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Learning from Residents' Adjustments in Self-built and Donated Post Disaster Housing after Java Earthquake 2006

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Abstract

Housing reconstruction cases without cultural sensitivity resulted in rejection. These raise challenge to understand the importance of cultural background and how different post disaster housing designs affect residents' lifestyles. This study investigated self-built and donated housing through on-field research with questionnaires, interviews, and field observations. Items related to dwelling usage, behavior adjustments, evaluation and community activities participation were obtained. Results suggest that residents adjust their physical behavioral aspects to maintain previous lifestyles, but evaluations indicate dissatisfaction with the unchangeable donated housing design. Social interactions importance, flexibility and open ended design in built environments are advantageous for their post disaster recovery.

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Keywords: Self-built housing; donated housing; lifestyle; social interaction; adjustments

1. Introduction

In Saturday, 27 May 2006, an earthquake measuring Mw 6.3 (USGS and ERI) struck the Indonesian island of Java with an epicenter of about 20 km south of Yogyakarta. Although the shaking lasted for only

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57 seconds, it killed over 5,000 people, injured thousands, and displaced up to 200,000 people from their homes. Right after the earthquake, housing reconstruction program were undertaken by many parties, NGOs and government. There had been cases where large scale of emergency house reconstruction in a short time without cultural sensitivity resulted in rejection of ill planned and designed settlement. On the other hand, some community based reconstruction housing get a good response because of its open ended design that facilitated the cultural needs. These highlight the importance of understanding cultural background in the design of a dwelling.

Social behavior is one of the important cultural backgrounds in Indonesia dwellings and Java specifically. For Javanese, a house is living environment that represent the philosophical concept of the society itself (Tjahjono, 1989). In previous researches, traditional “margersari” housing and other public housing consist of so called “core house”, the room pattern is “guest room”, “bedroom” and “kitchen”. (Ikaputra, 1992). Most of the ‘core housing’ alteration start with the expansion of double/triple size of guests room which is a “social space” and then bedroom.(Yoyok S., 1993). Even in early stage of Java 2006 earthquake recovery we found the existence of ‘guest area’ in temporary tents and house. At the time, although their needs of functional room (bedroom, kitchen, etc.) are not fully accomplished within the house yet, the importance to facilitate social interaction is express and actualizes in the “guest area”. Figure 1 shows the transition of “guest area” as interaction spaces in early stage of Java 2006 post disaster earthquake recovery. All of these findings show the importance of social factors in the Javanese dwelling.

There had been studies on how social behavior affect Indonesia domestic space (Java studies specifically). Some focused on how social interactions and its meaning influence the morphology of Java traditional dwellings (Tjahjono, 1989; Revianto, 1997) and others on its influence in the present non-traditional dwellings, such as public housing (Yoyok,1993). Even though cultural changes in the society accompany the change in house, social behavior apparently still have influence in Indonesia dwellings, especially Java. Correspondently, it is believed in that social behavior inevitably still an important cultural factor even in post disaster housing and different type of physical environment have influence to facilitate or inhibit certain social interaction that are necessary for the residents in Java 2006 post disaster housings.

In this study, data on physical setting as well as residents’ behavior in self-built and donated post disaster housing are interpreted in the emphasis of the personal-social interaction activities to extract clearer basic relation between the social meanings, ideal, values with dwellings usage, residents’ evaluation and participation in community activities are also studied to understand its influenced from residents’ perspective.

2. Social Concept in Javanese Traditional Dwellings

Tjahjono (1989) mentioned that Javanese house plans followed an unwritten prescription in which orientations, layout, and sequence of construction uncovered by “kawruh kalang”, the Javanese traditional knowledge that concentrated in building and handicraft, are regulated. The Javanese are among those people who consider cosmic view, built environment, power structure, and social organization as a totality and that Java dwelling is representing the philosophy concept of the society itself.

