

# **A STUDY ON RESIDENTS' STRATEGY FOR HOUSING RECONSTRUCTION AFTER THE 2006 CENTRAL JAVA EARTHQUAKE**

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**Abstract:** The damage of the 2006 Central Java Earthquake was concentrated on housing and private sector buildings. The Indonesian Government launched a financial aid measure for housing reconstruction. The residents have been very flexibly elaborating strategies in order to use the insufficient financial aid as effectively as possible for housing reconstruction. For example, 1) they are skillfully using a combination of temporary shelters and permanent rebuilt houses to maximize the limited space; 2) they both use the mutual corporation (*gotong-royong*) and hire carpenters to effectively use the limited funds; 3) they have separated a household into two or more households so as to obtain more funds. Their strategies were seen through interviews with the residents during our field study, which is illustrated in this report.

This research, accordingly, aims to analyze the present conditions and pressing matters on housing reconstruction after the 2006 Central Java Earthquake. Generally speaking, many researchers overemphasize the societal role of *gotong-royong*. In the phase of early response to the earthquake, however, the evacuees put priority on their own rehabilitation over *gotong-royong*, to say the least of it.

**Keywords:** Central Java Earthquake, reconstruction of sub-village, earthquake damage, housing reconstruction

## **1. Research Method**

The research site was southern Bantul District, Special Region of Yogyakarta, Indonesia, the focal area of the 2006 Central Java Earthquake. The 6.3 magnitude earthquake caused huge damage: 5,782 people were killed, 36,299 people were injured, and 135,000 buildings collapsed.

The research was conducted through interviews in Plembutan Sub-Village, Candan Village, Jetis Sub-District, Bantul District, between November 20th and 24th, 2006, about one and a half years after the earthquake. Those

surveyed were residents of RT1 to RT5 (RT meaning neighborhood organizations. Yoshihara, 2000), the chief of Village Canden (*Lurah*), and the chief of Plembutan Sub-Village (*Dukuh*).

The interviews of residents were carried out by visiting 13 households and asking questions about family structure, housing, the situation at the time of earthquake, the degree of damage caused by the earthquake, the condition of post-quake evacuation, evacuation routes at the time of the earthquake, temporary housing, the situation of housing reconstruction, the condition of post-quake life, and the change in housing between the pre- and post-earthquake period. Questionnaire sheets were prepared for the research. An interpreter (a student from Gadjah Mada University) asked the questions to residents based on the sheets and wrote down the answers on the sheets. Some related questions were also asked to the residents through the interpreter.

## **2. Outline of Plembutan Sub-Village and Damage**

The outline of the Plembutan Sub-Village and the damage there are as follows:

Area: approx. 28.06 ha (approx. 14.96 ha for residential use, and approx. 13.12 ha for cropland use)

Population: 814 before the earthquake, 804 currently (as of August 2007)

Number of households: 230 before the earthquake, 241 currently (as of August 2007). (Two households moved out, and 23 households were added by moving in and separating the households after the earthquake.)

Number of those who were killed: 19 in total (RT1: 4, RT2: 5, RT3: 4, RT4: 3, RT5: 3) (total in entire Candan Village: 269)

Percentage of those who were killed: 2.334% (= 19 of 814)

Percentage of buildings collapsed: approx. 97.8% (= 226 of 231). Out of 231 buildings, 226 either collapsed or were heavily damaged, and 5 buildings were partially damaged.

## **3. Aid System for Housing Reconstruction**

As an overall framework for post-quake reconstruction, the Indonesian government allocated 1 trillion rupiah (about 12.5 billion yen), of which 75 billion rupiah (about 970 million yen) was disbursed for urgent reconstruction. Donor nations/organizations and NGOs have sent a total amount of over 100 million dollars (about 11 billion yen) as emergency aid of various types (Architectural Institute of Japan, 2007). As a support measure for housing reconstruction, funds for the reconstruction of a permanent house was supplied to each household according to the degree of the housing damage. (This according to the interview with the chief of Candan Village, as described below. See Table 1. Fifteen million Rp. per household is equal to the amount for construction of a house (36 m<sup>2</sup>) under the Pokmas system, as described below.)

