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# Community consultation for climate resilient housing: A comparative case study in Vietnam ☆

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ABSTRACT

Community consultation has been mentioned in literature as one of key requirements for developing climate resilient housing but issues related to its real function and linkage to the effectiveness of resilient housing in a given context or community are still problematic. This article reports on a comparative case study between two climate-change prone cities in Vietnam: Hue and Da Nang, to examine consultation-related issues in the Vietnam context through the lens of post-disaster housing reconstruction. The comparison was carried out against the ISET (2012) urban climate resilience framework. The research outcomes demonstrated an absence of community consultation for the self-built housing, the importance of social relationship in building resilient housing, a big gap between at-risk grassroots communities and technically professional services, and a lack of urban governance for a safe and resilient construction.

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## 1. Introduction

There is no 'perfect' model of community consultation for all situations because of different local contexts and different people in need [10,40]. Recent writings have posed increasing concerns about the problems of community participation and consultation [10,20,5] and the effectiveness of community engagement [10,33,40] in disaster risk reduction and resilience. In Vietnam, one of the five most vulnerable countries to climate change [46], housing has been found to be one of the most vulnerable sectors [29]. Although disaster risk reduction (DRR) for housing has been widely realised by agencies, problematic themes are identified in terms of the usefulness of community consultation and its influences to the effectiveness of climate-resilient housing (CRH).

Post-disaster housing reconstruction appears to be one of key interventions to build resilience for vulnerable communities. Many factors related to the formation of CRH, such as hazard resistant capacity, functional spatial organisation, or livelihood development were addressed in a number of studies and projects [1,12,28,41,5,6] but discussion of the relationship between these factors and community consultation and how to address this relation in planning and implementation is still limited to date. This paper is based on an investigation of this relationship through a comparison of two case-study projects of post-disaster housing reconstruction in Vietnam.

Da Nang and Hue, two of the worst affected cities by climate change in Vietnam, have been selected as the case-study areas for this research. These two cities have several similar characteristics in terms of topographical, climatic,

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and socio-economic aspects. Both of them are close to the sea where many tropical storms originate annually. According to statistics from the Vietnam's Central Committee for Flood and Storm Control, the two cities experience about three to five typhoons every year, commonly followed by long-lasting rains, floods and inundations. In suburban, boundary or hazard prone areas of these cities, there are now a considerable number of houses highly vulnerable to climate hazards despite efforts of local governments and NGOs in post-disaster housing recovery.

In post-disaster housing reconstruction, international NGOs have emerged as the key housing providers and implementers. There are two international NGOs dominantly engaging with post-disaster housing reconstruction in Central Vietnam in recent years: Development Workshop France and Save The Children. These two agencies have provided safe houses after typhoons in these two cities and been recognised as some of the best practices of post-disaster housing reconstruction in Vietnam. According to experts from these agencies, post-disaster houses provided by them employed ways of community consultation during the design process. Therefore, two project sites from these two agencies, one in Hue and one in Da Nang, were selected as the study area. This paper examines these case studies in the light of understanding the linkage between post-disaster housing outcomes and the potential to build housing resilience, with a focus on the issue of community consultation.

## 2. Post-disaster housing reconstruction as a significant opportunity to build resilient housing

It is essential to *"regard shelter and dwelling reconstruction as a development rather than relief/welfare issue"* ([11]: 209). Many authors [18,2,23,7] and implementing agencies (e.g. UN-HABITAT, IFRC and Habitat-for-Humanity) have highlighted the link between housing reconstruction after disaster and the achievement of long-term *resilience* in which opportunities/demands of resilience can be identified and met in the reconstruction period. *Resilience* here is perceived as the ability (of housing) to absorb effects of climate hazards and bounce back to normalcy in a timely and efficient manner without critical changes of its basic functions [15,16,2,34,47]. Post-disaster housing reconstruction, targeting better housing than pre-disaster conditions [39], can bring chances of development for the affected communities [2,22,3]. Besides improving physical aspects, housing reconstruction enables the enhancement of social, economic and environmental functions [45] for community resilience.

However, the concept of *build back better* applied in post-disaster reconstruction is usually inadequately translated into practise. As indicated by Schilderman and Lyons [39], this concept is frequently perceived as 'build back safer' in practical interventions. This misinterpretation leads to excessive focuses on visible end-products of housing in recent practices where resilience targets are not met. In fact, it is unlikely to view post-disaster housing reconstruction as a single recovery action separated from the development of affected communities [3,44] since

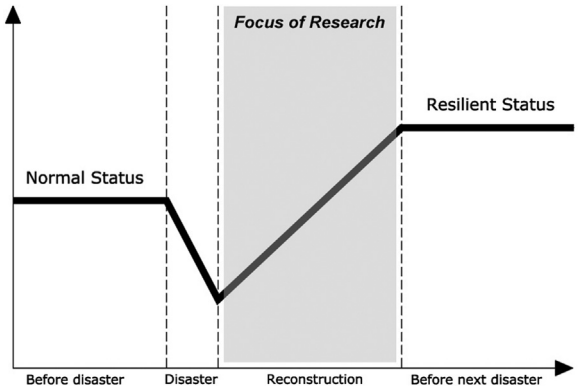


**Fig. 1.** Post-disaster reconstruction as the key to approaching resilient conditions.

post-disaster housing reconstruction is part of the process of creating housing values in both pre- and post-disaster periods. Its role should be broadened to the extent that makes housing and community more resilient to future stresses and changes posed by natural hazards [38,39]. By this way, post-disaster housing reconstruction potentially improves current housing situations from normal to resilient status (Fig. 1) for the stable development of climate exposed communities [3].

