Users' Long-Term Satisfaction with Post-Disaster Permanent Housing Programs: A Conceptual Model

Bee Lan Oo, Riza Sunindijo, and Fatma Lestari

***Abstract*—An objective evaluation of users' long-term satisfaction and expectation with the permanent housing provided is important for judging the successes or failures of housing reconstruction programs. Such evaluation studies would also have implications on the development of the respective guidelines and policies for local authorities, humanitarian and other agencies. Based on a review of literature, this paper presents a conceptual model on users' long-term satisfaction in the context of post-disaster permanent housing reconstruction programs. It provides a general view of the relationships that relate the users' personal characteristics and participation in the reconstruction project delivery processes to their long-term residential satisfaction.**

***Index Terms*—Post-disaster, permanent housing, reconstruction, user satisfaction.**

I. Introduction

One of the important recovery efforts after disasters is that of permanent housing reconstruction, which has generated wide research. On one hand, there is a large collection of case studies that reported on the successes and failures of post-disaster permanent housing reconstruction (e.g., [1], [2]), and on the other hand, authors have attempted to present an overview of these case studies in identifying the good practices and/or critical success factors in post-disaster permanent housing reconstruction (e.g., [3], [4]). In addition, there are studies that aimed to provide a framework for post-disaster permanent housing reconstruction (e.g., [5], [6]). It is noted that, however, there is a lack of studies on evaluation and verification of the outcomes of post-disaster housing reconstruction. This can be explained by the fact that evaluation is difficult and may be omitted by donors [7]. She further pointed out that even if there is an evaluation, it often focuses on easily enumerable aspects of reconstruction, such as the number of houses, schools and clinics built. Indeed, it has been reported that objective evaluations of permanent housing built for disaster victims were absent in the literature in a pioneering work that aimed to evaluate user satisfaction with post-disaster permanent housing [8].

While it is straightforward to determine the number of permanent houses completed successfully after disasters, the key issue here is whether a community is satisfied with the housing and whether they will actually inhabit the houses in the long term. Unfortunately, it is not hard to locate case studies in the literature that reported on home owners rejected or moved out from the provided housing for several reasons, including poor quality work, and the use of technology and design that were unsuitable for local weather and cultural sensitivities (e.g., [2], [9], [10]). In the long-term, there were also needs for home owners to carry out modification and maintenance-repair work in the provided housing (e.g., [11]-[13]). Thus, not surprisingly, authors have reported on the changes in resident satisfaction and permanency at a post-disaster housing sites in the long-term (e.g., [9], [14]). Accordingly, an objective evaluation of user long-term satisfaction and expectation with the permanent housing provided is considered important in assessing the results of reconstructions that follow any disaster. The evaluation would have implications on the development of the respective guidelines by the local authorities, humanitarian and other agencies. Based on a review of literature, this paper presents a conceptual model on users' long-term satisfaction in the context of post-disaster permanent housing reconstruction programs. It provides a general view of the relationships that relate the users' personal characteristics and participation in the reconstruction project delivery to their long-term residential satisfaction.

II. User Participation in Post-Disaster Permanent Housing Reconstruction

According to Ade Bilau and Witt [6], the context of post-disaster housing reconstruction differs markedly from that which of routine construction. Their argument is supported by a list of characteristics of a post disaster housing reconstruction context based on a critical review of literature. These include the requirement of speedy construction, the bureaucratic and community participation issues, the extraordinary financial requirements, and the resource challenges. In this, the additional dimension of post-disaster reconstruction of permanent housing is characterized by (i) the unpredictability of production volume, time and place; (ii) vastness of the production volume within a restricted production period; and (iii) the expansion of production area [13].

With a large collection of case studies that reported on the successes and failures of post-disaster permanent housing reconstruction, it is noted that the one of the common topics of discussion is the community participation issues. Davidson *et al.* [15] classified the level of community participation in post-disaster housing reconstruction into five levels, namely:

