (Prater and Lindell, 2000). For example, even though death and destruction from the Gulf Coast hurricanes were the most severe in American history, the number of news accounts has dropped dramatically with the lapse of time(Hawkins, 2006). Pennebaker and Harber(1993) estimated that safety concerns dropped back to near normal after about three months. With the Gulf Coast disaster, the decline of concern about safety took a little longer because of its historic magnitude.

Despite low levels of interest it is most effective and efficient to manage the threats of hazards before they become disasters. Disaster experts emphasized the importance of preparedness measures and mitigation policies at each level of government (Berke and Beatley, 1992; Federal Emergency Management Agency, 1994). However, since communities seek various goals within the limits of their finite resources, they tend to focus on those that are currently salient. In an effort to understand the dynamics underlying the structure of community goals, this study focuses on two

prominent goals of safety and development. Both of them are considered critical in communities, even though development is usually pursued as a top priority (City of Carbondale, 2002; City of Champaign, 1999; City of Columbia, 2004; City of Urbana, 2003). Although it would be more realistic to study all of the community goals at the same time, this would require a complicated model and risk obscuring understanding of the underlying dynamics between goals. A clear understanding of two goals sets a foundation for understanding multiple goal dynamics. Throughout this article, the concepts of safety and development are narrowly defined in terms of buildings in communities, although safety and development have many dimensions.

The problem focus of this study is on how to maintain or increase the level of community safety during periods of stability without compromising the level of development. This is a critical issue in any community, as safety involves protecting lives and properties of the community members and ultimately leads to better performance or achievement of other community goals like development. This research seeks to understand the dynamics between community goals of safety and development over time and to examine the effect of stakeholder interests on the achievement of those goals. More specifically, this study aims: 1) to examine how safety and development are interrelated over time; 2) to understand how stakeholders of safety and development are organized around their own goals; 3) to explore how community organization for safety affects the actual levels of safety and development over time.

II . Theoretical background: Conflict theory

To effectively understand the dynamics between community goals of safety and development, this study refers to conflict theory. The theory explains why and how conflict between safety and development arises in communities, paying attention to the interaction of stakeholder interests with community resources in goal dynamics. Since communities have numerous goals to be pursued within the limited resources, conflict arises in the process of resource allocation. Conflict emerges when two or more stakeholder groups differ in distributing material or symbolic resources and act on incompatible goals or perceived divergent interests (Dahrendorf, 1959). The more goals there are competing for the same resources, the less resources might be allocated to any one goal. Further, the more resources are allocated to one goal, the more likely that goal is to be achieved. Accordingly, if stakeholder groups of safety and development in a community have conflicting interests on any community issue, both of them compete each other to have their own interests pursued.

Conflict theory was codified by Dahrendorf based on various theoretical roots from Marxist theory and Simmel's work on social conflict. His primary focus is on "change rather than equilibrium, conflict rather than order, how the parts of society contribute to change rather than to stability, and conflict and coercion rather than normative constraint" (Ritzer, 1996: 277). Dahrendorf (1959: 135) defined conflict in terms of goal disparities, stating that "all relations between sets of individuals that involve an incompatible difference of objective ... are ... relations of social conflict".

Dahrendorf(1959) also believed that conflicts of interests exist all the time and result in change and development. Power is disproportionately divided, and some stakeholder groups dominate others(Ritzer, 1996: 268). Stakeholders in dominant positions attempt to maintain the status quo, whereas those in minor positions seek changes. Dahrendorf(1959) suggested that the number or size of stakeholder groups influence the direction of policies and practices in communities. In other words, the larger the stakeholder groups, the greater the probability that the goals of that group will be pursued because social order is based on the manipulation and control of non-dominant groups by dominant groups. For instance, at a given point in time, if there are more stakeholder groups supporting development compared to those supporting safety, the government will be inclined to create policies facilitating development. However, the situation can change at any time. A dramatic event such as a terrorist attack or a disaster can trigger a shifting in the distribution of interests.

