A study on housing modifications in resettlement sites in Cagayan de Oro, Philippines

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Abstract

This study explores the reasons for, and patterns of, housing modifications in Mahogany Village at the Calaanan site, where permanent houses were built as part of a program to resettle communities affected by the severe tropical storm Washi that hit Cagayan de Oro City in December 2011. The basic housing units provided were not intended to be modified and the possibilities for adaptations were limited. However, this research found that residents were willing to invest in the construction of complementary spaces, even though it was considered a violation of their occupancy agreement. The construction of modifications was driven by the low performance of the houses provided, while the need to modify them came about because householders' needs, activities, and goals were not properly satisfied. In this study, the identification of the patterns of modification is augmented by an analysis of the reasons behind these modifications, incorporating consideration of demographic, economic, sociocultural, local environment, and climatic conditions. The study's findings reveal that the local characteristics of the resettled communities and their physical context were not taken into account during the planning stage of the resettlement.

Keywords: post disaster resettlement; dweller-initiated housing modification; Typhoon Washi; Philippines

1. Introduction

Resettlement involves removal of communities from an environment where they have evolved over many decades or even centuries with traditional patterns of adaptation (Oliver-Smith, 1991). This relationship with the environment can be based on economic, political, or sociocultural factors, or a combination of them. Hence, the transfer of a community to another location can result in the destruction of social networks, divisions of communities, and a reduction of members' livelihood opportunities (Jha A. et al., 2010).

In the city of Cagayan de Oro in the southern Philippines, the process of resettlement was a result of the massive displacement caused by the severe tropical storm Washi that hit the region of Mindanao between December 16 and 17, 2011. The people most affected were those residing in vulnerable settlements near riverbanks, mainly along the Cagayan de Oro River. Thus, the targets for resettlement were squatter residents. The decision to resettle these communities was taken by the local authorities in the light of the impossibility of mitigating the original sites' vulnerabilities. The areas were later designated as buffer areas, or "no-build zones," where any construction is prohibited in compliance with the Water Code of the Philippines. Meanwhile, the principal concern in the restitution of housing in these circumstances was the provision of safer homes situated away from the disaster-prone zones in the city. The national and local governments agreed on the construction of 8,599 permanent houses for affected communities in Cagayan de Oro. More than 20 resettlement sites were identified, mostly located in peri-urban areas.

Non-governmental organizations (NGOs) and other implementing agencies built basic housing units in coordination with the local government. The approach taken for the planning and management of the project was top-down, with limited contributions from the local communities. The people affected were not consulted about their housing preferences, an omission that can lead to housing solutions not meeting beneficiaries' needs or being suitable for the local context.

Communities that are resettled in this way have to face an unpredictable, complex process of adaptation to their new environment that is not necessarily sensitive to a rational planning approach (Oliver-Smith and de Sherbinin, 2014). This is reflected in the modification of their built environment, and, more specifically, in their new home. Khan (2013) defined this phenomenon of a resident's adaptation to their environment as "spontaneous transformation," which encompasses any alteration, addition, extension, or

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modification of a house in terms of the form and the use of space as a result of the process of inhabitation, as the expression of the beneficiaries' needs and preferences. In addition, the development of modifications or extensions may indicate, to some degree, a commitment to permanence in both the housing and the wider village (Oliver-Smith, 1991).

The present study focuses on beneficiary-initiated modifications of the basic housing units that were built by the Habitat for Humanity Philippines (HFHP) NGO in Mahogany Village at the Calaanan resettlement site in Cagayan de Oro. These modifications began when the beneficiaries were allocated in groups from December 2012. The aim of this paper is to identify the patterns of the housing modifications and the uses for the renovated spaces, and to analyze the reasons behind the construction of these modifications.

2. Method

In order to understand the general situation at the Calaanan site, a questionnaire survey was conducted, covering 254 households in four villages. A detailed study was conducted in Mahogany Village, because its particular location, separated from other villages within the site, brings about additional difficulties for its residents.

Data were collected through (a) interviews with representatives of the governmental offices and implementing agencies or NGOs, which provided information about the resettlement and management processes; (b) a household questionnaire survey, with the sample comprising 59 households out of 160 houses built, and the survey covering demographics and household profiles, pre-disaster housing conditions, and housing modifications implemented after the beneficiaries' allocation stage; (c) a housing observation survey, including a technical survey to categorize the housing modifications; and (d) graphic documentation, including photographs of the settlement site, community facilities, interiors and exteriors of houses, and residents.

