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津田塾大学
TSUDA UNIVERSITY

The determinants of post-flood recovery speed. A case study of rural households in central Vietnam

○ Nguyen Cong Dinh
Okayama University
E-mail: dinhhce1902@gmail.com

Fumikazu Ubukata
Okayama University

Vo Hoang Ha
Hue University

Nguyen Quang Tan
Hue University

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1. Introduction

Vietnam is one of the most vulnerable countries to natural hazards. This is known as one of the places with the greatest population rate exposed to river-flood risk worldwide (Luo et al. 2015). Over the past two decades, floods killed at least 14,927 people, injured 16,829, and caused tangible damage amounting to 3.7 billion USD (CRED 2013). After suffering heavy losses, victims usually face difficulties in recovering quickly. While formal support remains inadequate, most assistance is achieved through informal networks known as social capital.

Social capital reflects the ability to mobilize different types of resources. It derives from social connections, shared norms, and mutual trust (Coleman 1988). Social networks are viewed as abundant information and resource reservoirs that are crucial for collective efforts and thus facilitate recovery (Ostrom and Ahn 2009). Besides, the effectiveness of this invisible capital also manifested through the mental aspect such as alleviating psychological stress, depression, and other psychosocial symptoms. Society seems to play a more comprehensive and active role in post-disaster recovery rather than relying on government budgets (Chan 2015).

Despite the increasing importance of social capital, the study on this topic is still limited to some extent. Most recent studies focused on the positive outcomes of individual social capital in relation to physical-mental health, well-being, and recovery satisfaction. However, the household's post-disaster recovery speed, an equally important issue, has not been given due attention. Whether or not social connections accelerate the household's post-disaster recovery? Clarifying this matter is imperative since the sluggish rehabilitation will increase social costs and make households' economic pain and deprivation deeper and longer-lasting. Other research, meanwhile, preferred to explore the various support types by social networks. The recovery period, in these studies, is merely regarded as one continuous phase, while it should be divided into different sub-phases, such as immediately after floods, in the short term, and long term.

Acknowledging these knowledge gaps, this study aims to examine: (i) the effects of social connections on post-flood recovery speed; and (ii) the different roles of social connections in the recovery sub-phases. These objectives will be examined by looking back on the recovery process of villagers after the major flood occurred in November 2017 in Thua Thien Hue Province, central Vietnam.

2. Study site and methods

This study was conducted in Thua Thien Hue province, central Vietnam. With more than a hundred kilometers long coastline and interwoven fluvial systems, this is a place gathering various natural calamities, particularly floods and storms. Four villages, Mai Duong and Thu Le 3 (Quang Phuoc commune); Phuoc Yen and La Van Ha (Quang Tho commune) in Quang Dien district were selected for the survey. Quang Dien is known as the most low-lying and flood vulnerable districts in Thua Thien Hue province. In 2017, heavy rain combined with water releasing from hydropower dams caused major flooding in the whole district, leading nearly 4000 households to be heavily flooded. Nearly 400 hectares of paddy-field, 260 hectares of vegetables, 400 tons of fishes, 30,000 cattle and poultry, and many other infrastructures were damaged by this flood. Total tangible damage was estimated up to 86 billion VND, the most horrible in the last ten years.

The data were collected through the face-to-face interviews of 164 households in 2019. The number of interviewed households is relatively equally divided among the four villages. Since this study targets the post-flood recovery phase, only households who experienced damages in the 2017 flood were visited. For data analysis, this study applied both quantitative and qualitative approaches. In the first half, a multiple linear regression model (OLS) was formed to examine the influences of explanatory variables on households' post-flood recovery speed. The dependent variable (recovery time) was determined by the time that households require to reestablish at least

90% of their infrastructure and livelihoods and access fully basic services (water, electricity, school, etc.). For explanatory variables, we focused on households' social networks as they are viewed as an incarnation of social capital. Besides, variables either related to total flood damage or household characteristics were also inserted into the model. In the second half of the paper, the quantitative comparative and qualitative analysis methods were utilized to examine how the role of different social connections vary in recovery sub-phases.

3. Results and discussions

3.1. Flood damages to interviewed households

The in-house asset damage was the most common as it was experienced by about three-quarters of interviewed households, followed by the breeding activities with nearly 70%. On average, each household lost roughly 2 million VND in each of the above categories. Nearly half of the households was also suffered in terms of breeding facilities. Damage from them, however, was under 1 million VND per household as they were mostly made of low-priced materials. The damage to housing, similarly, was low in both the household rate (28%) and damage value (0.93 million) as most villagers reinforced their houses relatively well. With regard to farming activities, although the damaged household rate was quite low (42.1%), the financial loss was the highest (5.06 million). The aquaculture loss, meanwhile, was relatively high (1.61 million) despite a low percentage of damaged households (28%). On average, each household lost at least 13 million VND after the 2017 flood.