A house is called “omah” in Javanese culture that comprised of a front and rear/back, which embodies principal ideas underlying the formation of a domestic setting as place to settle down and a place to establish relations (Revianto, 1997). The front side is a place of social interaction where residents meet others. It is the neatest and most socially prestigious part of the house that holds the social status of the owner. In Javanese dwellings, front part of the house called “pendopo” which is used for guest reception. Inner part of Javanese house called is “dalem”, which is used to for sleeping and sacred activity; “gandok/pringgitan” use to sleeping, eating, family gathering and the back part of the house called “pawon” which use for cooking and “kulah” for bathing. Differentiation between front and back area in

Java dwellings justify the important of personal and social aspects within the house. Because social aspects occurred as an integral part of the house, behavior privacy mechanism is appropriated to secure residents' privacy. The rear part, are more secured parts, though security can be accomplished through layering, heightening, thickening the enclosing separation fixed features such as wall or minimizing penetration of light.

3. Research Method

Although environments are not determining factor to generate certain behavior, but they can facilitate or inhibit certain behaviors, cognitive processes, etc. (Rapoport,1969). Two study cases in Java 2006 earthquake self-built and donated post disaster housing are considered as 'constraint dwelling' because there is a change of situation from their ideal living environment to their 'temporary' restricted condition. These conditions can acts as inhibiting environment that could block certain behaviors, cognitive processes, etc. Sometimes, new behaviors follow environmental changes. The appearances of these new behaviors (or could a different way of behavior) are an adjustment behavior where certain behaviors, cognitive processes, etc. need to be facilitated because they held important meanings even in constraint condition.

As activities pattern can be 'the most useful entry point' for relating culture with the built environment (Rapoport, 1969), this study investigates relationship between activities pattern and spaces through the spatial development and adjustment for satisfying social interaction in post disaster housing. It is expected that by studying constraint dwelling, a clearer result could be derived. The study presumed that the development of temporary house to permanent house will be the reflection and actualization of residents' cognition of suitable dwellings in self-built post disaster housing, whereas the unchangeable condition of donated housing on the other hand would inhibit some of residents' previous lifestyle that could cause dissatisfaction and as consequences physical and behavioral adjustment are being made. In addition, residents' participation in community activities was also studied to understand the importance of social interaction based on residents' viewpoint.

3.1. Overview of Case Studies

The first case study area are self-built post disaster dwellings located in three sub-villages of Ketonggo, Bawuran and Tegalrejo, Yogyakarta. Two integrated surveys were taken within 2 years periods difference to see the development from temporary house to permanent house. In first survey, 39 respondents were chosen based on houses' condition after the earthquake where most houses destroyed and the permanent post disaster houses rebuilt by the residents themselves or based on their own design cognition. Second survey targeted same respondents but only 33 respondents were re-surveyed as some of them were moved out from the villages.

The second study area is dome donated post disaster housing in New Ngelepen, Yogyakarta. After Java earthquake May 27th 2006, in the original Ngelepen village, almost 50 houses were demolished by catastrophic landslide and the area declared as a geographically unbuildable land. As a result, the residents were relocated to New Ngelepen post disaster settlement, situated about 1,5km from the original village.

The New Ngelepen introduced house clusters site plan design where every 12 houses form a block that shared sanitation, electricity, public toilet/washing area and approach pathways. Dome monolithic with a hemispherical roof and a circular plan were introduced with concrete cast as a single and integral structure as the donated post disaster houses. The diameter of the house is 7 meters, two stories, with the total area about 38 square meters. The development of the houses began in October 10, 2006, and started to be occupied at the end of April 2007. The unique unchangeable dome house design and its different

settlement type from residents’ original housing was investigated to understand its influence to residents’ social interaction within the first 3 years occupancy. A total of 68% of the residents in 34 occupied dome houses were interviewed (heads of the household and spouses). The details descriptions and location area of both study cases are shown in table 1 and fig. 1.