### 2.1. Targeted reconstruction approaches

In the aftermath of a climate-related disaster, there is usually a vast population whose houses get destroyed or collapse. Despite attempts by local governments and agencies to rebuild damaged houses, there is always a considerable amount of households who do not gain access to this aid. These non-beneficiaries seek various methods of recovery and reconstruction on their own. In the research community, most literature tends to focus on post-disaster housing provided by donors (donor-built) while very few authors and commentators mention the self-built one conducted by people (without donor support). In order to understand the overall perspective of post-disaster housing, this study aimed to examine both approaches, as follows:

1. ***Self-built*** where people rebuild their houses on their own without supports (non-beneficiary) (e.g. [26] for Japan case).
2. ***Donor-built*** where donors help to rebuild the houses (for a beneficiary) (e.g. [19] for Sri Lanka case; [37] for India).

These two approaches have been pursued in Vietnam for years, especially after the 1999 floods. The floods attracted a lot of international attention to post-disaster housing reconstruction. However, self-built post-disaster housing still receives little attention whereas donor-built ones are heavily discussed and praised in forums and platforms. Since the reconstruction approaches and stakeholders involved are dissimilar between *donor-built* and *self-built* post-disaster housing, it is necessary to

investigate key factors for risk reduction for each approach to better understand their strengths and weaknesses in building resilience.

## 3. Lack of an overall approach in the light of community consultation

Many aspects of resilient shelter have been discussed in numerous writings. Some studies recommend resource-based approaches [27,8], while others focus on livelihood development [28,36,9] and governance issues [14]. Various theories for disaster response and resilience have been suggested in various ways, in which, *community consultation* is believed to be one of the key components [17,45]. Most literature acknowledges the importance of *community consultation* in reaching an effective resilient housing system, but how to consult with community is still problematic.

In the book of Lizarralde et al. [22] focusing upon various aspects of sustainable post-disaster reconstruction, *community participation and consultation* is considered as one of the key factors. Recently, major concerns are given to the actual contribution of *community consultation* [31,40] to the real outcome of housing as many practices have faced problems related to improper ways of consultation, limited skills of facilitators, and limited uses of community feedback in planning. In some housing implementations, just having a link with beneficiaries and an employment of local people in some construction works are immediately considered as the *participatory* or *community-based* approach.

Many aspects of resilient housing to environmental crises have been heavily mentioned in research and practise but with limited attentions on *community consultation*. Barakat [4] and UNEP and SKAT [45] frame sustainable disaster housing in five aspects: technical, economic (financial), social, environmental, and institutional (organisational) without detailed descriptions of *community consultation*. Jha et al. [17] suggested a conceptual model for long-term post-disaster housing in which *community consultation* is a key requirement but still without guidelines for facilitating it. In practise, some projects with inappropriate ways of consultation resulted in a limited success of housing outcomes. For instance, beneficiaries from a housing project in Turkey were unhappy with their new houses as the reconstruction mainly involved agencies but modestly engaged with local people to respond to their actual needs [31]. Community consultation in a housing reconstruction project in Aceh, Indonesia after the 2004 India Ocean earthquake revealed their shortcomings when local masons were poorly equipped with understandings on why and how to build safe houses [35]. A post-disaster housing reconstruction project in Vietnam undertaken by IFRC and VNRC after a big flood in 1999 expressed their inefficiency since the construction was based on external resources (material, labour) with a limited use of local capacities for longer terms [4].

It can be stated that there is a big difference between community participation as free labour in some stages of construction and their active engagement in the whole design-and-construction process of housing [40]. Although the issue of *community consultation* is not a new topic, its limited achievement in practise has posed a concern about the role of *community consultation* to long-term housing outcomes. It is really challenging in gaining an effective engagement of community [13,20] and how to facilitate *community consultation* [10]. Current theories and practices seem to be successful in addressing the importance of *community consultation* but lacking a clarification of its nature and specific functions.

In addition, within a community, different players also have different interests and contributions to housing construction. Particularly, at-risk households, community leaders, community-based organisations, and local workers are the four community members commonly involved in local housing construction in the context of Central Vietnam. Some is important for physical building designs and material procurements while others are necessary for on-site construction and post-occupancy issues (i.e. maintenance, modifications, or extension). However, not many studies clarify their different roles in light of building climate resilient housing and often view *community* as a homogenous entity where beneficiaries/users are seen as the *community* representative (see [20,10]).

Another issue that needs to be considered is the existence of informal housing alongside the formal one in low-income countries (John and Lizarralde, 2012). Informal housing is mainly created in informal settlements or slums where practical construction interventions do not comply with existing regulations and norms [18]. In the post-disaster reconstruction context of Central Vietnam, informal and formal housing could be seen as the self-built (built by people) and donor-built (built by agencies) respectively where the number of stakeholders involved and the degree of their consultative inputs seemed to be higher in the formal (donor-built) stream.