3.2. Post-flood recovery speed and determinant factors

Factors influencing households' post-flood recovery speed have been revealed through the multiple linear regression model (Table 1). Contrary to expectations, the connections between households' demographic characteristics and recovery time are vague. The age of household heads negatively affects households' post-flood recovery time. The effect degree, however, is negligible ($p > 0.05$). More labors, richer social relationships, and more recovery experience are often attached to older-headed households, and these characteristics can be perceived as valuable inputs for restoration. Similarly, we found no statistically significant relationship between education level and recovery time ($p > 0.05$). For flood recovery, informal education or experience may be more important compared to the formal one. It is also possible that the relatively low and coequal educational level of villagers is inadequate to convert into any significant advantages in the recovery phase.

Table 1: Brief results of the linear regression model

Variables	Age	Education	Laborer	Non-farm job	Income	Damage	Friend	Neighbor	Relatives	Formal group	Informal group
Recovery time	#	#	#	#	#	+	#	#	-	#	-

Note: # statistically insignificant; + positive relationship; - negative relationship

Financial capital is an indispensable resource for post-disaster rehabilitation. Singularly, no linkage between households' financial-related characteristics and recovery time was found. Although the number of labor, job diversification, and income have certain positive influences on recovery time ($B = -0.086$; -0.127 ; -0.122 , respectively), their associations are statistically insignificant ($p > 0.05$). Better-income levels, an important ground for reconstruction, are often found in households having more laborers and involving in non-farm jobs. The failure of households who own these characteristics in shortening recovery time implies that there are certain barriers in translating these advantages into income in a short-time period. Indeed, the non-farm job market is often less bustling after floods, while agricultural production surely takes time to be harvested. Therefore, making money from these advantages in a short-time period is impractical. Meanwhile, the failure of households' income in hastening the recovery process may be due to the correlation between income and investment. Achieving a high level of income probably requires adequate investments from households. These investments, without severe floods, can yield big returns. Otherwise, households may suffer heavy losses, especially in the absence of adequate preventive measures. The restoration, therefore, can be extended. This assumption is bolstered since the recovery time was found to be negatively affected by the total damage ($B = 0.057$; $p < 0.01$).

Some significant linkages were found while examining social connections. The more connections with relatives, the faster household recovery time will be ($B = -0.129$; $p < 0.05$). As the natural tightness among relatives, their mutual help also emanates naturally as well. Additionally, since it is built on lineage ties, support from relatives is often greater physically and deeper mentally, which probably contributes to the rapid recovery of households. Connections with trusted friends and neighbors, meanwhile, made no significant associations with households' recovery speed ($B = -0.053$; $B = -0.079$, respectively; $p > 0.05$). This reality may first stem from the relatively low income of the majority of the population, which makes them less supportive. Households may also be less able to help each other since flood damage often occurs on a large scale without any discrimination, especially for those in the same geographical circumstances. It is also likely that the pioneer of relatives in providing aid makes other close relationships to be a reserve, which can be efficient in the case lineage ties fail to support. With regard to affiliation, households' recovery time, while shorten by informal groups ($B = -0.353$; $p < 0.01$), was not affected by formal groups ($B = -0.053$; $p > 0.05$). Taking part in formal groups, although unforced, normally includes most individuals with relevant characteristics, such as farmers, women, youth, and veterans. Due to their large scale, interactions between formal groups' members are usually depthless. This, combined with limited operational funding, makes these groups less effective in supporting. Informal groups, meanwhile, are often built based on identical traits such as hobby or career, which is conducive to form empathy and cohesion among the members. Besides, the smaller scale should also be seen as an advantage to promote stronger cohesion among members of informal groups. These are possible grounds revealing why informal groups were more supportive than formal ones.

3.2. The role of social connections in recovery sub-phases

To deeply examine how the role of different social connections varies over time, the post-flood recovery was divided into three sub-phases including immediately after the flood (within 3 days), the short term (within 3 months), and the long term (over 3 months).