The information collected was analyzed with regard to the definition of modification patterns and the current use of the spaces built. Additionally, the reasons for the modifications were analyzed in view of the particular issues found at the resettlement site.

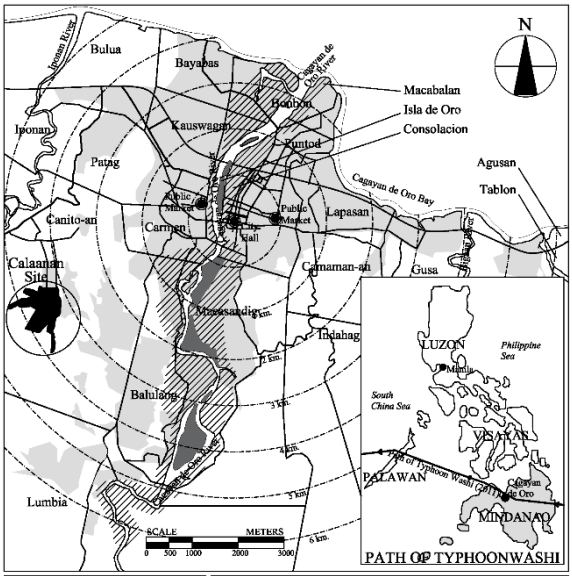
3. Disaster-induced resettlement

3.1 Pre-disaster settlements and housing

Tropical storms are prevalent in the region and regularly affect Cagayan de Oro; however, their frequency and intensity are lower here than the experienced in the north and center of the country. Thus, when Typhoon Washi hit Mindanao, it had an unpredicted impact, especially in urban zones.

The areas most affected were located near the Cagayan de Oro River (see Fig. 1). Residents of these settlements were used to floods, due to the rising levels of the river. However, the scale and intensity of Washi caused the total or partial destruction of around 18,436 houses through the ensuing floods, heavy rains, and increased river levels. Following the disaster, the local government, in coordination with other governmental agencies, NGOs, and civil organizations, launched an extensive resettlement program.

The target beneficiary of the resettlement was identified as the squatter communities residing in the Cagayan de Oro river basin. In order to prevent residents returning to the riverbank settlements, the government designated them as "no-build zones" or buffer areas (Fig. 1), thereby prohibiting the establishment of settlements on land categorized as highly vulnerable. This decision was taken with reference to the Presidential Decree No. 1067 (Water Code of the Philippines) regarding the strict observance of the three-meter easement of rivers.



LEGEND
Landmarks/ Commercial Areas
Affected/Flooded areas by Washi
No-Built Zone (Buffer Zone)
Calaanan resettlement site

LOCATION OF FORMER HOUSE (Mahogany residents)	
Residence at time of Washi	% (n=59)
Barangay Agusan	2% (1)
Barangay Balulang	2% (1)
Barangay Canito-an	2% (1)
Barangay Carmen	40% (23)
Barangay Consolacion	3% (2)
Isla de Oro	19% (11)
Barangay Macabalan	5% (3)
Barangay Macasandig	17% (10)
Barangay Puntod	10% (6)

Fig. 1. Cagayan de Oro—Affected Areas and No-Build Zone.

The present study's field survey in Mahogany confirmed that a high percentage of the residents' pre-disaster homes had been built in vulnerable areas (see "Location of former house," Fig. 1) that are now "no-build zones." These residents were aware of their exposure to hazard, but had prioritized livelihood opportunities available in the major public markets located nearby. Additionally, the original establishment of these informal settlements had come about through a lack of affordable land in the city and inappropriate measures for managing urban growth. There was no security of tenure, owing to the informal nature of these settlements. The proportion of residents who owned their house versus those who rented or shared with relatives or friends is shown in Table 1. In all the

cases, the houses were built on public land.

Table 1. Former Housing Tenure Status.

Tenure status	% (No.)
Own house	56% (33)
Rent	27% (16)
Share house	17% (10)

Access to basic facilities in pre-disaster settlements was limited, essentially because the service companies only invest in public infrastructure (drainage, water, electricity) in officially recognized areas. Access to water, for example, was through neighbors or direct from the river. Similarly, electricity was supplied in a few cases via individual meters, but, for most of the residents, it was obtained by sharing with neighbors inside or outside the squatter community, through informal connections.

Moreover, the potential for exposure to typhoons, floods, and even earthquakes (Lo and Oreta, 2010) present in pre-disaster squatter settlements is evidenced by the informality in housing construction and the prevalence of poorly used, local, traditional (e.g., nipa leaves, coconut timber, bamboo) and makeshift or improvised (tarpaulins, plastic sheets and others) materials, as shown in Tables 2 and 3.

