

Vulnerable Resilient and Climate Justice Communities: A policy and satisfaction evaluation of post-disaster temporary housing

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ABSTRACT

Given the rise of natural disasters, post-disaster reconstruction plays an essential role in forming resilient communities. However, among the multiple post-disaster reconstruction processes, temporary housing had been ignored by most post-disaster reconstruction practitioners. The 2009 Typhoon Morakot post-disaster management process was no exception. Therefore, this study uses literature research, interviews, and a time-series questionnaire to understand the temporary housing policy, stakeholders' opinions associated with the post-disaster management process, and the temporary shelter and housing living satisfaction trends. Two typhoon-affected indigenous communities located in southern Taiwan were selected as case studies owing to similarities in their social structure and conditions. Findings from this research shows that past experience and collaborating NGO might be the principal factors that influence the decision making on temporary housing policy. Moreover, an ideal environment and location for temporary housing are essential for living satisfaction. Finally, this research suggests an ideal pre-established policy, community-centered considerations, and spatial design are crucial for the future of temporary shelter and housing programs.

Keywords: *Temporary housing, Temporary shelter, Post-disaster reconstruction, Typhoon Morakot, Indigenous population*

INTRODUCTION

Under climate change and excessive human development, the frequency and magnitude of the natural disaster have intensified (Petz, 2013). Taiwan is no exception. In 1999, the Ji-ji earthquake struck the central part of Taiwan and brought 2,489 casualties and 490 million USD loss (Li et al., 2010). A decade later, Typhoon Morakot struck Taiwan on August 8, 2009, a disaster recorded as the strongest and deadliest typhoon in the country's history. The disaster left 677 dead and 22 missing where 1,766 households were damaged. The most affected area was Southern Taiwan, where 73% of the population were indigenous people. They were mostly affected by the associated heavy rains brought about by the typhoon. (Chen, 2009). Compare to the Ji-ji earthquake, more indigenous populations

suffered from severe physical and social impact, due to their high vulnerability even in the pre-disaster situation.

Because of the increasing incidents of natural disasters, the post-disaster reconstruction (PDR) had been treated with immense importance by most countries. By analyzing the past PDR projects, Quarantelli (1982) stated that the PDR process includes four stages, namely emergency shelter, temporary shelter, temporary housing, and permanent housing. The ideal post-disaster recovery scenario should be implemented in these four stages to secure the living right of those who lose their housing. However, even though the government and NGOs may have pre-established recovery and rehabilitation plans, their temporary housing policy seems to lack strategic planning (Johnson et al., 2006). Due to shortage of funds and human resources, the practitioner might even give up constructing temporary housing and jump straight away to the permanent housing stage. However, the skipping of temporary housing might contradict with the resident's willingness, as the comfortable living environment is crucial for the recovery and mental health (Johnson, 2007). Therefore, it is fair to say that the temporary shelter and housing stage constitutes one of the chief problem areas in the PDR process. Recently, the United Nations announced that "Sustainable cities and communities" had been incorporated into one of the Sustainable Development Goals (UN General assembly, 2015). Therefore, it is worth improving the PDR process, especially the temporary shelter and housing stage.

To focus on the post-disaster temporary dwelling issues, the aims of this research contains three elements: (1) Analysis the history of temporary post-disaster dwelling development in Taiwan, as well as the decision-making procedure of temporary dwelling during Typhoon Morakot post-disaster project. (2) Examine the satisfaction divergence between different post-disaster communities, which provided a different type of temporary dwelling. By focusing on these two elements, the decisive influencing external factor (policy) and internal factor (residents' living satisfaction) can be clarified via this study. Ultimately, this research is also trying to (3) Addresses critical post-disaster temporary dwelling related suggestions.

THEORY

According to Johnson (2007), after the earthquake in the eastern region of central Colombia in 1999, due to severe lack of funds and time, the government failed to provide temporary housing countermeasures at the first stage. The decision resulted in a proliferation of spontaneous illegal settlements which were built as temporary housing by self-help groups. Therefore, a policy was later announced to resolve the illegal settlement issue by providing newly built temporary housing to the disaster victims. On the contrary, to solve the displacement problem of the victims of the Great Hanshin Earthquake in Kobe, 1995, the government implemented the "Disaster Relief Law" to provide 48,300 temporary housing units to house 100,000 people. The government's prompt decision prevented further chaos and control the unrest after the disaster swiftly (Comerio, 1998). Therefore, it is evident that government attitude and decision-making are deeply interrelated to the disaster victims' living conditions.