Coser(1956) noted that conflict would lead to generating cohesion by which one group may form a series of alliances with other groups. Stakeholders with less resources are likely to seek change and form coalitions with other stakeholder groups in order to gain mutually intended goals or outcomes. Coalitions counterbalance the interests of the dominant stakeholder group. For instance, stakeholder groups for safety might coalesce with stakeholder groups for the environment to slow or possibly reverse an increasing trend toward development. Collins(1975: 289) viewed communities as “arenas for conflicting interests”. Kanter and Brinkerhoff(1981: 322) also described communities as “battlegrounds for stakeholders, both inside and outside, who

compete to influence the criteria for effectiveness so as to advance their own interests”. Self-interested people take actions in order to maximize their satisfaction and minimize dissatisfaction(Collins, 1975).

Further, goal attainment is contingent on the allocation of resources. Communities have a number of goals to be achieved within a limited amount of resources available, and thus seek to effectively and efficiently balance those resources. Because of resource scarcity, certain types of conflicts are inevitable in this situation. Communities may experience “conflicts over the amount of means, time, and energy to be allocated to each goal”(Etzioni, 1964: 15). Trade-offs between the allocations of expenditures resulting from compromises between two goals are unavoidable when decisions are made under conditions of resource scarcity (Welch and Welch, 1998). The critical needs at a given point in time will prompt a community to place a priority to a particular goal. When one goal takes priority, others are necessarily compromised.

III. Research methods

1. Research questions and hypotheses

The research questions guiding this study are as follows: 1) *how are the achievements of safety and development interrelated over time?*; 2) *how does community organization for safety affect the achievements of both safety and development?* According to conflict theory, as achievement of one goal increases, achievement of another goal decreases. In other words, as communities pay more attention to achieving a high-priority goal, they may usually have to divert their attention

from a low-priority goal. Resources directed to one goal necessarily limit the resources available to other goals, which can affect the achievement of those goals. The main hypothesis drawn from conflict theory is *with finite resources, a change in one goal is inversely related to a change in another goal*(Hall, 1991). The hypotheses being tested are as follows: 1) *the actual levels of safety and development are inversely interrelated over time*; 2) *community organization for safety increases the achievement of safety*; 3) *community organization for safety decreases the achievement of development*.

2. Case selection

This research is a case study. The unit of analysis is community, defined as an independent political entity or municipality. The focus of this research is on small to medium-sized communities with populations of 10,000 up to 100,000 in Illinois, USA. The main reason for the focus on the communities of this size is that many communities fall into this category and approximately 42 percent of people in Illinois live in the communities of this size. Census Bureau data identified 196 communities under this category in the State of Illinois as of July 1, 2002(United States Census Bureau, 2003). Mean of the community population in this category is 26,943, with standard deviation of 16,893. Figure 1 shows the distribution curve of small to medium-sized communities in Illinois, USA.

One community close to the mean population in the population category of 10,000 up to 100,000 in Illinois, USA was selected as a test community. It is a university city with a population of 25,167 in 2002(United States Census Bureau, 2003). Over half of the population are students. The city takes

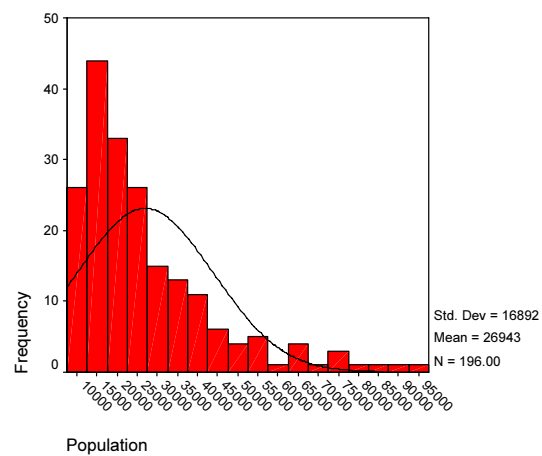


Figure 1. Distribution curve of small to medium-sized communities in Illinois, USA

a Council-Manager form of government. The mayor and six city council members are elected through non-partisan election and hold positions for 4-year staggered terms. The mayor, as the official head of the city, appoints members to the various committees, boards, and commissions, with consent of the city council. The city council functions as the key decision-making body related to the community goals of safety and development. And a city manager serves as the chief administrative officer of the city government(Community A, 2000).