Table 2. Materials used in Former Housing—Outer Walls.

Materials	% (No.)
Mixed wood + makeshift/improvised	24% (14)
Mixed wood + local traditional materials	59% (35)
Mixed wood + concrete/stone	17% (10)
Concrete/stone	0% (0)

Table 3. Materials used in Former Housing—Roofs.

Materials	% (No.)
Mixed wood + makeshift/improvised	29% (17)
Mixed wood + local traditional materials	5% (3)
Wood-galvanized iron	8% (5)
Mixed galvanized iron + concrete	58% (34)

These factors of a hazardous location, limited access to basic facilities, and poor housing construction determined the precarious living conditions and vulnerabilities that resulted in the severe, post-disaster damage to the residents' housing outlined in Table 4.

Table 4. Damage Level to Former Housing.

Damage level	% (No.)
Totally destroyed	88% (52)
Major damage	10% (6)
Partial damage	2% (1)
No damage	0% (0)

3.2 Post-disaster resettlement in Calaanan site

Calaanan is the largest resettlement site in Cagayan de Oro, with a total area of 26.7 ha; 2,299 houses were built, of which 2,176 are currently occupied, six are used as community support offices, 80 were never occupied due to inappropriate location, and 37 were severely damaged by landslides and their residents had to be relocated in other sites. Calaanan is located in the peri-urban area of Cagayan de Oro, approximately 7.5 km from the city center and the main local public markets (Fig. 1). It was one of the first settlements at which the implementing (NGOs and other donors) and governmental agencies built permanent basic housing units for victims of Washi in Cagayan de Oro.

The land is the property of the local government, and, before Washi, it was used for social housing programs. Therefore, by the time that the permanent housing for resettled communities were built, there was already some infrastructure in place, such as access roads, transportation routes (local buses or *jeepneys*), and community facilities such as the Barangay center, which includes governmental offices, with administrative and community spaces, as well as health facilities, schools, and commercial areas.

Conversely, the site's proximity to the central city area, compared to other resettlement sites, was less beneficial to relocated residents allocated to Calaanan.

3.3 Post-disaster permanent housing

Mahogany Village is the most isolated community within the Calaanan site (Fig. 2). The local government, which owns the land, coordinated the design of the settlement layout, land development, provision of infrastructure and services, and the planning and construction of permanent houses, of which a total of 160 were built.

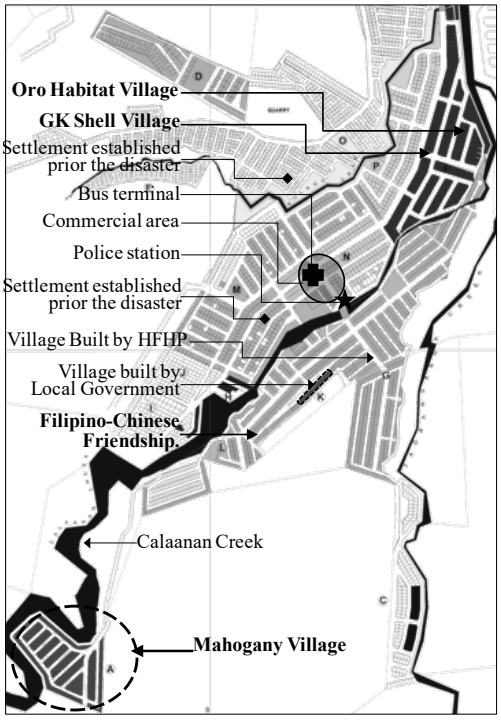


Fig. 2. Local Context and Location of Mahogany Village.

The basic infrastructure and services were provided in accordance with the National Building Code of the Philippines and the Minimum Design Standards and Requirements for Economic and Socialized Housing Projects, regulations that specify for the provision of access roads, water and electricity supplies, and appropriate drainage in new settlements. The access road, built with concrete by the Department of Public Works and Highways, connects Mahogany with the

rest of the site. However, due to Mahogany's location, there is no public transportation, and residents therefore have to walk or ask neighbors who have motorbikes to take them to the Calaanan terminal, and then take public buses or *jeepneys* to go to the city.

Mahogany's location was also a disadvantage in terms of the provision of potable water through public connections, and so HFHP and the local government built a communal well (see Fig. 4(j)) and communal faucets. Additionally, an NGO provided a rainwater collection system for every two housing units, comprising collection guttering and storage tanks.

