POTENTIALS TO BUILD DISASTER RESILIENCE FOR HOUSING: LESSONS LEARNT FROM THE RESILIENT HOUSING DESIGN COMPETITION 2013

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ABSTRACT

Shelter and settlements are facing greater challenges triggered by climate change and uncontrolled rapid urbanisation in Vietnam. To date, there seems to be a lack of overall solutions for resilient housing that address future climate risks posed to shelter and settlements in climate exposed areas. Current interventions tend to put more focus on physical improvements with limited attention to other aspects such as socio-economic and governance issues. This paper reviews the outcome of the Resilient Housing Design Competition 2013 (RHDC) organised in Vietnam in May 2013 in the lens of climate resilience, in order to examine key issues emerged from the competition and to suggest key potential lessons for future housing implementations. Examining the first-prize winning project, in addition to a literature review, against three key dimensions: physical, social, and administrational, helps to provide three important findings: (i) local knowledge and experiences of disaster risk reduction are valuable to developing long-term climate resilient housing, (ii) improving local awareness and supporting local economies are essential parts to raise resilience, and (iii) applying planning and construction regulations and criteria are significant to ensure a resilient housing system. These findings also generate some relevant policy implications in terms of enhancing local governance for resilient construction, sustaining local economies, and raising local awareness on climate risks and resilience.

CITIATION

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Rapid urbanisation has generated new housing risks to future climate in Vietnam (Hoang Phuong Thao, 2010)

INTRODUCTION

Over a quarter of the whole country has been urbanised (Wit, 2013) and that number is growing: the Vietnam urban population is likely to reach 42 million by 2024 (GSO, 2009). That number reflects nearly half of the national population (Wit, 2013). A strong urbanisation process has created greater pressures on meeting housing demands (Wit, 2013), particularly in suburban or peri-urban areas of cities. The urbanisation process has also seen mass imports of new housing styles, construction methods, and materials that, later on, influence and change local construction practices. Local perceptions and actions on housing construction have been gradually altered in accordance with changing living needs (Ly, 2012). In the locations prone to climate risks, such as flood or storm zones, failure to incorporate safety-related principles in building structures is widespread and become a main cause of increased housing vulnerability (Chantry and Norton, 2008). Realising this worsened scene, the national government and aid agencies have undertaken plans and actions for disaster risk reduction, but damage and losses after recent climate events, particularly in housing sector, have not followed a significant decline (CFSCC database, accessed Aug 2013). In early 2013, the Institute for Social and Environmental Transition (ISET), in collaboration with Hue University and Da Nang Architecture University, organised the RHDC to call for ideas in response to climate risks and effects of urbanisation in Central Vietnam, with a focus on Da Nang, one of the most vulnerable cities in the region.

This paper aims to examine the outcome of the RHDC, particularly on the first-prize winning project (hereinafter referred to as The Project), in order to identify major design-related issues and to generalise some key assumptions for future implementations of disaster resilient housing.

In Vietnam, increasing concerns are given to the capability of local housing and settlements, particularly in hazard prone areas. These concerns are in response to climate threats, especially storms and typhoon (MONRE, 2008; Anh et al., 2012). Recent disasters (e.g. typhoon Xangsane in 2006 and Ketsana in 2009) caused significant damage and losses to masonry shelters (Anh et al., 2012 & 2013; Phong et al., 2013). One reason for this is

FIGURE 1

THREE HOUSING MODELS PROPOSED IN THE PROJECT (THANG ET AL., 2013)

Tube House

Three-Compartment House

Twin Double-Storey House

the lack of awareness and understanding that local people and builders have on how to properly create safe buildings with new materials (e.g. cement, brick, or steel) and new construction methods (Chantry and Norton, 2008). According to The Project's author, due to economic constraints and limited awareness of disaster preparation, people seemed to prefer the use of immediate or short-term measures in response to disasters (i.e. using sandbags on roof, or anchoring roof structures to the ground) whereas long-term strategies (i.e. applying safety-related standards from initial constructions) were in absence. In an era of climate change with the estimated increasing occurrence of climate events (Vietnam Government, 2011), these short-term solutions are unlikely to help local communities avoid disaster damage and losses. In addition, issues of human comfort seem to be neglected in recent masonry houses. According to most competition participants, capturing natural light and intensifying natural ventilation, the two effective solutions for the hot-humid climate in Central Vietnam, seem to be absent in the visited local houses.