In 1998, this community was invited to join the national initiative to reduce the impacts of disasters named "Project Impact: Building a Disaster-Resistant Community" for the State of Illinois by the Federal Emergency Management Agency. This community is located in the area of high risk for floods, tornadoes, and earthquakes(e.g., in the New Madrid Earthquake Fault Zone and within the Tornado Alley) and has implemented a number of mitigation measures for safety. The Illinois Emergency Management Agency(IEMA) also recognized this community as a good example of promoting safety.

The community did not experience any major disasters during the study period, even though there were some potential disasters such as tornado, flood, and earthquake(Community A, 2004).

3. Measures of key variables

There are two main variables in this study: safety and development. The concepts of safety and development do not involve one single definition or one single strategy. Both of them involve different perceptual and physical aspects and have many different dimensions. For instance, there are a variety of dimensions of safety such as transportation, crime, violence, toxic chemicals and materials, and various natural hazards. Likewise, there are many dimensions of development such as economy, literacy, education, and individual freedom. Accordingly, it is extremely difficult to directly compare safety and development. Since it is beneficial to have dimensional equivalence to facilitate direct comparison, both safety and development were operationally defined in terms of buildings in the community.

In this study, the level of safety was measured as the fraction of seismically safe buildings to the total number of commercial buildings in the community. The safety of each building was measured by a rapid visual screening assessment, which was developed by the Applied Technology Council (ATC) with funding from the Federal Emergency Management Agency(FEMA). It is a method of rapidly determining the seismic safety of buildings (Olshansky et al., 2002). The ATC-21 score determines whether a building is seismically unsafe(with scores of 2 or less), moderately safe(with scores of 3 and 4), and safe(with scores of 5 and 6). On the

other hand, the level of development was measured as the fraction of new buildings, those less than 25 years old, out of the total number of commercial buildings in the community. This judgement was made on the basis of the data released by civil engineers and key informants at the city government. They reassured that it was appropriate to cut off at 25 years to judge whether buildings are old or new, considering the general process of aging and life expectancy of buildings.

4. Time horizon

The baseline time horizon of the study is 18 years. This time horizon was selected for three reasons. First, during this particular period of time, the study community experienced earthquake-related events, although it did not actually experience a major disaster. Iben Browning, a climate scientist, predicted that a major earthquake would occur in December 1990 in the region of New Madrid seismic fault zone, where the community was located (United States Geological Survey, 2002). People in the community were worried, even though it ended up with no earthquake happening(Farley et al., 1991).

Second, the 18-year period is sufficiently long to capture operation of the feedback loops governing the changes in the goals of safety and development. This time horizon encompasses the activities that explain the levels of safety and development in the community. These activities include renewal of building codes, office terms of city council members, community goal renewal, and budget allocations.

Third, this time period is recent enough to reliably trace back the information needed and gather perceptual data from key informants in the community. The city had released annual financial

reports each year during the study period. Several of the key informants interviewed had resided and worked in the community throughout this period of time.

5. Data collection

Archival and key informant sources of data were collected for the study. First, I collected several types of archival data. The ATC-21 surveys were gathered to evaluate how the level of safety changes in buildings over the baseline time horizon. The community goals officially stated by the city government from 1990 to 2007 were carefully examined to document what the community officially claimed to seek with respect to safety and development. Annual revenue data provided by the city government were analyzed to examine how much money was spent on the goals of safety and development. The minutes of the city council meetings were also examined to identify policy initiatives in the community.

Second, I conducted semi-structured interviews with key informants involved in activities of safety and development. Snowball sampling was used to identify the key actors and stakeholders working to influence the goals of safety and development. Eighteen key informants from city government and nonprofit organizations in the community were interviewed to elicit information about efforts to achieve safety and development. Interviews took an average of approximately one and half hours to complete. Follow-up e-mail or phone contacts with key informants were made to clarify ambiguities in responses or gather additional information not originally requested. Moreover, I conducted several additional interviews with some of the key informants

to assure that parameters specified in the simulation model were appropriate. The model was also presented to the key informants to elicit refinements concerning relationships between safety and development and to ensure that behavior patterns of key variables were realistic and that the feedback loops represented corresponded to community activities.