Sanitation was ensured through the installation of one septic tank for every two housing units by HFHP as part of the overall housing design. However, a power supply is not in place for all the households, as each family is required to apply to the local power company for an individual meter. The results of the survey recorded that 80% (47 of 59 those surveyed) of households had individual electricity connections.

Communal facilities were observed to have been partially provided. One of the houses is used as a development center or office for community assistance from the local government. There is a covered court built with non-permanent materials that is used as a meeting space (Fig. 4(h)), and there is a playground and sports field, which is located adjacent to the settlement but on privately owned land.

For the construction of the housing units, HFHP was assigned as the project's implementing partner or contractor, and financed the construction in Mahogany through donations from private corporations (for other villages, HFHP has received funds from the National Housing Authority or the Department of Social Welfare and Development). The houses in Mahogany were built by a subcontractor—the NGO All Hands Volunteers—and progress was supervised by HFHP.

The "quadruplex" design of the housing features four units per building (see Fig. 3). This design was adopted through coordination with national and local governmental officials and with regard to standardized designs developed by the National Housing Authority and the Department of Social Welfare and Development. It was selected because it optimizes the usage of the limited available land for relocation, promoting high density in the settlement. However, this type of use of limited space can cause feelings of discomfort and a lack of privacy among residents.

The average area utilized for each housing unit is 21 m^2, with the units built using conventional permanent materials, such as concrete hollow block, metal truss or roof supporting structure, and galvanized iron sheets. The design is simple, comprising an open main space, in which residents can add internal partitions, and a restroom installed in one corner (see Fig. 3). This minimalist housing design has long been used in social housing programs in the Philippines (Manalang et al., 2002), the beneficiaries of which are the marginal low-income families (represented by the lowest 30 percentile income group, with an average annual income in Philippine pesos of PHP 62,000 or approximately US$ 1,400; National Statistical Coordination Board).

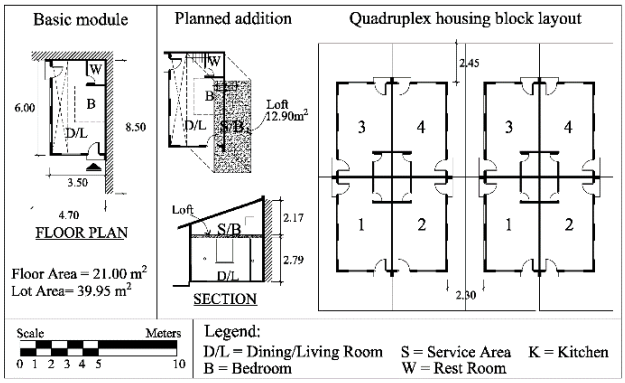


Fig. 3. Quadruplex Housing Units in Mahogany Village.

During Mahogany's housing design and planning stage, the implementing organizations (NGOs) provided options for extensions in order to address a potential need for additional space; these options were limited, though, to the construction of mezzanines or lofts for bedroom areas, adding an extra 12.90 m^2 to the overall housing floor area (Fig. 3).

4. Post-occupancy adaptation

The concept of "housing performance" is based on the premise that houses are designed and built to satisfy occupants' activities and goals (Preiser, 1989). However, the level of an inhabitant's satisfaction with their house is unlikely to remain high permanently. "Housing stress" appears when the "level of tolerance" is exceeded, creating a gap between the actual and the preferred housing (Seek, 1983). In fact, at any point in time, householders' needs or expectations can change simply through the process of inhabitation (Khan, 2013; Seek, 1983), and they may therefore decide to move to another house or modify their current one.

The phenomenon of "spontaneous transformation" or modification, as defined by Khan (2013), refers to alterations of houses carried out by their inhabitants with the objective of adapting them to accomplish desired environmental and living conditions. In Mahogany, data collected through the survey indicated that 69% of residents transformed their houses (41/59 surveyed households), with these transformations initiated either by them or with support from an NGO (see Table 5). That such modifications are initiated by householders confirms the need to adapt the original built environment to their personal requirements and behaviors. Furthermore, during the field survey, many of the non-transformer households (Fig. 4(d)) expressed their intention to build extensions, initially using improvised materials that, in time, could be replaced by more durable structures.