The above discussion illustrates local housing with unfavourable physical exposures in terms of climatic responsiveness and disaster resilience in Central Vietnam. Participants believed that the vulnerable nature of local housing to future disasters and climatically uncomfortable living spaces were driven by non-physical factors. These factors include limited awareness of people on disaster risk reduction, lack of technical supports for a safe and climate-responsive construction, and limited governance for a resilient housing system (Anh et al., 2013). This paper, therefore, investigates this relationship through an examination of the design competition's outcomes and The Project to generalise some key assumptions to potentially assist policy-makers in planning and designing appropriate housing programs and strategies for extremely climate-risk exposed regions of Vietnam.

OVERVIEW OF THE PROJECT

The competition took place in February, 2013 in Vietnam to seek housing-design ideas for the context of climate change and urbanisation, with a focus on Da Nang City. The 1st prize was given to the project that addressed a high response and adaptation to the local contexts in the light of disaster resilience (The Project mentioned above). The main outcome of The Project is the three housing options: tube (nhà ống), three-compartment (nhà ba gian), and twin double-storey (nhà ghép đôi) (Figure 1). These models were developed from existing local housing forms, and were highly praised for their functional and spatial appropriateness to peoples' lifestyles and their high potentials for replication in a wider region. In addition, according to the assessment panel's comments, these solutions were financially affordable to low-income families and offer them safer and more comfortable living places.

The Project has addressed three outstanding points related to three issues: site planning, building design, and construction technology (see Figure 2) for raising disaster resilience for housing. Firstly, site planning and settlement patterns are taken into account with an emphasis on using non-parallel or zigzagging roads and unequal distribution of houses. This serves to fragment wind flow, and can reduce wind effects pressed on buildings. Secondly, simple building shapes (e.g. rectangular or square) and high-sloping or pitch roofs are employed as key principles to design individual houses for storm risk reduction. Thirdly, construction technology for resilient shelters needs to follow two fundamentals: (i) all building parts, from the top to the bottom, need to be securely connected together by reinforced-concrete beams and pillars and (ii) there must be an effective strong room, known as a safe failure, made by reinforced concrete in each house for escape in case of calamitous typhoons.

FIGURE 2

OUTSTANDING POINTS ADDRESSED BY THE PROJECT

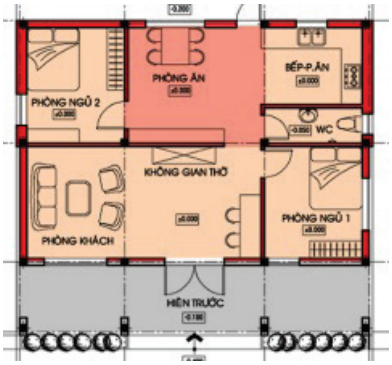
Site planning

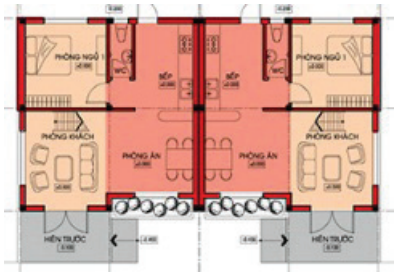
Non-parallel or zigzagging roads and buildings

Building Design

Simple building forms (rectangular or square)

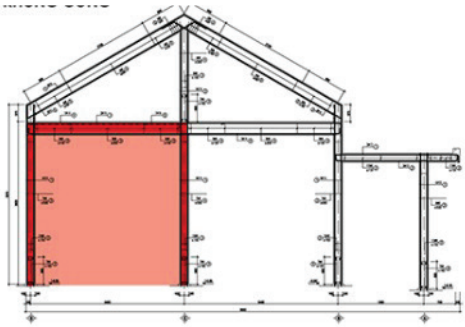
High-sloping or pitch roofs



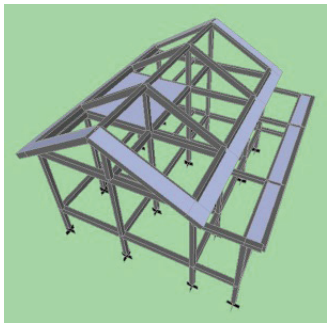


Construction Technology

Safe failure by using a solid room in the house (Top)



All building parts are securely connected (Bottom)