6. Analysis

A system dynamics model was created in Vensim PLE Plus, Version 5.5d (Ventana Systems, 2005). Developing the model was an iterative process. I revised the model numerous times, going back and forth from problem formulation to testing and policy formulation. Based on the feedbacks from the key informants, I verified the model. Further, the model was validated. Validation involves “a continuous process of testing and building confidence in the model” (Sterman, 2000: 81). In system dynamics modeling, the model is validated continuously throughout the modeling process. I used the following tests or procedures such as boundary adequacy, structure assessment, parameter assessment, dimensional consistency, behavior reproduction, and sensitivity analysis, to ensure the validation of the model, as suggested in Forrester and Senge (1980), Ford (1999: 285–288), and Sterman (2000: 858–890).

I conducted analyses by simulating results first over the 18-year baseline (1990–2007) and then extending the simulation over a 36-year period of time (2007–2043). Both the baseline and the initial 36-year simulation were carried out with the community's existing policy parameters. Subsequent tests were executed by repeating the baseline

18-year results and then making policy adjustments in 2008.

IV. Results

1. Stakeholders of safety and development

According to conflict theory, the behavior of stakeholders in support of their own goals is essential to fully capture the dynamics between safety and development. Semi-structured interviews with key informants identified that the main stakeholder groups of development in the community were certain for-profits, nonprofits, and city government. Five major community-based development nonprofits were identified. Various kinds of for-profits involved in development of buildings were closely connected with nonprofit organizations through memberships. These nonprofits usually represented the interests of for-profits and provided them with business development information in the community. For development, a high level of collaboration between the public and private sectors was noted. The stakeholders of development in the private sector tended to influence key decision-makers(e.g., city council members and city government officials) usually through personal contacts. They got involved in advocating for their interests based on their perceptions, which were usually subjective and based on visual and anecdotal grounds and media accounts. Further, the main stakeholder for development in the city government was the Economic Development Office. Development stakeholders at the city government sought to maintain close relationships with both nonprofits and for-profits through informal and

formal meetings. Both nonprofits and for-profits sought for close ties with city government as well. For example, for-profits usually asked city government for lower taxation and less regulations through development nonprofits. The city government provided tax breaks to private companies in order to encourage development activities.

The main stakeholder group for safety was the Building and Neighborhood Services Division in the city government, whose main duty was to supervise building safety in the community. The community's safety concerns were addressed by city government officials through initiating public awareness campaigns. Interestingly, there was no safety-driven nonprofit organization operating in the community. There were, however, two remote nonprofit organizations involved in influencing safety in the community. Government officials at the city government sought to maintain a close relationship with these remote nonprofit organizations to get more effective public awareness programs implemented. For-profits including insurance companies were potential advocates, but in this community they were not actively engaged in promoting building safety during the study period.

2. Relationship between safety and development

The results of the dynamic simulation revealed that the level of safety had been incrementally decreasing over the 18 years from 1990 to 2007. The community had set the intended level of safety at 90 percent, but the actual level of safety slightly declined from 44 percent to 43 percent. There was a huge gap identified between the intended and actual levels of safety, i.e., approximately 46 percent. On the other hand, the baseline trend

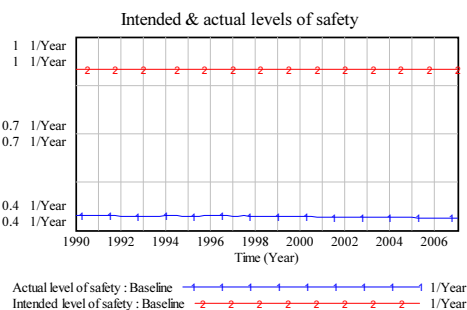
showed that both intended and actual levels of development incrementally increased over the 18-year period of time. For instance, this community set the intended level of development at 30 percent in 1990 and over the 18 years raised it up to 40 percent over two phases. Correspondingly, the actual level of development increased from 26 percent to 29 percent. The gap between the intended and actual levels was approximately 4 percent up to 11 percent. Figure 2 displays the baseline trend of intended and actual levels of safety and development.