"Usufruct" is the system that was used to grant occupancy rights to the households: householders

received an occupancy certificate after signing an agreement with the local government. This provided the right to reside in the houses for a defined term of between 25 to 50 years (Oxfam, 2014), but it did not provide any property right to the household. Thus, the security of tenure was not guaranteed, including that of the additions or modifications built by the residents.

4.1 Patterns of modification

In this study, two types of modifications featured: transformations that are planned or allowed and those that are unplanned or not allowed. This differentiation is based on the conditions specified in the occupancy certificate granted to residents through usufruct. Unplanned constructions are considered informal and a violation of the occupancy conditions, so extensions are liable to be removed regardless of the type of construction materials used. Thus, all non-allowed modifications are considered to be non-permanent.

Based on the construction materials used, two types of modifications were defined: "durable," with permanent or semi-permanent characteristics, and "precarious," representing temporary or transitional constructions that might be gradually upgraded into durable constructions. The materials typically used for the outer walls of durable extensions were concrete hollow blocks (Fig. 4(f)); these are widely used in the country for conventional constructions. For precarious modifications (Figs. 4(b), 4(c), 4(e)) and second floors (Fig. 4(g)), the surveyed residents used light or local materials (coconut lumber, nipa leaves, plywood) and makeshift materials (plastic sheets or tarpaulins).

The classification criteria used to define the level of modifications focused on internal additions and the external construction of new spaces. "Internal modifications" refers to the construction of lofts or mezzanines (see Fig. 4(i)); internal partitions (walls) were not considered in the study because they do not incorporate additional floor area. The majority of the externally modified spaces were built on one story; however, some households had also begun to build two stories (Fig. 4(g)).

The available area for extensions inside each lot is reduced to 16.87 m^2 because of the rainwater storage tank shared between every two houses. Consequently, some residents had started to build extensions adjacently to their houses but already out of the lot (Figs. 4(a) and (b)), and others built sub-houses separated from the house and the lot. This can be seen in the layout and type of extensions shown in Fig. 4.

As discussed in the next section, the residents' use of housing extensions was motivated by a number of reasons, such as a need to accommodate family members; a requirement for service areas for cooking, laundry, or storage; or as a means of an income source (Fig. 4(c)), owing to the destruction of livelihoods following the disaster and subsequent resettlements.

Table 5. Patterns of Housing Transformation.

Type	Materials	Level	Location	Uses	Space
Planned (allowed) (2)	Precarious (2)	Internal (7) modifications	Inside the house (7)	Service areas (7)	Storage (7)
	Durable (5)				
Combined planned and unplanned (5)					
Unplanned (not allowed) (34)	Precarious (30)	Horizontal (31)	Inside the lot (25)	Service areas (15) + *combined with other uses* (5)	Kitchen (1) Resting space/laundry (10) Kitchen–resting space (4)
					Shop–resting space (3) *Kitchen–sub-house (1) *Shop–resting space–sub-house (1)
				Small shops/business (6) + *combined with other uses* (4)	Shop/business (6)
					*Shop–resting space (3) *Shop–resting space–sub house (1)
			Combined inside/ outside the lot (1)		
			Outside the lot (5)	Bedroom areas (4) + *combined with other uses* (2)	Sub-house (4)
					*Kitchen–sub-house (1) *Shop–resting space–sub-house (1)
	Combined precarious and durable (1)				
	Durable (8)	Horizontal (8)	Inside the lot (8)	Service areas (4) + *combined with other uses* (1)	Resting space/laundry (3) Kitchen–resting space (1)
					*Shop–resting space (1)
				Small shops/business (3) + *combined with other uses* (1)	Shop/business (3)
					*Shop–resting space (1)
		Vertical (1)	Inside the lot (1)	Service areas (1)	Resting space (1)

Notes: A total of 41/59 households transformed their houses; subtotal number of households presented in parentheses; * = households that built multiple extensions with more than one use.