## 4. Climate resilient housing in the lens of urban climate resilience

The key concept of climate resilience used in this paper follows a theoretical resilience framework developed by ISET [16] in which building resilience is the continuous process of understanding vulnerability of a given sector/system and raising its resilience capacities based on shared learning dialogues (consultation process). This framework plays the role as an umbrella to cover and guide the development of climate resilience for almost all sectors including housing. This framework developed a pathway to build resilience by dealing with three different but interrelated components: (1) *agent* (human -related aspects), (2) *system* (physical aspects) and (3) *institution* (information- and policy-related aspects) (Fig. 2). Under this umbrella, climate resilient housing is conceptualised in three following factors:

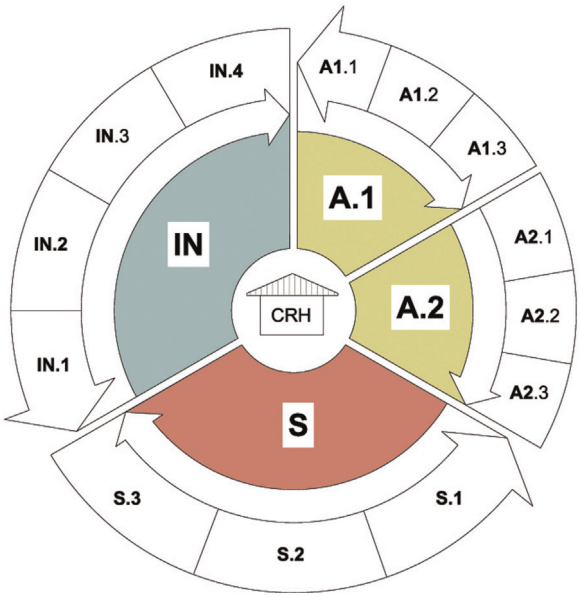


**Fig. 2.** Framework for CRH (based on [16]).

### 4.1. Agent (A)

In the context of Vietnam, four stakeholders commonly involved in the field of climate risk management are *at-risk households, local governments, civil societies,* and *building experts and practitioners*. They can be classified into two groups: *at-risk community* (households living in climate exposed areas) and *public sector* (local government civil society, and building experts and practitioners).

#### 4.1.1. At-risk community (A.1)

There is a consensus that the involvement of householders/residents in the design and construction of their houses is a requirement to achieve the best long-term results of resilient housing. They should be placed at the centre of the process and participate in all decision-making stages of housing design and construction [24,30,42]. They are the best persons who understand their situations and actual needs and capacities for their housing construction. In response to this, they are required to demonstrate three following characteristics:

1. *Responsiveness (A.1.1):* the ability of at-risk households to identify and prepare for a climate hazard and/or a disruptive event and the ability to recover after crisis [43].
2. *Resourcefulness (A.1.2):* the capacity to mobilise vital basic resources in cases of emergency to reduce damages and losses.
3. *Learning capacity (A.1.3):* the ability to internalise past experiences, to avoid repeated failures, and innovate to improve resilience performances of housing [43].

#### 4.1.2. Public sector (A.2)

Three stakeholders, *local governments, civil society,* and *building experts and practitioners,* have shown their influence to local housing construction. Although their roles are considered as supportive, advisory or supplementary, their inputs are indispensable to build long-term housing resilience to future climate, particularly in articulating and defining actual local needs and capacities, specifying and bridging barriers posed by social and political constraints, facilitating community consultation, and establishing a plan for action [32].

Similar to *at-risk community*, these three stakeholders need to address three following characteristics:

1. *Responsiveness (A.2.1):* the ability of public sectors to anticipate, identify, plan and implement for a climate hazard and/or a disaster and the capacity to effectively respond to crises [43].
2. *Resourcefulness (A.2.2):* the capacity to mobilise resources for climate risk reduction and resilience improvement.
3. *Learning capacity (A.2.3):* the ability to internalise past experiences, to avoid repeated failures, and the capacity to learn new or innovative knowledge and expertise for the better performance of climate resilient housing [43].

### 4.2. System: Housing (S)

Housing should be seen as a process rather than a product [11] and involves multiple factors [45]. Under to ISET resilience framework, housing is perceived as the *system* and encompasses three following features:

1. *Flexibility (S.1):* this refers to the functional, spatial, and technical flexibilities of the house that can accommodate unexpected changes, extensions, renovations due to climate change impacts.
2. *Redundancy (S.2):* the ability of the house to use spare parts to bounce back to normal conditions in a timely and effective manner after a big event.
3. *Safe failure and human comfort (S.3):* the house consists of one place where inhabitants can escape to in cases of calamitous disasters. Furthermore, the house is also required to address design strategies for hot-humid climate of Vietnam to increase human comfort.

### 4.3. Institution (IN)

Institution involves the accessibility of information, the governance and legal frameworks, social norms and beliefs that shape human relations and interactions, access to and control over resources and influences [16] for the effectiveness of climate resilient housing. Accordingly, institution needs to address four following features:

1. *Rights and entitlements (IN.1):* the permission to access and use basic resources and urban infrastructures and public services for the purpose of resilience [43].
2. *Decision-making processes (IN.2):* the decision-making stages in the design and construction of climate

resilient housing must be broadly accepted by all stakeholders, of whom the affected population plays a key role [21,24,25].

3. *Information (IN.3):* agents are provided with sufficient information related to their risks and vulnerability to decide the use of appropriate coping strategies [43].
4. *Application of new knowledge (IN.4):* this refers to the likelihood of applying new or innovative knowledge to enhance resilience performance for housing.

In short, CRH is the continuous process where *the agents*, *the system*, and *the institution* work together in a closed cycle or loop (Fig. 2) to achieve long-term resilient housing outcomes. Resilient housing outcomes can be achieved once involved stakeholders have sufficient awareness and capacities, local institutional frameworks are effective enough, and housing structures can withstand climate events.