Consistent with conflict theory, the empirical relationship between the actual levels of safety and development from 1990 through 2007 was close to an inverse relationship. The actual level of development increased from approximately 26 percent in 1990 to 29 percent in 2007, while the actual level of safety declined from 44 percent in 1990 to 43 percent in 2007. Next, I extrapolated the next 36 years to confirm the inverse relationship between safety and development over time. Surprisingly, the results revealed a shift from an inverse to a positive relationship between safety and development. The extrapolated lines showed that as safety goes down from 43 percent in 2007 to 38 percent in

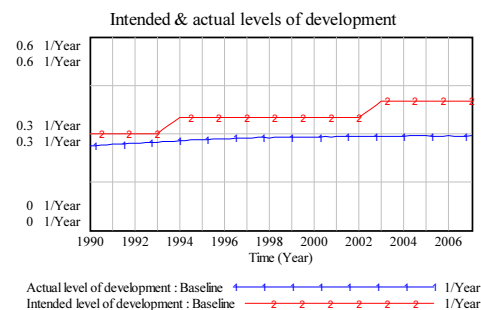
2043 development goes down from 29 percent in 2007 to 23 percent in 2043. It is noteworthy that the trend of actual level of development changed from an increasing to decreasing mode in between 2006 and 2007. In other words, in contrast to the hypothesis of conflict theory, the relationship between safety and development becomes mutually reinforcing over time from the long-term perspective. Figure 3 illustrates the relationship between the actual levels of safety and development. Figures 3-a and 3-b show the relationship between the actual levels of safety and development over the 18-year baseline period of time(1990-2007) and another 36-year extrapolated period of time(2007-2043) respectively.

3. The impact of community organizing for safety on safety and development

As mentioned earlier, city government was the only main stakeholder for safety in the community. There had been neither a public action group nor a for-profit organization actively involved in advocating for safety issue. As conflict theory indicates, the greater stakeholder groups for one goal, the greater the probability that the goal of that group is achieved. Further, a key informant at the city



(a) Baseline trend of safety



(b) Baseline trend of development

Figure 2. Baseline trend of intended and actual levels of safety and development

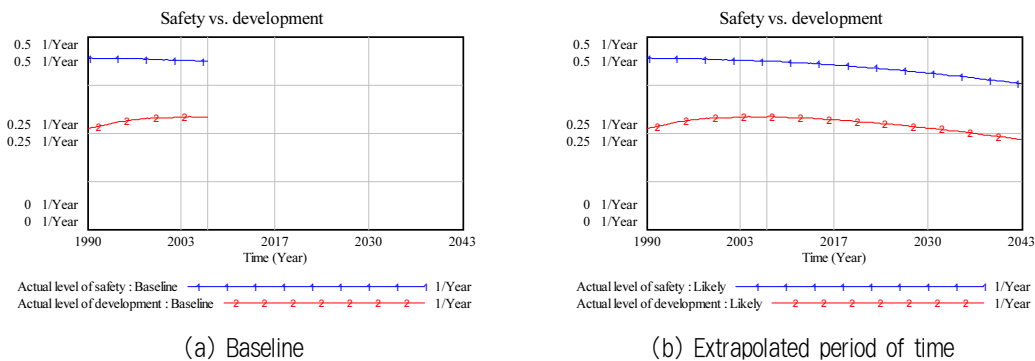


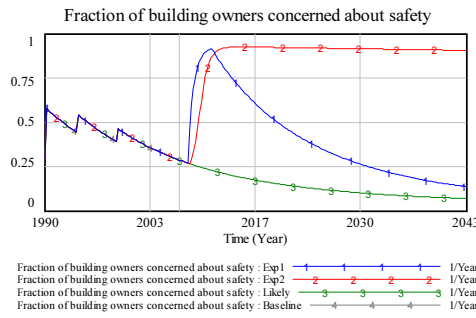
Figure 3. Relationship between safety and development

government confirmed that community organizing for safety could increase the level of safety over time. Community organizing for safety involves bringing people together to act for community safety. In other words, it involves forming a public action group to advocate for building safety and cooperate with other sectors such as city government and for-profits in the community.