Degree of Damage	Amount of Disbursed Aid	Number of Recipient Households
Totally collapsed Heavily damaged	15 million Rp. (about 200,000 yen)	3,000
Partially damaged	4 million Rp. (about 54,000 yen)	200
Minor damage	1 million Rp. (about 13,000 yen)	100
<b>TOTAL</b>		<b>3,300</b>

table 1: h Table 1. Housing Reconstruction Support Measure  
(Number of recipient households are out of the entire Canden Village)  
(Total number of households: 3,300, out of a population of 10,300 in Canden Village)

However, the aid is not directly paid to the households under this housing reconstruction support measure. The aid is first paid to a “Pokmas,” which is a group of 15-18 households, then given to individuals after going through the Pokmas, which is a feature of this system. “Pokmas” is a word coined from “kelompok (group)” and “masyarakat (community)” after the earthquake.

The definition of Pokmas is a group that is a part of the governmental benefit system. About 15 households whose houses either totally collapsed or were heavily damaged set up a group (Pokmas), appointed a chairperson, secretary, accountant and others, then received aid from the government as a group to manage it on an autonomous basis.

In this research, it was confirmed as below through the interviews with the chief of Canden Village, the chief of Plembutan Sub-Village, and an associate professor Ikaputra at Gadjah Mada University:

- ① The aid from the government is limited to that for permanent housing, which was given through a Pokmas. There is no aid for temporary housing. Temporary houses were built either by victims themselves or with assistance from NGOs.
- ② A Pokmas is set up for every 15 to 20 (registered) households and the structure (which and how many households should be included) and how the reconstruction funds should be divided are left to the community.
- ③ A standard plan for a reconstructed house under the Pokmas system has an area of 36m<sup>2</sup> (6m×6m), with a guest room (Ruang Tamu), a living room (Ruang Makan) and 2 bedrooms (Kamar Tidur).

#### 4. Comparison Between Houses Before and After the Earthquake

We made drawings of houses before and after the earthquake from the results obtained through the interviews with the 13 surveyed households. A comparison shows that the functions which were performed in a single house before the earthquake are now carried out both in the temporary house and the permanent house. That was the situation at the time of the research, one and a half years after the earthquake, and at that point, both the temporary house and the permanent house were in use in parallel. The layout of pre-quake houses made from the interview research and the layout of current houses obtained by actual measurement are shown as Figure 1 and Figure 2.

The household shown in Figure 1 consists of 7 family members. The house reconstructed through the Pokmas system is built in a space which can be separated for the son's household in the future (the location which used to be a backyard before the earthquake and has access to the road on the opposite side). The head of the household, a 62-year-old male, intended to live on in the temporary house (built in a place where a house used to be before the earthquake) in the future because he had no financial prospects. The only thing which appeared to matter is that the temporary house was occupying the space toward the front yard, where a permanent house should be built.

In the case of the household in Figure 2, the residents built a temporary house at the back of the site, then reconstructed a house through the Pokmas system in the front part, where their house used to be before the earthquake. As described below, this is the typical pattern of reconstructed houses built through the Pokmas system.

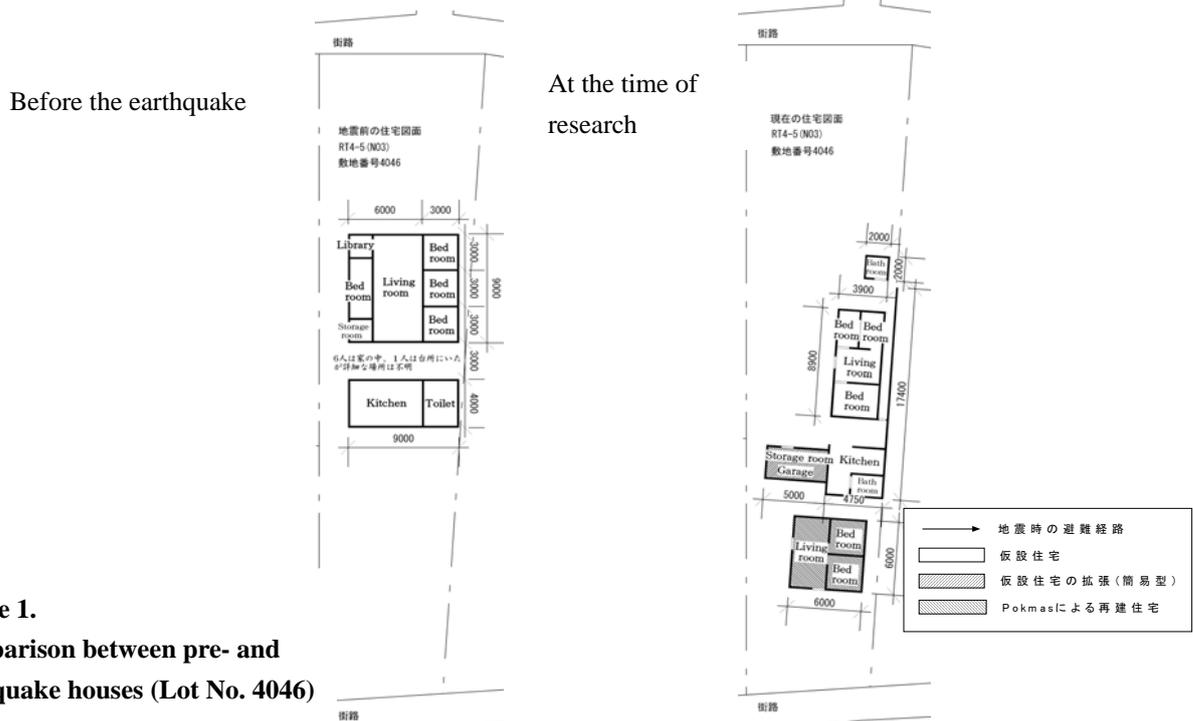
In general, they have bedrooms and living rooms, where they spend long periods of time in the reconstructed houses, while using temporary houses as kitchens and toilets, where they spend short periods of time.