Table 1. Detail Description of Case Studies Areas

Case	Java Post disaster dwellings	Dome Housing
Resident ethnic	Javanese 100%	Javanese 100%
Status	Owner 100%	House owner 100%
Dwelling Design	Self-built post disaster temporary and permanent house build by self-design cognition	Land borrower
Area type	Rural area, Yogyakarta, Java 3 sub villages (Ketonggo, Manggung and Tegalrejo). First survey obtained 39 data, only 33 data were re-attained.	Donated dome housing with unchangeable limited size & differ design cognition with original house Rural area, New Ngelepen, Yogyakarta, Java From total 71houses, only 51 lived in
Time survey	First survey in Nov.-Dec. 2006 Second survey in Nov.2008	August 2009

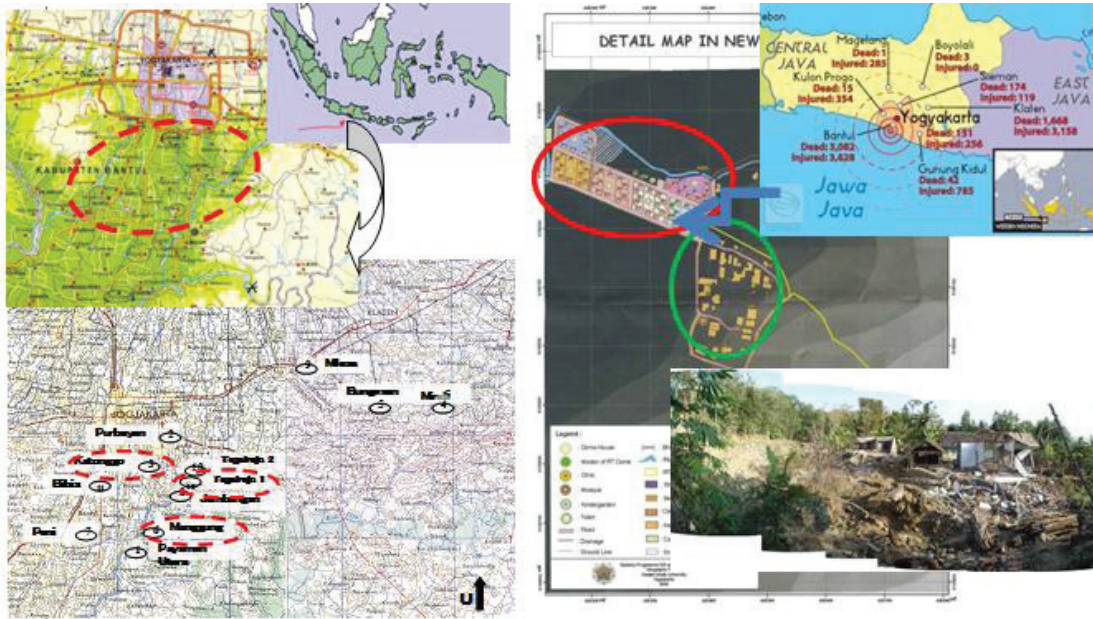


Fig.1. (a) location of self-built post disaster housing cases; (b) donated post disaster housing settlement

3.2. Data Questionnaires and Interview

Questionnaires, in-depth interview and observation with the residents were conducted with the help of Gadjah Mada University volunteers. Each team consists of 2 people, one person was asked to sketch the house plan while the other interviews the resident. Information acquired as follows:

- Background: Residents (age, sex, family, occupation, income, etc.) and house (structure, house age, land status, etc.)
- House plan: room space, size, etc
- Space usage :include personal and interpersonal activities
 Personal activities in space which include: *personal biological needs* (eating, sleeping, etc), *entertainment* (watch TV, relaxing, etc), *work* (study, etc) and *household routines* (cooking, etc).
 Interpersonal activities which include: location and behaviours in accepting different guest types in the house and interaction and frequency with neighbours.
- Cognition of space on front/back, hidden/seen, public/private, flexibility, etc.
- Evaluation of house, outdoor space and neighbourhoods space (for dome housing)

4. Research Results

4.1. Importance of social interaction

In self-built post disaster housing, 95% of the residents' values traditional social behavior. Accepting guest activities in the house occurs 41% for everyday occasions and 90% residents involved in community gathering and accept large gathering guests in their house. over 90% of residents said they still cherished traditional Javanese living practices and community values such as gotong royong (spirit of helping one another through good and bad) and kekeluargaan (feeling of extended kinship in which the community is considered to be one big family). Over 60% said these values grew even more significant to them following the earthquake. Many recovery programs operated by NGOs and the government were community-based and designed to incorporate such traditional practices into the rehabilitation process.