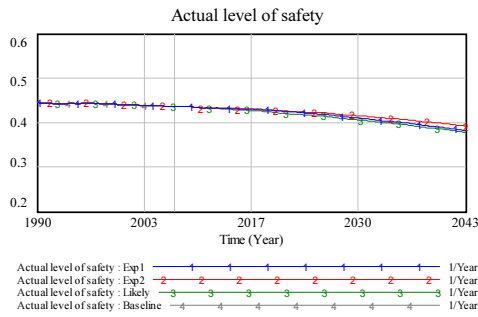
There was one hypothetical variable, i.e., *impact of community organizing for safety*, included in the base model to see how community organizing for safety can affect the achievements of both safety and development. Originally, the parameter was specified as zero in the base model. For these tests, the parameter of the hypothetical variable was varied in 2008 to see whether it can help increase the levels of safety and development. For the first scenario, Experiment 1 tested the impact of organizing community for safety in 2008 and maintaining it for 3 years. In this scenario, 5 people who are very concerned about building safety in the community form a public action group in 2008 and champion for the building safety for 3 years, bringing people together to act for the sake of building safety. For the second

scenario, Experiment 2 investigated the impact of organizing community for safety in 2008 and maintaining it for the next 36 years. In this scenario, 5 people who are very concerned about building safety in the community establish a public action group and advocate for the building safety for 36 years, taking leaderships and mobilizing residents to act for building safety.

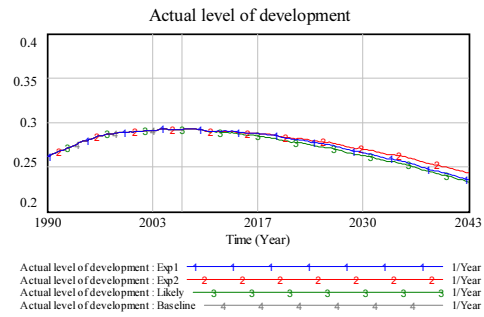
Figures 4-a, 4-b, and 4-c display the results of experiments. Figure 4-a shows the effects of community organizing for safety on building owners' concerns about building safety. Figure 4-b presents the effects of community organizing for safety on the actual level of safety. Figure 4-c demonstrates the effects of community organizing for safety on the actual level of development. In the figures, Line 1 demonstrates the result of the Experiment 1, i.e., community organizing for safety in 2008 and maintaining it for 3 years. Line 2 displays the result of the Experiment 2, i.e., community organizing for safety in 2008 and maintaining it for 36 years. Line 3 presents the likely result of the base model with no policy change. Line 4 demonstrates the result of the base model over the baseline period of time



(a) Building owners' concerns about building safety



(b) Actual level of safety



(c) Actual level of development

Figure 4. Effect of community organizing for safety on buildings owners' concerns, safety, and development

(1990-2007).

As shown in Figure 4-a, building owners' concerns about building safety dramatically improved as a result of community organizing for safety. Both Line 1 and Line 2 show that approximately 92% of building owners in the community became concerned about building safety in between 2010 and 2012. Further, Figure 4-b illustrates that it helped slightly improve the actual level of safety, although it did not correct the decreasing pattern of safety. Some improvement in the numerical values of safety was observed. In other words, it did contribute to increasing building owners' awareness of safety, but did not help them actually pay money to take necessary actions to increase

building safety. Interestingly, community organizing for safety also contributed to improving the level of development, although it did not change the decreasing pattern.

Overall, I found the following: 1) development stakeholders were better organized to advocate for their interests than those of safety; 2) for development an active partnership between the public and private sectors was prominent, while for safety city government was the only main stakeholder group; 3) the actual level of safety had been decreasing over the past 18 years, while that of development had been increasing; 4) there was a huge gap identified between the intended and actual levels of safety, while the gap in development was not; 5)

the relationship between safety and development was mutually reinforcing from the long-term perspective, in contrast to the hypothesis of conflict theory; 6) community organizing for safety was helpful to increase the actual levels of development as well as safety, although it didn't improve the decreasing patterns of safety and development.

V. Conclusion and implications

In contrast to the hypothesis drawn from conflict theory, the results revealed that the relationship between safety and development might be mutually reinforcing from the long-term perspective. Conflict theory is valuable in describing how different stakeholder groups can affect the dynamics between goals of safety and development. However, the theory is not sufficient to explain the goal dynamics over time. It does not take into account historical and dynamic perspectives, although the goal dynamics is inherently dynamic processes. It is mainly because conflict theory was originally formulated as structurally static. Simple and static hypotheses such as the inverse relationship between safety and development are too short-sighted.