The research on evacuation routes at the time of the earthquake is indicated as below. Since the disaster occurred at 6.00 in the morning, most people were at home:

- ① They evacuated their homes into an open space outside, feeling the danger of the house collapsing.
- ② They evacuated through an exit which they were using in daily life.

In the current situation, the building coverage being higher now than before the earthquake, the space for evacuation is smaller, and accordingly it would be more dangerous to evacuate through if another earthquake happened. The possible measures for the situation include not only to secure the evacuation route but also to raise people's awareness of this issue through thinking about two-way evacuation and conducting evacuation drills on a routine basis. Some residents answered, on the other hand, that they had expanded their housing space after having taken the evacuation route into consideration. Problems in relation with evacuation routes seen in the comparison of the drawings are summarized as below:

- ① The parallel use of a rebuilt house and a temporary house increased the building coverage, resulting in the decrease of common space, such as a front yard.
- ② In many cases, people reconstructed houses by separating their household into a parents' household and children's households. As a result, as in ①, the building coverage increased and the space for evacuation decreased.



**Figure 1.**  
**Comparison between pre- and post-quake houses (Lot No. 4046)**

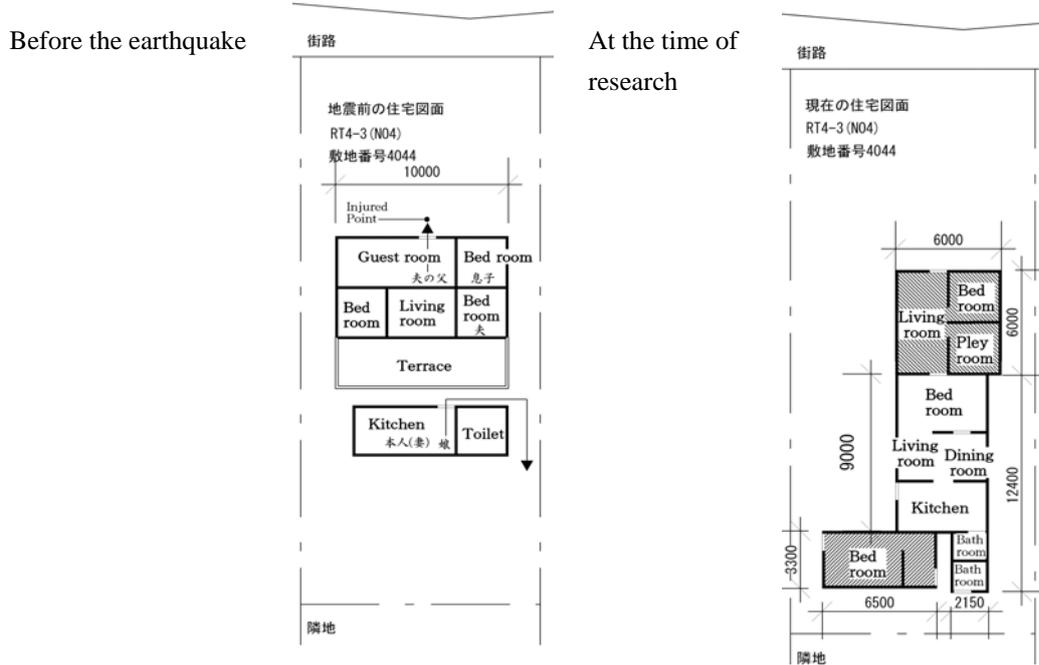


Figure 2. Comparison between pre- and post-quake houses (Lot No. 4044)

## 5. Comparison of Room Layout Before and After the Earthquake

We compared the layout of houses as they were before and after the earthquake. The room layout before the disaster was on the order of: road (indicated by a solid line in the drawings) → front garden functioning as a common space → guest room → living room/bedroom → kitchen/toilet → property line.