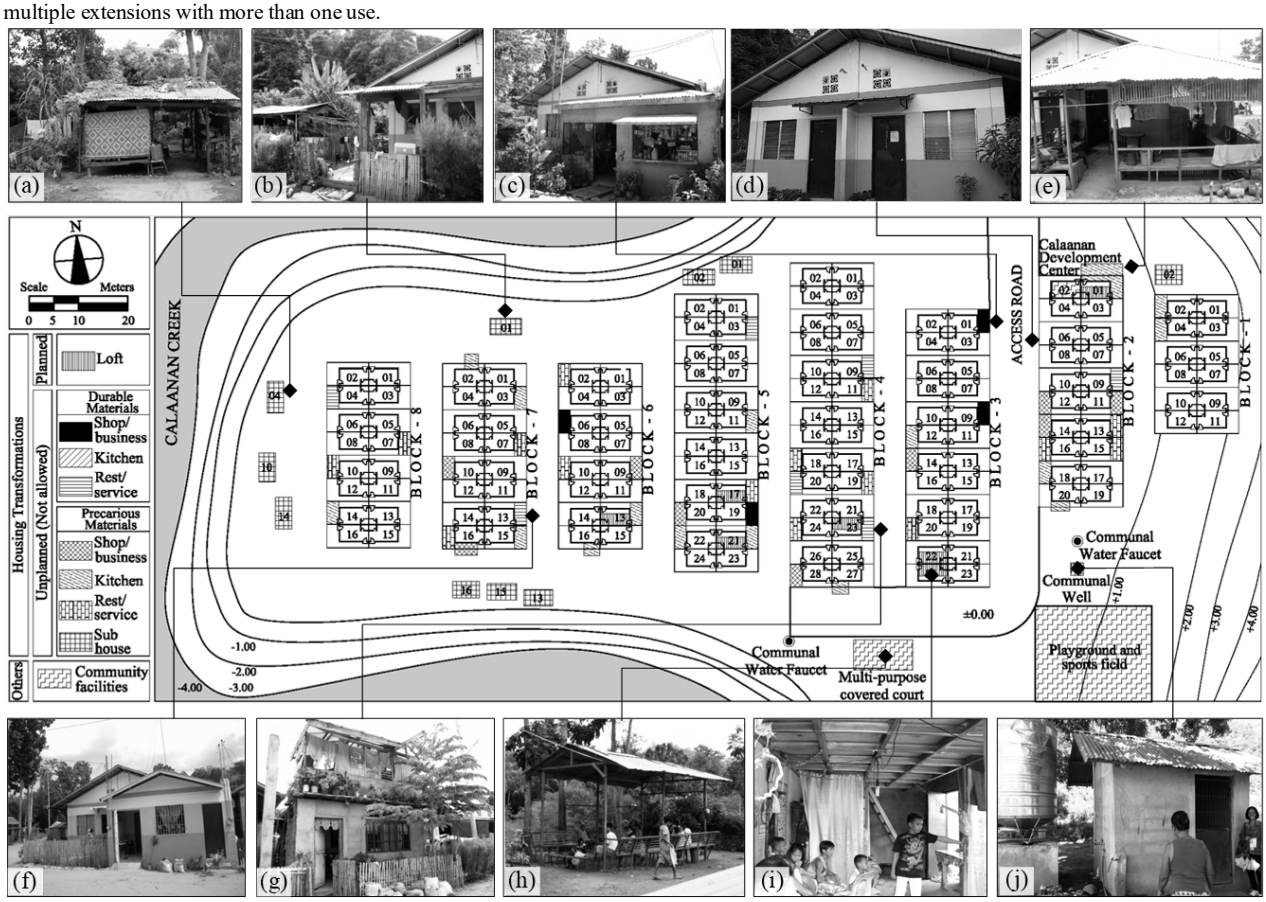


Fig. 4. Mahogany Village—Settlement Layout and Types of Housing Transformations.

4.2 Reasons for transformation

Khan (2013) stated that housing transformations are the result of internal and/or external factors, and can be driven by multiple reasons that may overlap or combine. In this study, such factors were adapted to the situation found in the site. Thus, internal factors were found to be the result of one or more needs of the residents, as well as social and cultural patterns. Additionally, in Mahogany, external factors were defined by the local conditions. The present analysis of internal and external factors driving housing transformations encompassed demographic, economic, and social and cultural issues, and local environment and climatic conditions (see Table 6).

Table 6. Reasons for Housing Transformation.

Factors	Determinants	Indicators	Motivation
Internal	Demographic issues	Density	Need for space
	Economic issues	Residents' occupations	Income source
	Social/cultural issues	Local lifestyle	Daily activities
External	Local environment/ climatic conditions	Climatic conditions	Adapting to local conditions

Note: Based on Khan (2013).

Housing modifications are thought to be the expression of residents' impetuses to satisfy certain needs and behaviors. In the study's survey, residents were asked about their motivations to construct modifications; the results are presented in Table 7.

Table 7. Residents' Motivations for Housing Modification.