Further, this positive relationship between safety and development from the long-term perspective has a practical and important implication for community policy and practice in Korea as well as in the United States. It opens up the possibility for cooperation between stakeholders of safety and development. Collaboration between local government and nonprofits can be an effective strategy(Grønbjerg and Child, 2004). Since local government is a key stakeholder in both safety and development, it can take initiatives to collaborate

with development nonprofits to promote the community's safety. Further, community organizers can work with stakeholders on both sides to build coalitions and identify the ways increased safety is beneficial for the community's development. They can take two-pronged approaches for effective community organization: top-down and bottom-up approaches. For a top-down approach, they can work with key decision-makers on both sides to build coalitions. For a bottom-up approach, they can initiate public action groups to increase public awareness of safety in the community. In this way, local government can more easily adopt disaster mitigation policies when windows of opportunity arise. A disaster event can be a good window of political opportunity for disaster mitigation policy. This window of opportunity usually occurs in the immediate aftermath of a disaster when the community is most receptive to policy changes(Prater and Lindell, 2000).

Furthermore, non-linearity observed in the relationship between safety and development over time has significant implications for understanding complex social problems and relationships between variables. Relationships change over time because of the feedback loops governing the behavior of the system. It is also important to acknowledge that all relationships are eventually non-linear. We need to understand the rising and falling patterns of association that happen in complex systems. Efforts to achieve or maintain given levels of safety and development must be understood over a long period of time.

As revealed in the findings of this study, community organizing for safety could help increase the achievements of both safety and development. There may be multiple policy adjustments needed

to achieve sustainable increase in both of them, because the single effort of community organizing for safety could not change the decreasing patterns of both safety and development. However, the more policy adjustments that have to be made to bring about desired results, the less likely those desired results are to be achieved. This is because policies are embedded in networks of relations among stakeholders. Every policy change is potentially viewed as beneficial by certain stakeholders, but detrimental by others. With a single policy change the resolution is relatively straightforward depending on the ratio of those for and against the change. But the situation becomes considerably more complex even with only two policy changes. Some stakeholders will support both changes and others will support the first policy but not the second, while still others will support the second but not the first, and there will be those who do not support either policy. A simple ratio of for versus against is no longer possible. As the number of necessary policy adjustments goes up the situation becomes geometrically more complex and messy. Accordingly, it becomes increasingly essential for safety stakeholder group to broadly collaborate with other stakeholder groups including development stakeholder groups.

Here are some future directions for studying the dynamics between community safety and development. First, this study used a case study design. Single case studies are limited in replication and generalization (Yin, 1994). Communities may have different goal dynamics, governance systems, and dynamics of stakeholder groups. Therefore, multiple case studies are needed to compare the dynamics between safety and development in communities and generalize it. Second, this study focused on

buildings to facilitate direct comparison between safety and development. Since there are several dimensions of safety and development, it is a potentially interesting stream of work that needs to be done to study the dynamics of other dimensions of safety and development. Finally, this study focused only on two goals out of many community goals. Focusing only on two goals may not capture the whole dynamics of community goals. There might be more complex dynamics operating in the relationships among all the community goals than between safety and development. In the future research, it is recommended to examine the dynamics between more goals other than between safety and development.

References

- Berke, P. R. and Beatley, T., 1992, *Planning for Earthquakes: Risk, Politics, and Policy*, Baltimore: Johns Hopkins University Press.
- City of Carbondale, 2002, Carbondale Community Goals, Retrieved December 27, 2002 from <http://www.ci.carbondale.il.us/goals2.htm>.
- City of Champaign, 1999, City council goals, Retrieved January 15, 2004 from <http://www.ci.champaign.il.us/government/gvcg.html>.
- City of Columbia, 2004, City of Columbia 2004 goals, Retrieved February 7, 2004 from <http://www.columbiaillinois.com/2004goals.htm>.
- City of Urbana, 2003, 2003 Comprehensive plan update, Retrieved January 17, 2004 from http://www.city.urbana.il.us/urbana/community_development/planning/Comprehensive_Plan/Draft_Goals.pdf.
- Collins, R., 1975, *Conflict Sociology: Toward an Explanatory Science*, New York: Academic Press.
- Community A., 2000, *City Profile*.
- Community A., 2004, *Project Impact*.