## 5. Case studies

The typhoon Xangsane (2006) resulted in serious destructions of local housing in Hue and Da Nang, particularly in the peri-urban areas where poverty was concentrated and limited preparedness was common. This paper reported on a comparative study conducted in early 2013 between two peri-urban locations which had houses rebuilt after this typhoon: Hoa Hiep Bac (Da Nang) and Loc Tri (Hue).

In each site, this study conducted ten (10) semi-structured interviews with ten households, five donor-built and five self-built, and two open-ended group discussions with local representatives and local builders, ten (10) persons per group. In addition, two (02) architects involved in the provision of donor-built post-disaster housing at the two sites and two (02) persons from the district government in charge of disaster management were approached to capture their perceptions, roles and contributions to the development of climate resilient housing. In total, there are sixty four (64) participants in this research, ranging from the at-risk community to the public sector, as illustrated in Table 1.

The case studies have indicated two main forms of consultation commonly used in the design process of post-disaster housing: *community meetings* and *separate household consultations*. Local experience and innovative knowledge and expertise in terms of risk reduction need to be shared in these two forms to acquire an effective resilient housing to future climate. The case studies also revealed that there are several barriers to building housing resilience related to stakeholder awareness and capacity, physical and structural conditions of housing, and institutional mechanisms.

### 5.1. Case study 1: Hoa Hiep Bac, Da Nang

The typhoon Xangsane (2006) caused serious damage in this ward such as breaking the sea wall, the destruction of road system, and the damage to local ships and boats. In terms of housing, the group discussions revealed that about 204 houses were totally destroyed and over 500 houses damaged partially, and most of these belonged to low-income groups. However, because of economic constraints, not all households were able to reconstruct their homes right after the typhoon. According to the local authority, 25 houses were rebuilt by Save the Children UK (donor-built) and over 100 houses were rebuilt by owners (self-built) at that time.

Generally, self-built post-disaster housing contains more unsafe conditions than donor-built ones. In particular, four of five self-built houses surveyed lack the continuous beams at the middle and top levels to strengthen the walls whereas these beams were installed in all five donor-built houses. Household interviews showed that, the main reasons for not using these beams in self-built

**Table 1**
List of respondents participating in the fieldwork.

| Stakeholder | Actor | Hoa Hiep Bac | Loc Tri | Fieldwork method |
|---|---|---|---|---|
| At-risk Community | *Affected Household: Donor-built (05), Self-built (05)* | 10 | 10 | Household Interview (HI) |
| Public Sector | *Ward/Commune's People Committee (02), Commune's Committee for Flood and StormDFEG Control (02), Youth Union (01), Women Union (01), Red Cross (01), Fatherland Front (01), Farmer Union (01), Village heads (02)* | 10 | 10 | Focus Group Discussion (FGD) |
| | *District's Committee for Flood and Storm Control* | 1 | 1 | Key Informant Interview (KII) |
| | *Local Builders (Masons)* | 10 | 10 | FGD |
| | *Architect* | 1 | 1 | KII |
| **Total** | | **32** | **32** | |

houses were due to economic constraints and limited awareness and skills of local workers, mainly masons, on resilient construction.

Another interesting point that makes donor-built and self-built houses different is the use of different kinds of brick in construction. While the self-built houses used one type of locally common bricks with the thickness of 10 cm, the donor-built ones applied a new type of brick, thicker than local bricks, which were first provided by a local factory for this project. This makes the walls of donor-built houses thicker than self-built ones, at 15 cm. The architect in charge of the design of donor-built housing noted that, the brick walls with a minimum thickness of 15 cm could work as a load-bearing and wind-resistant structure. This was actually an innovation at that time (2007) because brick walls were widely used for covering function only. However, due to its unfamiliarity to local clients and higher cost than available local common bricks, this new brick disappeared from the scene right after the project completion.

In terms of construction cost, self-built housing is more cost-effective than donor-built. Even though almost similar investments were spent on both self-built and donor-built houses, the size of self-built houses was bigger than the donor-built ones with the availability of more living spaces. According to household interviews, self-built households had to find all possible ways to reduce construction costs such as reusing damaged materials or participating into all construction works whenever possible. On the other hand, despite efforts to provide low-cost housing, donor-built houses were still seen to be costly due to the employment of a building contractor outside the community for housing construction.

AGENT – limited awareness of at-risk households while valuable resources from professional bodies are out of reach of in-need community

It has been observed from household interviews that both self-built and donor-built households are quite subjective of potential risks from climate hazards. Self-built and donor-built households have quite similar levels of awareness towards climate risks. They seemed to have less understanding of climate change but more knowledge about natural disaster even though their awareness of natural disaster was still limited. Eight of ten surveyed households said that natural disaster in Da Nang have reduced as they have not experienced any big storms like Xangsane since 2006. Two of the respondents felt that Xangsane is a once in a hundred years disaster and may not occur again until next century. This limited awareness explains the lack of using disaster preparedness measures in local housing and exaggerates housing vulnerability in this ward. As stated by one key informant:

> *At the time right after Xangsane, due to many houses destroyed, the pressure of building safe houses made people easily accept and follow safe construction principles. Nowadays, when economic pressures are greater than disaster management pressures, most practices of local housing construction does not conform to safety-related criteria. In addition, due to the lack of knowledge of local masons and the subjectiveness of householders, most new houses built in recent years do not incorporate risk reduction features and, may obviously, be incapable of coping with future storms.*
> (KII 2)

Great traumas and fascination from the typhoon Xangsane in 2006 also exist till now and negatively affect the local awareness on disaster risk reduction. This reduces people's beliefs in the safety of their homes, even provided by the donor (Save The Children) with storm resistant features. As one donor-built interviewee said:

> *I don't think my house can withstand a typhoon like Xangsane. All of us must run to safer places if Xangsane revisits. We still remember very clearly what happened in Xangsane seven years ago.*
> (HI 3)

On the other hand, the public sector, especially building experts such as architects, seems to have better understandings on how to build resilient housing to climate risks. The discussion with the responsible architect indicated that misunderstandings of local people about safe housing are the main reasons of increased housing vulnerability.