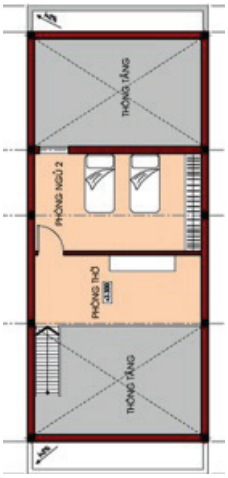


FIGURE 3

ANALYTICAL FRAMEWORK TO GENERALISE ASSUMPTIONS FROM THE DESIGN COMPETITION

ANALYTICAL FRAMEWORK

This paper was structured following a sequential process (see Figure 3) to generate key lessons learnt from the competition. The Project plays an important role as the backbone of this paper to generalise findings and implications. Information and data collected from the submitted design projects were analysed to come up with some possible assumptions. These assumptions were subsequently reviewed in relevant literature to consolidate their validation before generalising key findings and recommendations.

DESIGN-RELATED ISSUES

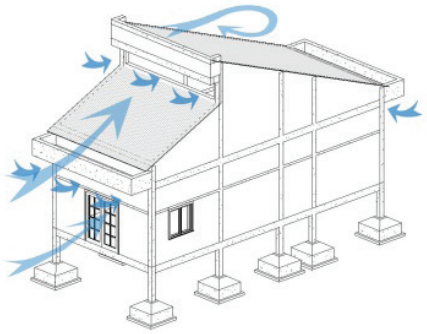
Examining the drawings and explanations from The Project in line with our further discussions with the team allowed for the identification of important design issues related to physical, social, and administrational performances of local housing. These issues could potentially be useful for future developments of climate resilient housing in Da Nang particularly and in Vietnam generally. Design issues identified from The Project range from physical (e.g. unsafe conditions of existing local houses) to social (e.g. economic constraints of low-income families) and administrative aspects (e.g. lack of safety-related building codes or construction standards in hazard prone areas).

Physical design issues are the first fundamental requirement of climate resilience. Physically, The Project addressed the use of safety-related measures for storm risk reduction such as the addition of posts and beams into building structures and strong connections for roof reinforcements (Figure 4). Improvement of technical aspects for disaster risk reduction (DRR) have been emphasised in numerous relevant texts (e.g. McEntire, 2011; Jha et al., 2010; SKAT & IFRC, 2012; DWF, 2011) as one of the core aspects for DRR interventions. According to The Project's author, the proposed design was based on the lessons learnt from local experiences through their field visits. What they found interesting was that three housing forms (tube, three-compartment, and twin double-story, as seen in Table 2) dominated the local context, and that these forms were relatively appropriate to peoples' lifestyles and community settings (Thang et al., 2013). In terms of storm reduction, the shape of the building is effective at reducing wind pressures. Thus, the team's approach involved construction techniques to existing housing forms that increase technical stability based on the two core structural principles mentioned earlier. The respect to and integration of local knowledge in DRR solutions has been highlighted in literature as, in combination with new or scientific knowledge, a pathway to achieving sustainable DRR (e.g. Mercer et al., 2010; Gaillard and Mercer, 2012). The physical issues of local housing designs mentioned above suggest that local knowledge about DRR is rich and plentiful, but could be improved by skilled persons to capture and interpret them into resilient housing solutions effectively. Still, these local housing designs indicated that such kinds of knowledge and experiences are currently plentiful in local communities of Central Vietnam.

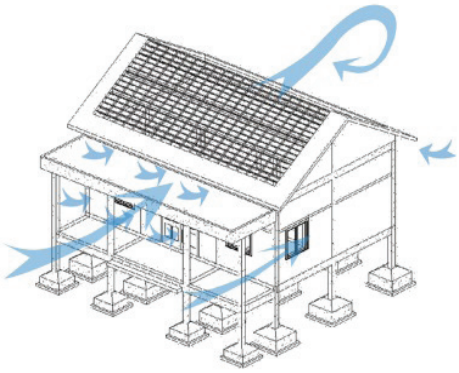
FIGURE 4

RESILIENT STRUCTURES TO STORM EVENTS GIVEN BY THE PROJECT (THANG ET AL., 2013)