Motivation	% (No)
Limited space/need for privacy	39% (16)
Uncomfortably hot inside	26.8% (11)
Limited space + hot inside	14.6% (6)
Need for income source	19.5% (8)
Total	100% (41)

Limited space within which to accommodate family members or perform various daily activities inside the home was the main motivation residents reported for transforming their houses. The second was a need to address the uncomfortable heat of the houses' interior spaces. Together, the houses' restricted, airless spaces and high temperatures were a significant combined reason for alterations, too. The need for an income source was another motivation present at the site, but was less pressing.

4.2.1. Demographic issues

Floor area per person is a key indicator of housing quality and measures the adequacy of living space in dwellings (UNCHS, 2001).

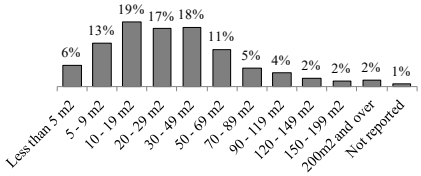


Fig. 5. Occupied Housing Units by Floor Area.

(Philippine Statistics Authority, 2010)

In the Philippines, there is a tendency toward high density and even more limited floor area per person than the average for the region. The housing data presented in Fig. 5 reveal that 38% of the families in the country live in houses measuring less than 20 m^2.

Therefore, the permanent housing units each comprising 21 m^2 built in Mahogany were considered to be a decent and appropriate solution, at least in the context of the Philippines more broadly. They were similar to dwellings built for social housing and post-disaster housing elsewhere in the country, and, despite limited space, may even have represented an improvement of housing quality for many of the marginal, low-income families. However, these houses were not exempted from modification.

Considering the pressures on larger families living in close quarters, the study's analysis should present a connection between family size and the incidence of transformations. However, as Table 8 shows, the major percentages of modifier households were medium-sized families, followed by small families.

Table 8. Family Size–Housing Modifications.

Persons (No.)	% (No.)	Modified % (No.)	Non-modified % (No.)
1 to 3	10% (6)	66.7% (4)	33.3% (2)
4 to 6	63% (37)	78.4% (29)	21.6% (8)
7 to 10	20% (12)	50% (6)	50% (6)
> 10	7% (4)	50% (2)	50% (2)

Likewise, the construction of sub-houses and lofts might be thought to be connected with a need to alleviate crowding in a house, building sleeping spaces and adding privacy for extended families (more than one family unit). Yet, the results reported in Table 9 show that, of seven lofts built, five were supported by an NGO and only two were built by residents. In addition, just one loft was built by an extended family, and three by larger-sized families. Most of the lofts built belong to medium-sized and nuclear families.

Table 9. Demographically Related Extensions.

Extension	No.	Family size				Type of family	
		1–3	4–6	7–10	10+	Nuclear	Extended
Lofts	7	14.3% (1*)	42.9% (2*+1†)	28.5% (1*+1†)	14.3% (1†)	85.7% (1*+5†)	14.3% (1*)
Sub-houses	6	—	83.3% (5*)	—	16.7% (1*)	100% (6*)	—

Notes: * = dweller-initiated transformation (funded and built); † = NGO-supported transformations (funds and construction).

Lofts were originally intended for use as dormitory spaces. However, due to the houses' uncomfortably high temperatures, residents typically used them for storage. Therefore, the construction of lofts is not necessarily related to a pressure to accommodate family members. On the other hand, only two out of five sub-houses were built by large families (with 11 and 12 members, respectively) and the other three were built by medium-sized families (four members).

However, the use of the sub-houses is flexible, and can combine sleeping areas, a kitchen, and storage.

The demographic indicators show a tendency for housing modifications in both small and large families. There appears to be no direct relationship between family size and the construction of extensions; moreover, the incidence of modifications is higher in small- and medium-sized families.

4.2.2. Economic issues

Beneficiaries' financial situations may point toward their likelihood to build extensions and the materials that might be used. Table 10 shows data analyzed according to daily family income. Unexpectedly in this context, the incidence of extensions built is higher in poorer families.

Table 10. Average Family Daily Income–Housing Modifications.

DFI	Transf.	Non-transf.	Materials of modifications.		
			Precarious	Durable	Both
0–100	100% (7)	0% (0)	85.7% (6*)	14.3% (1*)	—
101–200	62.5% (10)	37.5% (6)	70% (7*)	30% (2*+1†)	—
200+	66.7% (24)	33.3% (12)	75% (18*)	20.8% (1*+4†)	4.2% (1*)

Notes: DFI = daily family income in Philippine pesos; * = dweller-initiated transformation (funded and built); † = NGOs supported transformations (funds and construction).