> *The poorer, the more vulnerability they are because they cannot afford the use of some costly safety-related measures with good-quality materials……People always think brick houses are incapable of resisting storms but in the Save The Children houses I designed, even by brick, they can withstand storms effectively.*
> (KII 1)
> *Not all weak houses can be upgraded for disaster mitigation because they are technically weak from the foundation and the improvement of foundation is similar to the construction of a new house.*
> (KII 2)

SYSTEM – more flexibility and safe failure found in self-built

Regarding *flexibility*, based on household interviews, the functional spatial layout of self-built housing is well responsive to family's needs thanks to a full decision of owners on the position and the size of each space/room (Fig. 3). On the other hand, the donor-built houses with the use of similar designs and room sizes, even agreed by

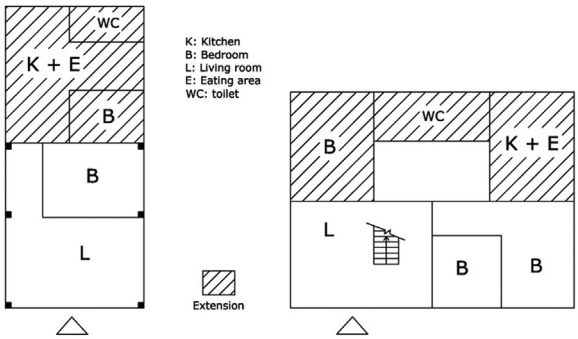


**Fig. 3.** The flexibility of spatial layout in self-built house (right) compared with donor-built (left).

most beneficiaries in project planning, seem to be less adaptive to family's expectations. Three of five donor-built households interviewed said that their houses are too small to accommodate vital functions of living such as small bedrooms, kitchen or toilet.

> *My house with two small bedrooms is not enough for my children. We cannot put a double bed in a small bedroom and so, they have to sleep on the floor instead.*
> (HI 2)

Although self-built houses are, technically, not better than donor-built ones in general, their owners seem to be more creative when they think of a safe place in their unsafe houses for emergency cases of catastrophic events. Four of five self-built houses visited have a 'solid box' in their houses, made by RC skeleton and slab, where family can stay during the calamitous typhoons. In other times of year without disasters, it is used as a toilet. On the other hand, all five donor-driven houses visited have no similar solutions for emergency cases except for evacuating to the nearest safe places as the only alternative option. *Safe failure* was then widely applied by self-built owners while neglected in donor-built ones.

INSTITUTION – Lack of resilience-related information, effective governance for housing vulnerability reduction, and community consultation

Information here refers to experiences, knowledge and lessons learnt related to risk reduction for a long term rather than just withstanding disaster impacts for short terms. However, it is hard to find resilience-related information, in this community. Even at local authority levels, such information is widely unknown by local staff apart from their retainment of redundant information related to immediate and short-term measures for preparing just before a disaster, responding to, and recovering right after it for previous years.

In terms of governance, it was found that disaster management is mainly based on an action plan, annually designed and adopted from the city and district governments to the local grassroots levels. In some cases, it may have some more directional documents from the city and/or district governments to further plan and implement more disaster responsive strategies for some specific regions due to their greater exposures to climate risks. As reported, the ward authority strictly follows directions and tasks in the action plan approved by the district government.

The over-dependency on an action plan has revealed the limitation of local administrative bodies in achieving climate change adaptation and resilience since solutions for unprecedented events are missing. In addition, limited governance for local construction such as the lack of building regulations for safe construction is also a contribution to the limited governance for resilience. For the construction of most houses in peri-urban and hazard prone areas, a building permit is not required except for a permission application form which is signed and sent to the ward people committee by homeowners. Basic information such as simple house plans, building sizes, and some building elevations are needed for the application.

There is a lack of communication between at-risk communities and professional bodies. It was found that self-built households had no communication and *consultation* with architects and engineers during the formation of their houses. They were free to decide their housing forms, spatial layouts, building sizes, materials and methods of construction and commonly without storm resistant features. On the other hand, donor-built houses were designed in consultation with beneficiaries through community meetings at the preliminary stage and separate household consultations after that.

Currently, there still lack of consultation with professional sides related to safe construction, and people just work with the hired local masons and freely decide construction methods for their housing. The common process to build a house often follows two main stages. First, the preparation of building plans to ask permission from the local authority is done through an application sent to the ward people's committee. House plans and elevations required for application is usually made through the help of local staff in the ward's land registration department or architecture students temporarily staying in the community during their study in nearby universities. The purpose of this permission application is to help the local authority to ensure the location of the house in residential land. After getting approval, owners kick off housing construction at any times. According to household interviews, many changes were added in practical construction such as alterations of spatial layouts or roof typologies according to owner's needs and guidance of masons for easier and cheaper construction. Local authority representatives rarely visit the construction to check whether the house conforms to the approved plans or not.