Similar situations happen in dome donated post disaster housing. Approximately more than 95% (both heads of household and spouses) said that they participate in community activities with their own willingness, while only less than 5% feel obligated to participate and null for no participation. High participation to community activities is supported by their perception on the importance of the value and existence of community activities in their neighborhood. Approximately 65% head of household and 57% of spouses response is "I feel that community activities are very important" and approximately only about 34% for both heads of household and spouses said that "they are neutral, don't really have certain feeling". Unfortunately the incapability of dome house design to facilitate certain social interaction behavior results in the usage of outer space of the house and neighborhood as the 'guest area' or 'incidental social interaction space'.

4.2. Physical changes from temporary to permanent self-built post disaster housing

Housing expansion from temporary to permanent houses made by the residents within 2 years period after the earthquake indicates the need of guest room increases by 5 times its original size and 3.6 times its original total room number (Figure 4). The expansion and separation tendency of guest area have relevant founding with public housing complex in Yogyakarta where most 'core house' alteration cases started

with the expansion of guest room to the front area and had doubled its original size (Yoyok, 1993). However, total room number and addition of bedroom modification is still the highest overall adjustments which also indicate a high need of private space although its average room size actually decreases (Fig. 2). There are also cases where both temporary and permanent house (by the time of the research conducted) were used simultaneously by the residents show that guest area is one of the earliest function that move to permanent structure house from temporary house which apparently have a better structures and overall appearance than the temporary house. This indicated the needs of having a ‘good’ image space for interaction with guests. According to Revianto (1997), guest room as of social interaction space where the dweller meets others hold the task of encoding the social status of the owner. It is usually the neatest and most socially prestigious part of the house.

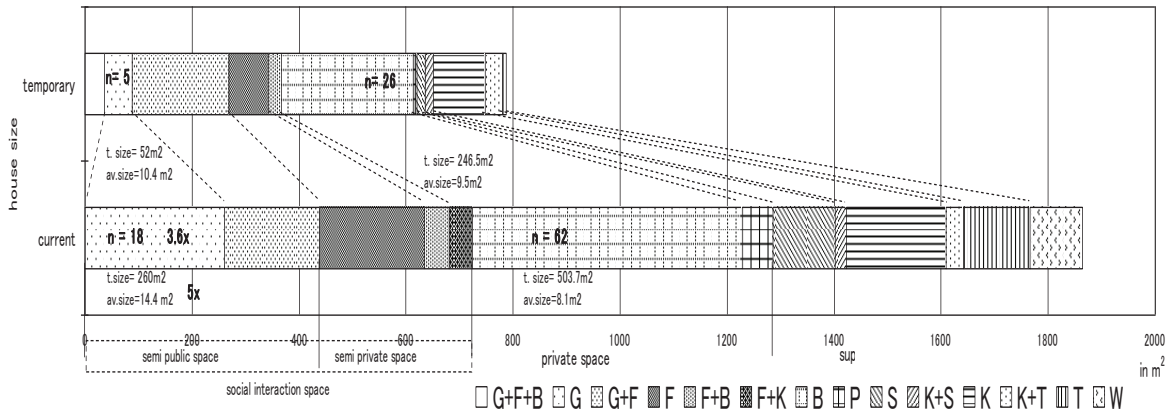


Fig. 2. Size expansion from temporary to permanent in self-built houses

4.3. Cognition of spaces in self-built post disaster housing

Space pattern development in self-built housing also showed the existence of private/public spaces even in the simplest condition with only 1 room house plan by using semi fixed element to differentiate private/public space such as the use of furniture arrangement, semi fixed partition as illustrated in Fig. 3.