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manipulate, inform, consult, collaborate and empower. He indicated that an empowered community would be happy and satisfied with the housing and resettlement. Indeed, Mazza *et al.* [16] found that citizens were dissatisfied with the post-earthquake reconstruction in the city of L'Aquila due to the fact they have not been well informed about the reconstruction phases. In a successful example of post-tsunami housing reconstruction in Aceh, Indonesia, Fanany [7] found that recipient participation is a key factor in effective donor-recipient interaction, and that it is important to eliminate any respective obstacles to participation including the emotional hindrances. Encouragingly, she reported that the residents' high level of involvement in the housing design and selection of materials, and the construction processes in the reconstruction helped them to deal with the devastation and loss caused by the tsunami. Erinsel Önder *et al.* [17], on the other hand, examined the effect of user participation on satisfaction with post-earthquake housing that specifically considered the moderating effect of housing quality (both exterior and interior spaces). In terms of psychological needs and quality of interior spaces, they found that those who participated in the design and construction process were more satisfied than those who did not participate. However, there is no significant difference in degree of satisfaction between the two groups for the housing exterior spaces and general characteristics. The findings in the literature clearly indicates that user participation in post-disaster permanent housing reconstruction has implications on the project delivery processes. These processes include the selection of project location, project delivery method, type and design of housing, which in turn affects the project delivery speed and quality of housing.

III. The Delivery of Post-Disaster Permanent Housing

A key challenge in post-disaster permanent housing project is the selection of site location. The reconstruction of houses in the original settled land would provide the users with greater control of the design and construction processes, and minimise the disruption to community networks, relationships and livelihoods, however, this is not always possible [9]. Permanent relocation to suitable resettlement sites is often required to mitigate future hazards [11], [13], [18]. In particular, when the affected communities are resettled involuntarily, proper planning is important to lessen future vulnerabilities and to improve long-term sustainability [9]. They further pointed out that housing reconstruction approaches should be implemented after studying the perceptions, and the needs of affected community. In this, the project delivery approaches can be broadly classified into donor- and owner-driven approaches, representing the two divergent top-down and bottom-up principles, respectively. However, Dikmen *et al.* [19] claimed that these two principles are based on over-simplified views of the reconstruction processes, and the need to choose between them may impede formulating properly adapted responses to the urgent requirements. For example, Bareastein [2] have documented four different approaches, namely: contractor-driven, subsidiary, participatory and owner-driven approaches. There are, however, some variations in defining these approaches between authors, perhaps this is because they have to define the approaches based on the local conditions and cultures. On the other hand, authors have attempted to compare the strengths and limitations of donor- and owner-driven approaches in delivering post-disaster permanent housing (e.g. [20]-[22]). These studies found that beneficiaries were generally more satisfied with the owner-driven approach. Nonetheless, it is argued that assessment of user satisfaction on various elements of housing recovery programs over a period of time is important to determine the extent to which reconstruction has been successful, thus providing lessons learnt for future reconstruction projects [20]. Interesting enough, Snarr and Brown [8] and [14] have detected changes in resident satisfaction and permanency at a post-disaster housing site in their longitudinal study at two time periods (i.e., 2 years and 11 years) after a natural disaster.

There is much evidence in the literature to suggest that the adopted project delivery approach would have impact on the project delivery speed, and type and quality of housing. For example, Fanany [7] reported the slow pace of reconstruction process with an owner-driven approach, nonetheless, the residents were very satisfied with the project management processes where they had influence on the design of their houses, the selection of material and the type of housing. On the other hand, while the donor-driven approach has been found to be more efficient in terms of time, cost and quality control from project management perspective, it had the tendency to neglect cultural and local conditions as well as users' needs, thus lowering user satisfaction and limiting the diversity in housing types [19]. For the worst scenario, users rejected or abandoned the provided housing due to poor quality work, and the use of technology and design that were unsuitable for local weather and cultural sensitivities (e.g., [2], [9], [10]). This mismatched between the built housing and the lifestyle and expectations of the users can partly be explained by the urgency to provide housing after disasters that prevents the governmental and welfare agencies from perceiving the local culture [13].

IV. Attributes of Post-Disaster Permanent Housing

When comparing permanent housing built post-disaster and those built under normal conditions, Tas *et al.* [13] emphasized that there should be no difference between them in terms of performance. They further pointed out that cultural, social and natural features must be considered in both housing types. In addition, authors have highlighted the importance of integrating long-term disaster mitigation and preparedness into post-disaster housing reconstruction programs (e.g., [18], [23]). There is a small collection of structured survey questionnaire studies that aimed to investigate the user satisfaction with the performance of post-disaster permanent housing on medium- to long-term perspectives as summarized in Table I.