- Coser, L., 1956, *The functions of social conflict*, New York: Free Press.
- Dahrendorf, R., 1959, *Class and Class Conflict in Industrial Society*, Stanford, CA: Stanford University Press.
- Etzioni, A. (Ed.), 1964, *Modern Organizations*, Englewood Cliffs, NJ: Prentice Hall.
- Farley, J. E., Barlow, H. D., Finkelstein, M. S., and Riley, L., 1991. "Earthquake Hysteria, Before and After: A Survey and Follow-Up on Public Response to the Browning Forecast", Paper presented at the Research Conference on Public and Media Response to Earthquake Forecasts, Southern Illinois University at Edwardsville.
- Federal Emergency Management Agency, 1994, FEMA's Mitigation Programs, Retrieved February 11, 2003 from <http://www.fema.gov/ig/h-16-94.shtm>.
- Ford, A., 1999, *Modeling the Environment: An Introduction to System Dynamics Modeling of Environment Systems*, Washington, DC: Island Press.
- Forrester, J. W. and Senge, P. M., 1980, "Tests for building confidence in system dynamics models", In A. A. Legasto, Jr. J. W. Forrester, and J. M. Lyneis(Eds.), *System dynamics, TIMS Studies in the management sciences*(14th ed., pp. 209 ~228). New York: North-Holland Publishing Co.
- Grønbjerg, K. A. and Child, C., 2004, "Indiana Nonprofits: Affiliations, Collaborations and Competition", Bloomington, IN: School of Public and Environmental Affairs. Retrieved April 28, 2006 from www.indiana.edu/~nonprof/results/npsurvey/insaffil.html.
- Hall, R. H., 1991, *Organizations: Structures, processes, & outcomes*(5th ed.), Englewood Cliffs, NJ: Prentice Hall.
- Hawkins, R., 2006, "The Shortest War on Poverty: Why We've Already Forgotten Lessons of Race and Class after Katrina", Tenth Annual Conference of the Society for Social Work and Research, January 12-15, San Antonio, Texas.
- Kanter, R. M. and Brinkerhoff, D., 1981, "Organizational performance: Recent developments in measurement", *Annual Review of Sociology*, 7: 321 ~349.
- Olshansky, R. B., Wu, Y., and French, S., 2002, *Evaluating Earthquake Risk in Mid-American Communities* [Final report]. Urbana, IL: Mid-America Earthquake Center.
- Prater, C. S. and Lindell, M. K., 2000, "Politics of Disaster Mitigation", *Natural Hazards Review*, 1(2): 73 ~82.
- Pennebaker, J. W. and Harber, K. D., 1993, "A Social Stage Model of Collective Coping: The Loma Prieta Earthquake and the Persian Gulf War", *Journal of Social Issues*, 49: 125 ~145.
- Ritzer, G., 1996, *Sociological Theory*(4th ed.), New York: McGraw-Hill.
- Rossi, P. H., Wright, J. D., and Weber-Burdin, E., 1982, *Natural Hazards and Public Choice: The State and Local Politics of Hazard Mitigation*, New York: Academic Press.
- Sterman, J. D., 2000, *Business Dynamics: Systems Thinking and Modeling for a Complex World*, New York: McGraw-Hill.
- United States Census Bureau, 2003, *Population estimates in cities and towns*, Retrieved January 6, 2004 from <http://eire.census.gov/popest/data/cities/tables/SUB-EST2002-04-17.pdf>.
- United States Geological Survey, 2002, "Responses to Iben Browning's prediction of a 1990 New Madrid, Missouri, Earthquake", USGS CIRCULAR 1083, Retrieved March 30, 2004 from <http://neic.usgs.gov/neis/pANDs/12b.html>.
- Ventana Systems Inc., 2005, Vensim PLE Plus, Version 5.5d, Available from Ventana Systems, Inc. <http://www.vensim.com>.
- Welch, P. J. and Welch, G. F., 1998, *Economics: Theory and practice*, Fort Worth, TX: Dryden Press.
- Yin, R. K., 1994, *Case study research: Design and methods*, Thousand Oaks, CA: Sage.

원 고 접 수 일 : 2008년 3월 31일
1차심사완료일 : 2008년 6월 13일
최종원고채택일 : 2008년 6월 24일