### *5.2. Case study 2: Development Workshop France in Loc Tri, Hue*

The typhoon Xangsane in 2006 seriously destroyed this commune in which nearly 100 houses were totally destroyed and over 300 houses were partly damaged. After typhoon Xangsane, the agency Development Workshop France helped rebuild seven (07) houses (donor-built) while about 30–40 houses were rebuilt by people (self-built).

As observed, there was not much difference between self-built and donor-built houses in Loc Tri. The first difference between self-built and donor-built houses is the roof structure. The donor-built houses contain more structural elements for the roof than the self-built ones such as the addition of concrete frames in the middle of the house and on the gable walls. This makes the roof of donor-built houses stronger than self-built ones and improves the solidity of buildings. According to household interviews, the main reason of using fewer elements for roof structure is the limited awareness of local households. Most of them thought that such elements would cost more money while the stability of the houses is not dependent on their presence.

AGENT – improved awareness of at-risk community

People in Loc Tri have a long history of coping with climate hazards and take serious consideration to disaster preparedness measures. In eight out of ten houses surveyed, there are always additional items for consolidating the house when the stormy season comes such as the wooden bars for putting on roof, the tough fishing net to cover the roof, or the iron cables to anchor roof structures to the ground. They are not surprised when the typhoon Xangsane (2006) visited as there were several similar storms in the past. However, due to economic constraints, they prefer the use of immediate solutions in response to disasters because it is cheaper and locally available.

At the community and authority level, the awareness of persons in charge seems to be satisfactory since they could identify the main threats from climate and the most vulnerable sectors in their region and be worried of the worsened trend of future climate toughed by climate change and global warming. Most of them believed that natural hazards will increase in the future and local housing is inadequate to cope with if safety-related measures are unused.

SYSTEM – adequate flexibility but limited safe failure in both self-built and donor-built

As observed, the surveyed houses are spatially flexible to functional needs. Self-built housing is not discussed here because their *flexibility* was already met due to the free decision of house-owners on housing design based on their actual needs. Within donor-built houses, even though designed by the outsider (Development Workshop France), they still demonstrate a high level of responsiveness to people's living needs. For instance, spaces for keeping fishing tools (livelihoods) and worship (culture) can be found in all five donor-built houses. As one donor-built householder said:

> *The project team was highly respectful of local needs and allowed us to participate in the project as much as possible. For construction, we collaborated with local masons and all construction work was under a very strict supervision of the project's technical staff.*
>
> (HI 3)

Another aspect showing the *flexibility* of post-disaster housing is the use of light-weight furniture, like plastic tables and chairs to avoid flood damage. The light weight furniture is easy to move or lift up to hang on the ceiling during storms or floods.

There seem to be a lack of elements to address *safe failure* in both self-built and donor-built housing. Despite their houses containing some construction techniques for safety, most of surveyed households preferred to evacuate to a safe place if big disasters came, particularly for children, women, and elderly. Only men remained on site during disasters to respond to unexpected situations such as collecting assets and valuable items from collapsed houses in floodwater or rescuing people. Because this region is affected by both storms and floods at the same time, the use of a safe place as the *solid box* in Da Nang case is not appropriate if floodwater levels increase and cover the house.

INSTITUTION – limited governance for housing resilience and lack of community consultation

In terms of *governance*, there has been no legal documents stipulating or instructing the construction of climate resilient housing. Short-term solutions for protecting people and property are preferred in current governance mechanisms whereas long-term strategies for raising housing resilience such as the improvement of administration system or legal frameworks are still in absence. Just like in Hoa Hiep Bac, most actions taken for disaster risk reduction are based on the action plan approved by the district government. And those actions mainly involve immediate or short-term responses.

In addition, similar to Hoa Hiep Bac, building permits are not required for housing construction not only after the Xangsane typhoon (2006) but also at the present times. People freely decide what their house should be without any technical instructions or guidelines of how to build safe.

In terms of *community consultation*, like in Hoa Hiep Bac, there was no stakeholder consultation in the self-built group whereas it was widely used in the donor-built. The construction of self-built housing was merely done by owners in cooperation with local masons while the donor-built houses was designed through the collaboration between people (beneficiaries), community leaders, community-based organisations, local authority, local builders, and built-environment professionals. The process of community consultation used by Development Workshop France followed two stages: a community meeting with beneficiaries, community-based organisation, and local authority and the separate consultations with beneficiary households to finalise the design for each household based on their needs and actual situation. With the use of community feedback in practical construction, Development Workshop France had provided the locally appropriate houses in Loc Tri after Xangsane and been highly appreciated in community.

## 6. Comparative analysis and discussions

In terms of *AGENT*, perceptions of local communities on climate risks and resilience are different between two cases. Most of respondents have realised the danger of climate events although people in Hue seem to have higher levels of awareness. At-risk households in Hue demonstrated more activeness and readiness to cope with climate hazards in comparison with Da Nang households. Apart from using techniques for safe construction such as adding RC beds and multiple beams surrounding the house, Hue residents also prepare vital equipment and tools (e.g. wooden bars, iron cables, or strong fishing nets) to additionally consolidate the house when a hazard (storm) occurs. They seem to be more self-sufficient in the course of responding to climate change and natural disaster.

Another interesting finding from case studies is the contribution of social relations to post-disaster recovery and reconstruction. From the case study in Da Nang, self-built households with limited financial capacity had

utilised their strong relationship with neighbours, friends, and relatives to ask their assistance for their housing reconstruction. Instead of hiring construction workers, they borrowed workdays from their friends or neighbours and later on repaid in form of the same number of workdays spent on housing construction of their lenders. Such social relations were promoted in this circumstance and commonly seen in the formation of self-built housing but rarely found in the donor-built in Da Nang case. In Hue, both self-built and donor-built houses had utilised this social relationship to reduce construction costs.