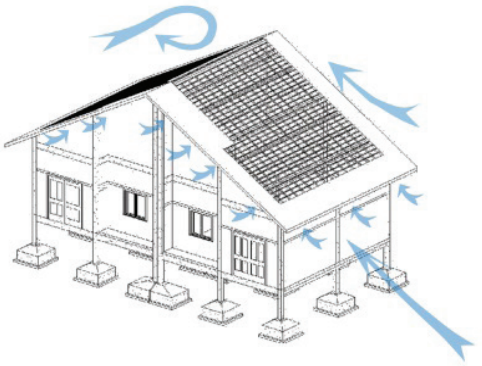
Tube House



Three-Compartment House



Twin Double-Storey House



Socially, The Project highlights four major challenges to the promotion of climate resilient housing in the context of Central Vietnam: economic difficulties, lack of climate-risk knowledge, limited skills of local builders, and lack of communication. Firstly, economic constraints generated by unstable livelihoods, high rates of unemployment, and temporary low-paid jobs of local people are undermining efforts of housing risk reduction (Thang et al., 2013). This issue was already discussed by many authors in literature who believed it to be one of the biggest obstacles to the achievement of resilience (Wisner et al., 2004; McEntire, 2011). In Central Vietnam, particularly with poor and low-income groups, economic difficulties make them put DRR as the secondary priority behind basic needs of living such as food, healthcare, or school fees for children. The second challenge addressed by The Project was the limited awareness of local people on climate change and the importance of climate risk reduction for a long-term development (Thang et al., 2013). This has made them underestimate the actual danger of climate hazards and prefer immediate or short-term responses. According to The Project's author, people often think of disaster preparedness and risk reduction when they receive announcements of a coming hazard on mass media, and then rush to using quick and simple measures to respond (e.g. putting sandbags on roofs, moving valuable items to safe places in house, and evacuation in the case of big events). The third challenge addressed by The Project is the limited skills of local builders, usually masons, in building safer and more resilient shelters. Da Nang experienced strong typhoons as recently as 2006 (ADPC, 2007), when typhoon Xangsane seriously destroyed the city. Still, the safety techniques of local builders seem inadequate, and are likely to re-produce risks to future hazard in new construction (Thang et al., 2013) The fourth major challenge to poor and low-income groups is a lack of communication and consultation with in-field experts and professionals (i.e. local architects and engineers) about building resilient shelters. Currently, poor and low-income groups pursue construction on their own and lack technical guidelines or instruction for disaster resilient construction. The challenges mentioned above have been realised as the key obstacles to a wider application of proposed housing designs according to The Project's author.

Administratively, it could be inferred from The Project that there may be a lack of local governance for an environment of safe construction. So far, no building codes and construction regulations related to DRR have been applied in the project site (Thang et al., 2013). According to The Project's author, building permits are also not required for most local practices of housing construction, specifically for the single-storey shelters. People freely decide their housing forms and construction according to their needs and financial capacity (Thang et al., 2013). As for poor and low-income groups, many unsafe conditions can be found in their houses, as there are neither technical

supports nor regulatory requirements for safe construction given to them. This limited governance strongly influences housing vulnerability and may undermine efforts of building a resilient housing system to climate change in the future. In literature, limits of governance and management have been realised as a complementary catalyst to the increase of climate risks in human society (Ahrens and Rudolph, 2006; Diagne, 2007; Tierney, 2012; Seng, 2013).

KEY RECOMMENDATIONS

1. Local practices of housing construction can be viewed as a firm foundation for the promotion of climate resilient housing in Central Vietnam.

Based on findings from the above design-related issues (discussed on page 5-7), it can be assumed that local practices of housing construction are likely to reach resilient construction. Da Nang does not have a long history of DRR compared with other places of Vietnam; the city only saw its first strong typhoon in 2006 (ADPC, 2007). However, valuable local experiences in construction practices do exist in Da Nang. This supports the assumption that, in other places of Vietnam that experienced strong typhoons earlier than Da Nang, local experience and coping measures are substantial and valuable to the future development of climate resilient housing. Referring to some successful cases of post-disaster housing reconstruction done by the NGO Development Workshop France (DWF) in Vietnam, maximising the use of local knowledge in their rebuilt homes became one of the key success factors (DWF, 2011). On the other side, the failure of flood-resistant houses provided by IFRC in 2000 in Vietnam was believed to result from limited uses of local resources, particularly locally available materials and construction techniques (VNRC and IFRC, 2002). The above discussion aims to suggest that future housing implementations for climate-risk exposed regions such as Da Nang need to fully capture existing values of local housing and effectively translate them into locally responsive and adaptive housing options.

2. Improving awareness of at-risk households and communities as well as stimulating the local economy are the essential elements to build climate resilient housing.