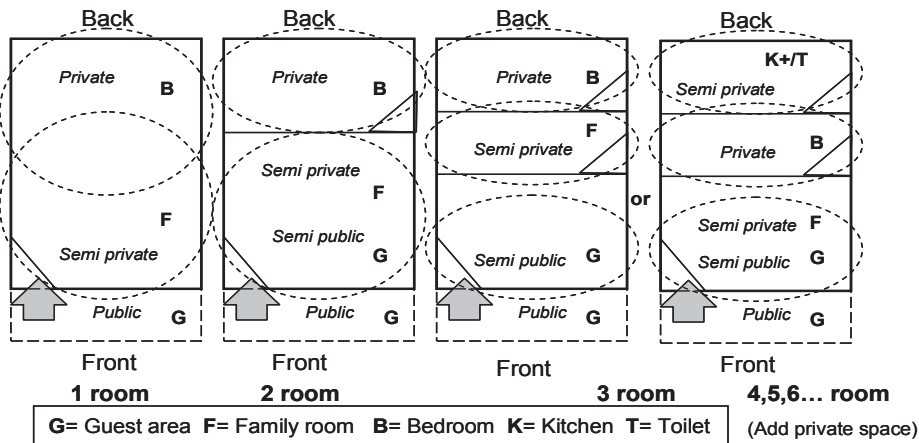


Fig. 3. Development of private/public space pattern in self-built post disaster housing

It is supported by residents' cognition of front/back area that is frequently associated to hidden/shown area to other people. These findings are relevant with previous research on traditional dwellings where front of house is outwardly-oriented domain where domestic prestige displayed in form of status differences and formality in meeting others (Revianto, 1997). Residents' spaces cognition of private/public, front/back, shown/hidden are much related with "self" (personal) and "other" (interpersonal) space domain that actualize in the arrangement and allocation of the spaces. It showed embodied principal ideas underlying the formation of a domestic setting as place to settle down and a place to establish relations in their post disaster housing.

4.4. Dwelling Conditions and Usage in Dome Donated Post Disaster Housing.

After analyzing residents' dwelling conditions and how dome donated post-disaster housing is used and altered. The findings suggest that the residents use and recognize some rooms/areas within the house and its outdoor space differently than the master plan. In masterplan, 2nd floor of the dome house planned as family room, though only 44% of the residents acknowledged the availability of family rooms (mostly used the 2nd floor for storage). Moreover, 67% of the residents use their yards as a crop yard, fish pond, or chicken coop although master plan suggests yards to be aesthetically clustered fruits and flower gardens.

The residents indicated that not all their needs were met as certain rooms/spaces were unavailable in the original dome houses. In addition to adjustments already made, the residents noted future plans to change the condition of the original dome house. Changes to terraces, kitchens, and private bathrooms were highest on the residents' lists. Of the original dome houses more than 80% have an added terrace or canopy to protect the dome openings from the elements (original windows and doors in the dome houses were unsuited for a tropical environment) as well as to provide additional social space to the inner guest room. Furthermore, more than 80% of residents would prefer to add a 'dirty' kitchen in addition to 'clean' kitchen (findings supported by Ikaputra, 2008). The adjustments and preferences for additional rooms/spaces suggest misfits in the dome house design.

4.5. Residents' Evaluation of Dome Donated Post Disaster Housing

Residents' evaluation to their dome house design shows "very hard" capability of residents to "to change the order/function of the rooms" (64%), "to expand the room" (57%), and "to change the location of the doors or windows" (76%). Only 61% for capability "to give rooms addition" shows "regular" capability (Figure 6). we can make a conclusion that flexibility in dome houses is one of the most complicated problems for the residents except for capability "to give rooms addition" although in reality it is also hard for the residents to add room that compatible with original donated house.

Evaluation for house outdoor space shows "very agree" attitude toward statement "it is better for each house to have private approach pathway" (57%), "there is not enough yard/room in the house to have social gathering" (61%) and "it is important to have a front terrace but the space available is not possible to made one" (50%), while only 64% shows "agree" attitude toward statement "each house should have own pathway from house to public toilet area" (Figure 4). From house outdoor evaluation showed that there is not enough space for need of front terrace not large gathering space. Moreover, house outdoor design elements such as pathways that were design to promote social interaction in fact only intrude their privacy