Awareness and capacity of civil society such as community-based organisations and NGOs is quite similar in Hue and Da Nang. Their role is important to help at-risk communities identify and then reduce their vulnerability. However, the different reconstruction approaches applied by the two NGOs, Development Workshop France and Save The Children, generated different results of post-disaster housing. The so-called *family-tailored* approach used by the Development Workshop France made Hue's families more satisfied towards their donor-built houses compared with the Save The Children where a so-called *community-based* approach still showed a limit in meeting household's needs. The active participation of local people into the housing design and construction process in the Hue case, again, demonstrated its efficiency thanks the locally cultural appropriateness and the reduced construction cost of donor-built houses. Meanwhile, the role of community-based organisations such as women's union, fatherland front, or farmer's union was not clear in the provision of post-disaster housing. They seemed to be present in all community consultation activities but rarely gave specific inputs or suggestions to the discussion and sometimes overlapped each other.

Throughout the fieldwork, there is a clear distinction in terms of the role of men and women in housing reconstruction. Accordingly, men are those who decide everything related to housing repair and reconstruction after disaster while women are responsible for housework such as cooking, washing, or looking after children. This is a long tradition of Vietnamese communities, inherited from the previous feudal system, and people accept it as a culture.

It was found from the case studies that a large amount of professional and research community are standing outside the course of post-disaster housing reconstruction for low-income groups. Many architectural offices, university scholars, or building experts who have better insights of disaster risk reduction and climate change adaptation are not really involved in the process of providing better design and construction solutions for low-income communities. To date, there has been still an absence of supportive or incentive mechanisms in both cases where the involvement of such knowledgeable parties is encouraged and integrated in the development of climate resilient housing.

In terms of *SYSTEM*, while donor-built houses in both cases show their adequate capacity for hazard mitigation, self-built houses in Hue exhibited a better performance than in Da Nang since they addressed more technical features for risk reduction to meet the demand of *redundancy*. The *flexibility* through the locally cultural appropriateness of spatial layouts was addressed in the donor-built houses in Hue while limitedly seen in Da Nang. People in Da Nang presented more complaints on their donor-built houses due to the difficulty of putting furniture inside and extending the house later. Although *safe failure* was integrated in the Da Nang's self-built houses, their overall performance regarding technical safety is not higher than Hue's houses where many resilient features were found. Similarly, donor-built houses in Hue show their higher flexibility since actual needs and expectations of beneficiary households were addressed in spatial layouts. The family-tailored approach of Development Workshop France where people had stronger voices and more powers in their housing formation has proven its success in reality.

In relation to cost effectiveness, while self-built houses in both cases were quite efficient as they used all available resources (materials and labour) whenever possible, the donor-built houses in Da Nang seemed to be less cost effective. This was due to the use of building contractors outside the community.

Concerning local knowledge and experiences, the donor-built houses in both cases showed their inheritance of local wisdoms related to safe construction. Valuable local experiences were learnt by the project team who then applied for their donor-built housing design. Examples are the use of surrounding reinforced-concrete beams in Da Nang case or the application of reinforced-concrete beds in Hue case.

Narrowly, the comparison between the two cases indicated that signifying community consultation for climate resilient housing needs to focus on three main points: (i) *the disaster-proof capability* of the house where not only capacities to cope with previous disasters but also alternative solutions against future catastrophic events (stronger than previous disasters) are considered and prepared (i.e. safe failures); (ii) *the spatial fitness* to functional needs of at-risk households in short and longer terms, and (iii) *the economic efficiency* of housing construction and later maintenance, extension, and renovation. These three points are actually the key expectations of low-income people in hazard-prone areas towards their housing. In consultation, it is essential to discuss these points individually and as a whole since they are interdependent and mutually reinforcing in the formation of resilient housing. Depending on each case or community, these three points will be translated into different issues and not similar from case to case.

In terms of *INSTITUTION*, both cases show critical shortcomings in stakeholder participation and community consultation for climate resilient housing. Community consultation used in donor-built housing reconstruction only existed within the project duration, frequently 2–3 months, while there was no consultation for the self-built group. Within the donor-built group, community consultation was used in two forms: *community meeting* and *household consultation*. A community meeting was organised at the beginning of the project with the participation of project staff, community leaders, local authority, community-based organisations, local builders and beneficiary

families. The main purpose of this meeting was to inform the project objectives and scale, the targeted population, the procedure of working, and to seek some initial agreements for the next steps. Then, separate household visits and talks were conducted to assess their actual living needs and capacity for reconstruction prior to finalising the design and the method of construction.

However, the case study findings suggested that *community meetings* and *separate household consultations* should be organised in a more flexible and interactive way to allow an active engagement of community members for their better inputs or responses. For example, instead of organising in a closed room where participants just sat in front of the facilitator and answered given questions as in conventional ways, posters and graphic illustrations can be used in *community meetings* through an interactive learning and sharing process where participants could raise new issues or questions and be the master of the talk in some stages where they are knowledgeable. This interactive learning process can be applied to *separate household consultations* to get better response from in-need families. By this way, roles of community players and external parties to resilient housing construction are clearer. Namely, local builders and workers can demonstrate their available experience and skills on safe construction, at-risk households can identify key vulnerable conditions of their housing and their strengths they are possessing, local authority, community-based organisations, and community leaders realise their important work, and implementing agencies better understand local contexts of in-need communities before initiating practical interventions.