TABLE I: DIMENSIONS OF USER SATISFACTION WITH POST-DISASTER PERMANENT HOUSING

Author(s)	Disaster	Study period	Dimensions
Snarr and Brown [8]	1974 Hurricane Fifi in Honduras	2 years after disaster	Institutional services; work; housing; housing facilities; site characteristics; social environment.
Snarr and Brown [14]	1974 Hurricane Fifi in Honduras	11 years after disaster	Institutional services; work; housing; housing facilities; site characteristics; social environment.
Tas *et al.* [13]	1999 Marmara earthquake in Turkey	5 years after disaster	Residential satisfaction; Social conditions; Physical and natural conditions.
Erinsel Önder *et al.* [17]	1999 Marmara earthquake in Turkey	Not stated	Housing exterior spaces; Psychological needs; Quality of interior spaces.
Andrew *et al.* [20]	2004 Indian Ocean Tsunami in India	3.5 years after disaster	Physical infrastructure; Access to services; Public safety; Aesthetics.
Manatunge *et al.* [9]	2004 Indian Ocean Tsunami in Sri Lanka	12 years after disaster	Environmental factors (neighbourhood and infrastructure facilities), Social factors (dwelling, surrounding environment, and services).

In general, the different sets of dimensions or attributes in these studies can be broadly classified into four dimensions, namely: (i) site characteristics; (ii) physical conditions of housing; (ii) institutional services; and (iv) social environment. Table II summarizes the attributes or factors for each dimension. The 'physical conditions of housing' appears to be the most important dimension given the long list of attributes identified in the previous studies. It should be noted that the respective previous studies that adopted an interviewing or a mixed qualitative and quantitative approach in data collection have been excluded in Table I. This is because the authors had not attempted to present their findings according to some sets of dimensions. These include: a study on 2004 Indian Ocean Tsunami in Aceh, Indonesia [21], and two studies on 2004 Indian Ocean Tsunami in Sri Lanka [18], [22]. Nonetheless, the important factors in these studies have all been included in Table II.

TABLE II: ATTRIBUTES OF POST-DISASTER PERMANENT HOUSING

Dimension and attribute	
Site characteristics	
• Land tenure and ownership	• Proximity to workplace
• Location of the house	• Space between houses
• Proximity to city	• General cleanliness
Physical conditions of housing	
• Level of completion of the house	• Material used
• Size of house	• Aesthetic value
• Size of rooms	• Interior noise
• Layout of the property	• Visual privacy
• Housing design	• Access to utilities supply
• Housing quality	• Lighting and ventilation
• Interior design	• Feeling of home
• Convenience of space	• Easy to upkeep
Institutional services	
• Shopping and conveniences	• Leisure and sport facilities
• Educational facilities	• Public transportation
• Hospital facilities	• Spaces for social gathering
• Facilities for religious practice	• Preparedness for future disasters
Social environment	
• Neighbour interaction	• Neighbourhood or public safety
• Nearness to friends and relatives	
• Personal security	• Trade opportunities
• Outsiders' impression	• Availability of job opportunities

V. A CONCEPTUAL MODEL OF USERS' LONG-TERM SATISFACTION

With the evidence on modification, rejection and abandonment of permanent housing provided after disasters, users' satisfaction is of paramount importance in the success of post-disaster recovery projects. In the long term, a mismatch between the user lifestyle and the provided housing will entail social costs that place a burden on public finances [24]. In Manatunge and Abeysinghe's [9] study on level of satisfactory of beneficiaries after a decade of the tsunami disaster in Sri Lanka, they pointed out that there are two main challenges in this type of study. Firstly, individual's level of satisfaction is very subjective and depends on personal qualities along with a temporal dimension, in which it could change with the progressive increase of decrease of beneficiaries' economic level. The next challenge is that the respondents tend not to disclose their true feelings in order to avoid a series of questions asking for explanation. In addressing these challenges, they suggested the approach to formulate indirect questions that relate the beneficiaries' experiences to hypothetical situations.