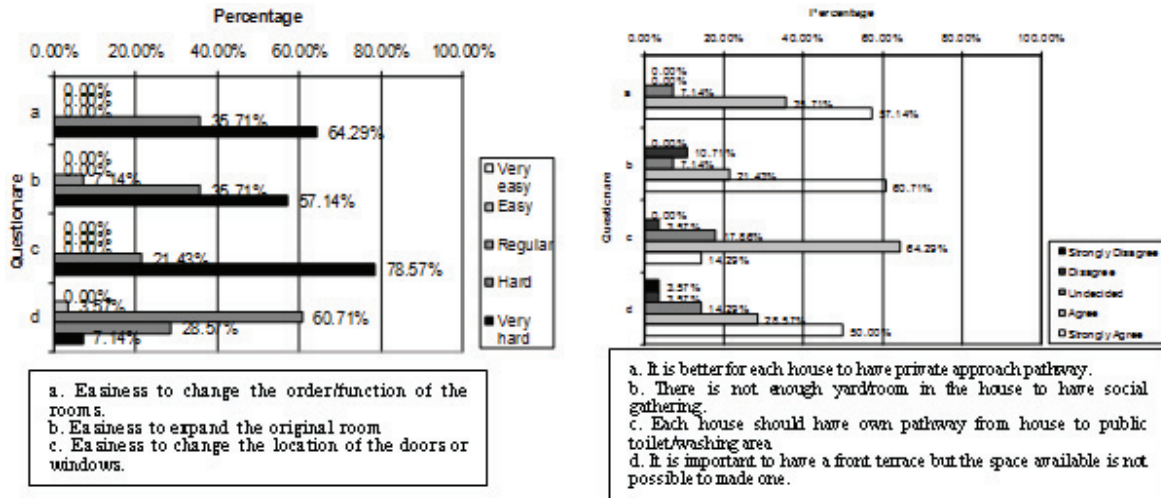


Fig. 4. (a) Residents' evaluation to dome donated post disaster housing design ; (b) outdoor space (right)

Inflexibility of the dome house design to provide enough social interaction space in the built-in 'guest area' had resulted in the usage of surrounding outer space or even the neighborhoods space. Unfortunately, dome house outdoor site plan also have some misfit relating to its used as an extension space that facilitates the social interaction. From the interview and observation, during the day little children were playing freely on the streets, while housewives chat on side of the streets. The streets were also used as social gathering spaces. Near neighborhood entrance, main street was painted as badminton field where youths and man gather in the evening to play badminton or just to hang around. Social gathering that used to be facilitated in original dwellings but not possible in dome houses, now performed on the streets such as wedding ceremony, etc.

5. Summary and Conclusion

In self-built post disaster dwellings, physical changes and development from temporary to permanent such as size and room number expansion, space modification, function changes, apparently show that guest area is inevitably an important social interaction space to be provided in the house. On the other hand, total room number and addition of bedroom is still the highest overall adjustments which also indicate a high need of private space. These show that both needs of social interaction space and private space are simultaneous exist. The duality spheres in the house also actualize in their cognition of spaces. Respondents' cognitions of private/public, front/back, hidden/shown spaces are much related with the arrangement and allocation of "self" (personal) and "other"(interpersonal) space and how it is interrelated in spatial arrangement of fixed and semi-fixed elements of the house. These findings are relevant to Java traditional housing that contains both interrelated 'self' and 'others' domains (Revianto, 1997).

In dome donated post disaster housing, discrepancies between the intended usages in the master plan and actual usages show insensitivity of residents' cultural needs. Thus, the residents have had to adapt and adjust physical and behavioral aspects to maintain their previous personal and social lifestyles. Even though social interactions indeed still facilitated and preserved by the respondents within the house, because of its inflexible design, sometimes private space is intruded. As consequences some behavior adjustments are needed to be taken such as appointment of time and preparing of incidental 'guest area'.

The evaluation on the house design and outdoor spaces suggests dissatisfaction where residents are incapable of changing the condition of their donated post-disaster house design. Due to design limitations,

in some cases where certain activities cannot be done inside and outside the house space then neighborhood spaces such as streets, etc. will bear bigger role in facilitating these social interaction needs

This research has once again highlighted the importance of social behavior in Java dwelling even at its constraint situation. Meaning, values and ideals of social behavior are reflected on their cognition of spaces in the dwellings as well as their behavior adjustments. It is necessary that even in constraint dwelling such as post disaster housing need to consider social behavior importance as culturally sensitive design for reconstruction recovery. Flexibility and open ended design in physical built environment would give an advantage in their critical transition to the new environment

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