The findings showed that the Hue's donor-built houses revealed a higher efficiency than the Da Nang ones since the project team worked closely with the community right from the beginning and during the decision-making stages of the project to seek family agreements on proposed housing designs before construction. Furthermore, the project team also had a regular supervision of construction works to ensure their conformation to the design requirements.

For the self-built houses, people constructed their houses without any support from the outside regarding safe construction and just based the construction on their available experiences. It is was seen that Hue people have more experience in disaster preparedness thanks to their longer history of facing disasters while, in Da Nang, people have just been aware of typhoon impacts since 2006, the time typhoon Xangsane struck. The reality of no consultation in the construction of self-built houses in both cases shows a gap between professional parties and at-risk communities where essential professional expertise and knowledge is not accessed by in-need households. To explain, household interviews revealed that low-income families often cannot afford to hire an architect to design their homes while, on the other hand, from the view of local architects, low-income groups are not their targeted clients because they will get lower payments. This gap is a real challenge to the development of climate resilient housing that necessitates the involvement of local governments and public sector to seek a bridging connection between these two groups.

Regarding *governance*, limited links between at-risk households and local administrative bodies still exist in both cases. Lack of controlling local construction is found in these cases except for verbally encouraging or convincing people to follow safe construction. No building codes or regulations for safe construction are used in these vulnerable areas. In addition, building permits are not required for the construction of local housing, particularly low-income housing, apart from a permission form sent from homeowners to inform the local authority about their housing construction. As explained by local authority representative, the economic difficulty of low-income people was the main barrier to the wide application of building permits for their housing construction. Although the local governments have realised the importance of controlling unsafe practices through building permits, it was impractical to translate this idea into practise if no economic support was provided at the same time because associated design fees and extra costs of using safe construction methods will cross the economic capacity of low-income families.

Without safety control, people freely decide their housing based on their available experience, frequently lack of technical features for disaster risk reduction. This weak governance on local housing construction becomes one of key drivers of the increased housing vulnerability in informal settlements where building codes and construction standards for safety purposes were unseen or invalid to the formation of informal housing [18].

In sum, the discussion above relating to the successes and shortcomings of post-disaster housing in Hue and Da Nang against the housing's climate resilience framework established in the literature review has indicated some key issues for developing climate resilient housing in Central Vietnam. The success of donor-built houses by Development Workshop France in Hue pointed out that developing climate resilient housing necessitates the cooperation between local and new knowledge. Experiences and lessons on risk reduction need to be shared among stakeholders in two forms of discussion, *community meetings* and *separate household consultations*. As community participation and consultation are context-specific [10,22], forms and degrees of stakeholder engagement will vary between communities. In the case of Da Nang and Hue, two dominant and interrelated forms of community consultation above were effectively used in the provision of donor-built post-disaster housing. Community meetings are usually conducted from the beginning with the participation of all stakeholders involved to seek agreements on broader issues. Separate household consultations are subsequently conducted between at-risk households and technical experts (e.g. architects, engineers) to seek agreements on narrower subjects and details such as spatial and structural designs or methods of construction (e.g. labour, materials, methods of construction). This consultation process is likely to be further applied to the self-built group where knowledge for climate resilient housing was often absent.

## 7. Conclusions

As conceptualised under the climate-resilience framework of ISET [16], the achievement of climate resilient housing is a handling of the three following components: *agent, system,* and *institution.* This research has investigated the key issues of post-disaster housing based on a field survey in Central Vietnam in light of community consultation and come up with six policy implications for a resilient housing system to future climate. They included:

- Limited self-sufficiency of households living in hazard prone areas is linked to their limited financial resources. Local governments together with the wide public need to plan and implement actions for local economic development. Programs for vocational training or financial support for household's economy development need to be put in place for this purpose.
- One of the key findings of this research is the effectiveness of social relations through mutual help among neighbours and friends for post-disaster recovery and reconstruction. Governmental and educational programs to enhance neighbourhood activities and promote neighbourliness and friendships could increase this capital to build community resilience.
- Important stakeholders such as professional agencies/experts still rarely participate in the construction of local housing in peri-urban and hazard prone areas. Some obstacles such as high costs of design services for low-income households require local governments to initiate appropriate supportive policies or subsidy programs to reduce obstacles and to bridge this gap.
- Problems related to technical aspects of housing such as limited hazard mitigation and safe failure is the foundation for government to develop more training opportunities for people and for universities to add more subjects and courses related to climate change adaptation and disaster risk reduction. Currently, there are no courses or subjects like that in Central Vietnam's universities.
- Lack of adequate preparedness for climate risk reduction of at-risk households is linked to their limited awareness of climate risks, lack of information, and the ineffective communication and consultation. There is a need to develop programs or campaigns for raising public awareness, to build systems for improving information transferred to people, and official procedures to strengthen community communication and consultation.
- Weaknesses of current local practices of housing construction towards risk reduction and climate resilience point out a need to promulgate policies for the application of building permits in hazard prone areas with the mainstream of some safe principles for housing construction.
- The development of micro-credit programs such as low-interest loan programs was encouraged to support low-income groups in post-disaster housing reconstruction. As seen in the case studies, people faced big difficulties in mobilising adequate finance for reconstruction and a large amount of households whose houses were seriously destroyed by disasters had to borrow money from different sources with high interest rates including usurers.

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