The current layout is, on the other hand, on the order of: road → front garden functioning as a common space → reconstructed house (living room/bedroom) → temporary house (kitchen/toilet) → property line. In the case of constructing the second house due to, for instance, the division of a household, it continues in the back with a “reconstructed house (in the case a second one is built) → road on the opposite side.” This result indicates that there was not much change in the basic layout of the housing function. We examine the reason for the current layout of a house from two viewpoints: the transition of housing after the earthquake and the order of construction.

### ① Housing Transition After the Earthquake

In general, people went through the transition of housing following the course of: “earthquake → tent in the Lapangan Canden (several days to 10 days) → temporary shelter in the Lapangan Canden (2 weeks to 2 months) → tent on their own land → temporary house on their own land → current house”.

### ② Order of Construction

As seen in ①, the order is: “collapse of the old house in the earthquake → construction of a temporary house → reconstruction of a permanent house on their own land”.

First, a temporary house was built on their own land in the space



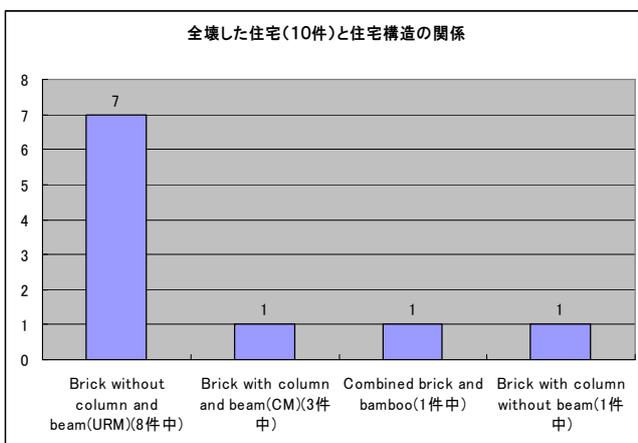
Photo 1. Lapangan Canden

in back of the collapsed house (opposite side of the road), then a permanent house was built in the space where the collapsed house used be. As a result, the layout became “reconstructed house → temporary house”.

## 6. Discussion

### 6-1 Structural Characteristics of Houses with Minor Damage

Regarding housing damage, 13 cases of interviews in Plenbutan Sub-Village showed that 77% of the houses (10 of 13 houses) collapsed completely during the earthquake. The houses that did not completely collapse have some certain characteristics.



**Figure 3. Structure of Collapsed Houses**

Ten houses collapsed totally and, among those, 7 did not have columns or beams. There were actually 8 houses without columns and beams. The one that did not collapse had been reinforced by thickening the bricks. In one case of a house that had columns and beams but still collapsed, the house was already 46 years old, and it is possible that the locations of the columns and beams were not quite adequate, since the house had not been constructed by carpenters. The characteristics of the houses that did not collapse can be summarized as below:

- (A) Built with bricks, and had columns and beams
- (B) A professional carpenter was involved in the construction.
- (C) Comparatively new

There was also only one case where the respondent said the house was built through advice from someone else. This indicates that there is a possibility that the damage would not have been that serious if the houses had been built under technical guidance regarding earthquake resistance.

### 6-2 Effective Use of Temporary House after Completion of Permanent House

At the time of this research (November 2007), when one and a half years had passed, there were many cases in which a reconstructed house and a temporary house were both used. It is assumed that people first built a permanent building

for bedrooms and a living room, where they spend long periods of time, while using the temporary building for the kitchen and toilet, where they spend only short periods of time, and that the temporary section would be rebuilt in the future. This assumption is backed up by the fact that some respondents answered that they did not intend to continuously use the temporary house in the future but rather wanted to rebuild it when they could afford it. The temporary building section is utilized in a flexible way depending on the financial situation of the individuals: If the kitchen or toilet collapsed, there would not be much actual harm; they are using anything they can use. Here can be seen their housing norms, in which removal of the temporary houses is not pushed needlessly in order to force the reconstruction process to move forward, and the people's down-to-earth way of living is respected. This is regarded as one of the reasons that the reconstruction process did not appear to have been too severe in the sub-village as a whole.