Emotions, shelter, supplies, information, and cleanup supports were the most common supports immediately after the flood. Debris cleaning is the most popular help since it was received by nearly half of the respondents (48.78%), followed by emotions, supplies, information (about 40%), and shelters (14.63%). The roles of relatives and neighbors were underscored in this stage since they provided the most supports in almost all categories. Mental support, although non-financial, is extremely important, especially for those who experienced severe damages. Almost 40% of households received this type of support from neighbors, while over 20% obtained from relatives. Similarly, 32% and 39% of households were supported by neighbors and relatives in cleaning up deposits and debris, respectively. This type of help was often directed towards solitary or labor-scarce households. Besides, serving temporary shelters was also mainly done by neighbors at about 10%. In contrast, the contribution of the local government in this emergency time was only reflected through information and necessities supports. The authorities provided urgent necessities and information to 25% and 31% of the households, respectively. Most of them are poverty-stricken or harshly damaged households. Supports from friends and formal groups, meanwhile, are negligible during this period.

The supports in the short-term recovery phase mainly concentrated on emotions (63.41%), supplies (39.02%), repair (43.90%), cash (46.34%), and career (32.32%). Relatives and neighbors still maintain important roles. Relatives gave the greatest support in four out of five categories including supplies (35%), repair (37%), cash (31%), and career (19%). Supports from friends, formal groups, informal groups, and local government, though fairly modest in the early stage, tended to increase, especially for informal groups and local government. For instance, informal groups provided financial and livelihood support to 28% and 15% of households, respectively. Meanwhile, approximately 27% and 15% of respondents received necessities and livelihood-related supports from the local government. Similar to the first sub-phase, the local government's supports in this period still limited in both quantity and number of the beneficiary. Assistance from informal groups, by contrast, was more in both quantity and diverse in terms of beneficiaries. Friends and formal groups, though fairly impressive in mental heartening, were underwhelmed in supporting necessities, repairs, finance, and livelihoods. Only around 10% of interviewees obtained these above assistances from friends and formal groups.

While support from neighbors, friends, and formal groups tends to be sparse gradually, the long-term recovery sub-phase saw striking contributions of the local government. Respectively, 7.32%, 17.07%, and 37.80% of interviewees benefited from supports relating to housing repair, livelihoods, and finance. The roles of relatives and local government, though relatively equivalent to other linkages in repairing housing, significantly surpassed in financial and livelihood categories. In particular, about 35% and 10% of households acquired financial and livelihood support by local government, respectively. The allowance was mainly determined based on the damage extent. This effort of the local governments, although remarkable, progressed slowly, so it was less efficient in improving the recovery speed. This not only shows the limited local resources but also indicates difficulties in inventorying of damages as well as the cumbersome administrative procedures between authority levels.

3. Conclusions

The main aims of this study were to examine the effects of social connections on post-flood recovery time and the different roles of social connections in the recovery sub-phases. The findings first confirm a positive correlation between the damage level and time of recovery. Besides, it shows the ineffectiveness of the socio-economic and demographic characteristics, including age and educational qualifications of household head, laborer number, engaging in non-farm jobs, and income level in reflecting the households' recovery speed. In other terms, the advantages related to these characteristics are insufficient to convert into advantages in recovery speed. The model, in contrast, emphasizes the vital role of social connections in accelerating the households' rehabilitation. In this respect, connecting with relatives and informal groups appeared to be more useful than the other linkages as they contribute significantly to shortening the recovery. While blood-based relations were crucial among relatives, small scale, diversity in membership, and formation ground were believed to be the foundation for these differences.

This study, through subdivision of the recovery process, further exhibits the variation in the role of social connections over time. Our analysis accents the substantial role of relatives and neighbors in the urgent time after the flood and the short-term recovery as they were the most supplier in almost all support categories. In comparison with relatives, the less contribution of neighbors in the regression model was attributed to the lesser amount of support. Meanwhile, neighbors are believed to play a greater part in providing urgent assistance based on their advantage of space. The results also indicate an increase in the role of friends, formal groups, informal groups, and local government in the short term, especially for informal groups and the local government. Households' long-term recovery effort, meanwhile, pertained to the leading role of local government through supports related to finance and livelihoods. Through this result, we imply the limitation of the local government and community-based organizations in supporting flood victims, especially during the crisis immediately after floods. In addition to the lack of financial-related resources commonly found in developing countries, this limitation was also ascribed to the slow administrative procedures between government levels.

The above findings, besides stressing the vital role of social capital in speeding recovery, indicated the dynamics of social connections in recovery sub-phases that should be integrated into the rehabilitation policy.

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