Analysis of the design proposals helped to strengthen the conclusion that climate risk reduction needs to be extended beyond physical aspects, with special attention to social enhancements such as raising local awareness and sustaining the economy. Although some public awareness raising activities are in place in Central Vietnam, people still underestimate climate threats and its increasing severity in the future. Disaster preparedness is not as important as basic needs of living for low-income groups (Anh et al., 2013). For medium and high-income groups, fashionable construction that focuses on decorations and details are preferred over safe construction practices (ADPC, 2007). Therefore, it is important to improve local awareness at the same time of stimulating local economy to avoid the misuse of financial resources for other purposes (i.e. building decorations) rather than safety.

3. The importance of bridging gaps between at-risk low-income groups and in-field professionals, especially architects and engineers.

This issue has been raised by the competition and can be seen as a common problem in reality of Vietnam. Vulnerable communities in this country often belong to poor and low-income classes (DWF, 2010; Anh et al., 2013; McEntire, 2011) where economic constraints inhibit their accessibility to professional services for better housing design and construction. Recent literature is also increasingly concerned with the role of built-environment professionals (frequently including architects, engineers, planners, and surveyors) in disaster risk reduction (e.g. Max Lock Centre, 2009; Aquilino, 2011; UNISDR, 2013). Professional expertise and skills are crucial to effectively assist at-risk communities to better cope with future disasters (UNISDR, 2013). In case of Vietnam, architects and engineers are often the two professionals who are mainly involved

in the design and construction of post-disaster housing (e.g. recent projects undertaken by DWF or Save-The-Children after typhoon Xangsane in 2006 or Ketsana in 2009). To do this, it requires mutual and interactive learning and sharing processes among at-risk people, communities and in-field professionals through communication and consultation activities indoor and outdoor.

4. It is essential to apply safety-related codes and criteria for local construction to increase climate resilience.

Academic literature addresses governance-related issues in DRR, however, it is exposed in different forms according to different contexts around the world. While other countries show their limits of DRR governance in other issues, Vietnam demonstrates it in form of missing safety-related regulations and criteria for local construction practices. For examples, in Indonesia, governance for DRR is faced with problems of social conflicts, national security, decentralisation of top-down policies, and lack of political commitment (Seng, 2013). Or in Senegal, governance issues are scoped down to the constraints posed by topographical and geographical difficulties of vulnerable locations, unclear land tenure, extremely poor people, limited healthcare, and environmental degradation (Diagne, 2007). In Vietnam, as inferred from this competition, DRR is faced with challenges from a lack of building codes, zoning, and planning criteria for climate risk reduction in hazard prone areas (e.g. floodplains or cyclone exposed areas in Central Vietnam). Based on our previous research and practices in the field of post-disaster housing reconstruction in Vietnam, these governance-related problems can be found almost everywhere throughout Vietnam (DWF, 2010; Anh et al., 2013). Current governance mechanisms for civil construction (i.e. residential houses) tend to focus on central urban districts while giving little consideration to peri-urban and rural areas, the places that are, in fact, more vulnerable to climate risks. Therefore, improving local construction practices through the application of safety-related regulations in form of building permits helps to create an enabling environment for resilience performances and enforces a future resilient housing system in Vietnam.

CONCLUSION

Based on the examination of a housing design competition and a review of relevant literature, this paper outlines four important findings to assist future developments/interventions on climate resilient housing in hazard prone areas of Vietnam. They include (i) the significance of local knowledge, (ii) the importance of raising local awareness and developing local economies, (iii) the pivotal role of professional expertise, and (iv) the critical need to enhance local governance. While the first two findings tends to highlight the value of local construction practices and expertise in disaster risk reduction and management, the third and fourth appear to signify the involvement of a broader resilient context where measures for economic development, improved public awareness, and effective governance are crucial. These findings can be valuable lessons that potentially inform further research and practices in terms of building resilient housing and settlements in extremely climate-risk exposed areas of Vietnam.

The value of this competition is not only the delivery of design products for resilient housing, but also a good initiative to raise awareness of a wider range of local stakeholders including administrative officers, scholars, practitioners, and professionals working in architecture and the construction sector. The Project's author was invited by the Women's Union of Da Nang to share their lessons, insights, experiences, and design outcomes with a broader community of the city in order to assist current local housing programs.

The findings of this paper have also generated some policy implications for local authority to issue appropriate legal frameworks and supportive programs to improve local construction and to build safer and more resilient communities, particularly with the low-income and highly disaster prone groups.

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