In addressing subjectivity in residential satisfaction, Amerigo and Aragones [25] stated that objective attributes of the residential environment, once they have been evaluated by individuals, become subjective and giving rise to certain degree of satisfaction. In this, the subjective attributes are influenced by what are termed 'personal characteristics' that include the individual socio-demographic and personal characteristics, as well as his or her residential quality pattern – a normative element whereby the individual compares his or her real and ideal residential environment. It is noted that this notion has been adapted in assessing residential satisfaction in public low-cost housing [26]. For this study, this notion is adapted to present a conceptual framework on users' long-term satisfaction in the context of post-disaster permanent housing. Fig. 1 illustrates the proposed conceptual framework that relates the user participation in housing reconstruction to the project delivery approaches and processes, the attributes of the permanent housing, and ultimately their long-term residential satisfaction. In these relationships, the users' levels of satisfaction (i.e., subjective attributes) are affected by their socio-economic and demographic characteristics. Also, the users' perceived levels of recovery after disasters is another important personal characteristic that would impact their levels of satisfaction

with the attributes of the permanent housing [20]. Indeed, questions on user self-assessment of recovery had been included in the pioneering work by Snarr and Brown [8]. Given the characteristics of a post disaster housing reconstruction context, it is argued here that a systematic model is needed for an objective evaluation of users' long-term satisfaction and expectation with the permanent housing provided. In particular, the user participation issues are not common in construction under normal conditions, and it is important to examine the interaction between the users and the reconstruction processes, in which would affect their satisfaction in long periods.

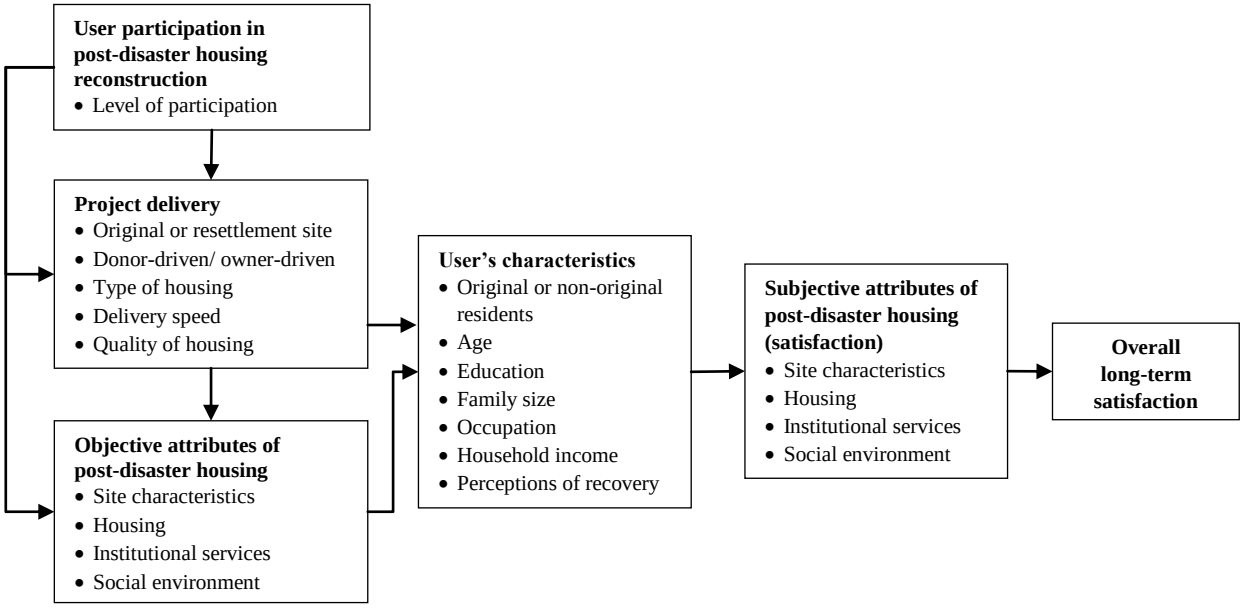

Fig. 1. A conceptual model of users' long-term satisfaction with post-disaster permanent housing.

VI. Conclusion

Based on a review of literature, this paper presents a conceptual model on users' long-term satisfaction in the context of post-disaster permanent housing reconstruction programs. It provides a general view of the relationships that relate the users' personal characteristics and participation in the reconstruction project delivery processes to their long-term residential satisfaction. Although a similar model is absent in the literature, it is recognized that the proposed model should be adapted to suit the local conditions. Further studies on testing the proposed model are needed because users' residential satisfaction or dissatisfaction is a complex construct, and tend to vary by housing types, countries and cultures.

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