**Photo 2. Case of temporary house still in use after a permanent house was built**

### **6—3 Difficulty of Housing Reconstruction for Partially Damaged Houses**

On the other hand, it was observed that some households had great difficulties in housing reconstruction due to differences in the damage assessments. The direct reason lies in the huge difference in the amount of aid made in accordance with the assessment. Partially damaged houses are, though assessed as “partially” damaged, in a condition in which they need to be more or less reconstructed. The amount of aid is 4 million Rp. for a partially damaged house, while that for a totally collapsed house is 15 million Rp., meaning the former is less than one-third of the latter (see Table 1). This amount is not enough for housing reconstruction, and the possibility that the money was only going through their hands was sensed during the research. A daily wage for a carpenter or a mason is 40,000 Rp. to 50,000 Rp. — therefore 4 million Rp., the amount for a partially damaged house, means the daily wages of 100 days or less. There is considerable concern that the residents' displeasure over the amount of aid for totally collapsed houses may more strongly lead to the residents with partially damaged house spending insufficient amounts of aid in a wasteful way.

### **6—4 Substantial Strategy to Receive Aid by Household Separation**

In some cases, people registered as separating their pre-quake household because the assistance is given by household. There were even some cases where they separated their household when they received the aid, then reunited the separated households into one again after receiving it. This shows that the separation of households was in order to increase the amount of aid. Here is seen a sturdy, flexible strategy by the residents to maximize the limited assistance. They said that separation or reunion of a household can be done flexibly as needed.

## 7. Problems in Housing Reconstruction Support Measure

The creation of the Pokmas system enabled the people in neighborhood to move and act toward the reconstruction on their own initiative, talking to each other and making decisions themselves. Also, it has proved to be effective to a certain degree, since reconstruction has been done within a year, though the permanent building area is small.

On the other hand, some residents answered in the interview research that they would prefer the provision of construction materials for house reconstruction to cash benefits because they have concerns about corruption regarding the direct-cash benefits. This indicates there are some issues which should be improved upon.

The following are some concrete complaints received during the interview:

- (A) The price of housing construction materials has been changing according to the order within a Pokmas to receive aid from the government (the price of construction materials has soared with time due to the lack of materials).
- (B) Office overhead is checked off within a Pokmas and the price of the construction materials they received is obscure (which indicates there is some corruption within the Pokmas system).
- (C) The amount of aid from the government is different depending on whether the household is separated or not.
- (D) There is considerable difference in the amount of aid between a totally collapsed house and a partially damaged house.

## 8. Issues in the Future

We entered the research region expecting to study a reconstruction process abundant with the spirit of *gotong-royong* (mutual help), which is the culture of Indonesia. Contrary to our expectation, however, all the reconstruction work of permanent houses was done by hired carpenters. In Indonesian history, *Gotong-royong* has been advocated by Sukarno, the “Father of the Nation,” as something that flows at the bottom of *Pancasila* (five principles of the state) and as a principle unique to Indonesia against Western parliamentary democracy. Thus, we should not forget that there has been a tendency for *gotong-royong* to be emphasized for political purposes. In fact, paddy owners in farm villages in Java have been hiring workers instead of planting, plowing (contract-plowing with wages per acreage) and harvesting themselves after the Green Revolution. It was found that such economic individualism (Schweizer, 1989) as seen in the case of farmers in Java has been strongly reflected in the reconstruction process. As a matter of fact, according to an interview with the chief of Plembutan Sub-Village, about one month had passed before the *gotong-royong* began to be seen in the reconstruction work; before that, people had been loaded down with their own matters, such as removing rubble from their lot. The research revealed that as far as post-disaster reconstruction is concerned, *gotong-royong* was observed only in the work to construct temporary housing. It is necessary to examine more closely the relationship between *gotong-royong*, which is often highlighted, and reconstruction with hired workers.

There also were cases where support from NGOs had a big influence on the reconstruction process. Which NGO becomes involved in which sub-village is decided depending on how well the matching of an NGO and the chief of the sub-village goes. In that meaning, it is necessary to examine what kind of relationship the sub-village as a whole, as well as each of the households, had built up with the NGO, and how the relationships worked.

This study is supported by Grant-in-Aid for Scientific Research (Scientific Research A, #19206065) on “Comprehensive Study in Reconstruction of Housing Environment in the Area Affected by the Central Java Earthquake” from the Japan Society for the Promotion of Science.

**Acknowledgment:** We would like to express our heartfelt gratitude to the professors and students at Gadjah Mada University and to Toshio Onoda, student at Kobe University (then in his fourth year) for giving us a great help with this study.

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