Precarious transformations initiated by these households were predominant. The questionnaire survey results also revealed that the middle-income families tended to build durable extensions. In the higher-income group, most of the durable extensions (lofts) were built by an NGO.

Householders' occupations are another indicator that may influence housing transformations. Table 11 shows the study's findings in terms of the head of the family's current occupation and the extension type.

Table 11. Current Household Occupation–Transformations.

Occupation	% (No.)	Transf. % (No)	Non transf. % (No)
Laborer	32% (19)	57.9% (11)	42.1% (8)
Unemployed	5% (3)	100% (3)	0% (0)
Driver	15% (9)	55.6% (5)	44.4% (4)
Shopkeeper	10% (6)	100% (6)	0% (0)
Construction	17% (10)	70% (7)	30% (3)
Hawker	7% (4)	75% (3)	25% (1)
Other	14% (8)	45% (6)	25% (2)

Notes: * = dweller-initiated transformation (funded and built); † = NGO-supported transformations (funds and construction).

Non-skilled residents, such as laborers and hawkers, experience instability in their jobs, because of the distance to their places of work in the city and public markets. Nonetheless, they are willing to build extensions. Residents who built their house extensions for use as small grocery stores and other businesses felt significant pressure to obtain an income source.

Overall, this analysis of economic issues revealed that residents do not feel limited by work instability or lower incomes. A similar inference was made regarding the construction of durable extensions, which are built by higher- and lower-income families.

4.2.3. Social and cultural issues

Communities' social and cultural patterns may also play a role in residents' decisions to build extensions. In this study, the uses for such extensions help to define the reasons for their being built, as these daily activities often reflect a society's customs and habits. It was expected that residents' activities would be performed inside of their homes, as extensions were not allowed. Instead, the priority was to expand the living spaces outside of the housing units, regardless of the conditions of occupancy.

Table 12 demonstrates the sample residents' tendency to build service areas for cooking, storage, and resting spaces that are combined with laundry.

Table 12. Use of the Extensions.

Type of spaces	% (No.)
Bedroom areas	9.8% (4)
Combined bedroom and service areas	2.4% (1)
Service areas	53.6% (22)
Combined service areas–shops	9.8% (4)
Small shops/business	22% (9)
Combined bedroom–service areas–shops	2.4% (1)

This finding can be explained on account of the absence of service areas inside the houses, but also because of the traditional and popular kitchen types in poorer Filipino communities, which are typically located outdoors and use a "dirty kitchen" or stove in which firewood is used for fuel. There is also an economic advantage to this, because the wood can be obtained for free from the trees in the surrounding area. Other service spaces, such as laundry areas, are combined with resting spaces, which are used for childcare, socializing, and resting during the daytime.

4.2.4. Local environment and climatic conditions

Adaptation to the local conditions and environment is a common concern in the provision of post-disaster housing and resettlement (Jha A. et al., 2010; Oliver-Smith, 1991). In relation to the local climatic conditions, such as high temperatures and humidity, the use of conventional materials in the permanent houses and a lack of proper ventilation lead to uncomfortably hot internal spaces. As a result, the residents needed intermediate shaded spaces for daily activities such as socializing or resting, and, hence, built such spaces using local traditional materials. A similar situation was seen in the sub-houses, regarding sleeping and resting spaces.

Likewise, there was a change in the final use of lofts from planned sleeping spaces to storage, because these spaces were extremely hot, day and night. This, in turn, demonstrates a limited consideration of local conditions in the housing design and planning stage.

5. Conclusions

This study explored the patterns of housing

transformations and the reasons for their construction, which change in accordance with the beneficiaries' adaptation to this new environment through the process of inhabitation. This process generated a variety of self-built structures, which were limited by the available lot area. However, the needs and preferences of residents underpin the tendency for and motivation to extend their living space.

The construction of extensions is unavoidable, as it is result of the process of inhabitation and is essential for dwellers' adaptation. Therefore, such extensions should be taken into account at the planning stage and flexibility in the housing design should be increased accordingly. This would support the proactive attitude observed within residents' inclination to transform their houses regardless of their economic situation.

Consideration of local conditions—identifying patterns in beneficiaries' daily activities and family structure characteristics, livelihood opportunities, and an understanding of the local climate—is critical for the provision of suitable housing and the construction of locally sensitive solutions. The present study might be complemented by further analysis of housing transformations in the middle and long term in order to understand the impact on households of resettlement programs, which would also prove useful for the improvement of resettlement and social housing programs in the Philippines in the future.

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