Apart from the external factor, living satisfaction and the environmental psychology perspective also contribute to the precise understanding of the temporary dwelling issues. For instance, the temporary housing built by the Japanese government after Hanshin great earthquake had been criticized by the residents that the location was built far from the city center, which hampered the reformulation of the pre-existed community relationship and living satisfaction (Comerio, 1998). Moreover, the limited space and without carefully planned configuration of the settlement consequence in the depression and suicides among the victims who fell into loneliness due to the feeling of isolation (Maki et al.,

1995). Therefore, the designer learned the feedback, during the East Japan earthquake in 2011, the daycare center and essential facilities had been considered during the temporary housing planning stage. The new planning concept thrived on allowing more social engagement for the residents. Moreover, the configuration allowed enough sunlight and living space to improve the victims' psychological condition, especially the elderly (Abe et al., 2011).

According to the previous literature mentioned above, it is fair to say that the policy decision-making of the temporary housing (external factor) and residents' evaluation of the temporary housing living condition (Internal factor) can profoundly contribute to a more vulnerable resilience community after the disaster. Therefore, the conceptual framework can be drawn in Figure 1.

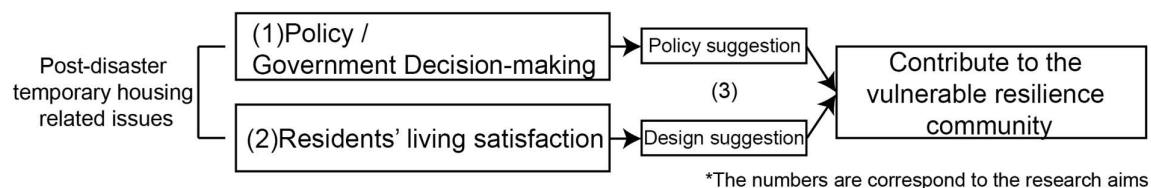


Figure 1. The conceptual research framework

METHOD

Two indigenous communities in the southern part of Taiwan were selected for the case studies; (1) Hao-Cha community and (2) Jia-Lan community. Both study sites were selected based on the extent of the damage by the Typhoon Morakot, which made government designated both pre-disaster settlement as "Danger Zone" and the communities were subjected to be relocated. The temporary housing policy applied to the sites, however, were different. Given the special kinship, the two communities shared similar socio-economic circumstances. The different temporary housing policies as well as the living environment with a relatively similar socio-economic background makes the comparison viable to differentiate the temporary housing related issues in each community.

Data collection

This study uses both the qualitative approach and the quantitative approach, which include (1) The literature research to understand the history of temporary housing policy before the Typhoon Morakot (2) Key informant interviews were conducted from 2017 to 2019, to government officers and the NGO representatives involved in the temporary housing project to understand the process of the policy making (semi-structured interviews). Additionally, residents' interviews were conducted to seek their opinion on various temporary dwelling environments (Table 1). The interviewees were based on their experiences and the roles they played in the communities after the disaster. Thus, the interviewee's opinion was diverse and fair to be contained more objectively. (3) A time-series questionnaire based on the living satisfaction of the residents (1) one month after the disaster, (2) the first (2010) and (3) the second year (2011) after the disaster was used to understand the change of their satisfaction rate in different types of temporary dwelling (Hao-Cha=56 sample, Jia-Lan=46 sample). The data was collected by the co-author's research center, National Science and Technology Center for Disaster Reduction, and analyzed by the author.

Category	Quantities	Profile
Government officer	1	The county government officials in charge of the temporary housing policy
NGO representative	3	The executive position managers who in charge of the temporary housing construction and negotiation with the government
Resident in Hao-Cha	11	three community leaders, two religious' leaders, one village representative, and five villagers with different social-economic background
Resident in Jia-Lan	9	One community leader, one formal community leader, one community organization leader, and six villagers with different social-economic background

Table 1: Interviewees' quantities and profile by category

RESULTS AND DISCUSSION

The history of the temporary housing policy in Taiwan

On September 21, 1999, an earthquake of a magnitude of 7.3 struck the central part of Taiwan, destroying 38,935 housings (Lai, 2019). The government adopted a temporary housing policy after most of the victims spent three weeks in makeshift shelters in tents, gyms, schools, and parks due to the extent of the typhoon damage. This was the first time for the government to operate a large-scale post-disaster relocation project, the project was based on cost sharing. The government offered several categories of assistance; (1) 30% discount on rental cost for government-owned social housing units. (2) Housing subsidies for renting apartments in the private market and (3) Constructed new temporary housing structures. The disaster victims chose according to their preferences according to the three categories (Peng, 2019).

The project was implemented with collaborations from NGOs, and 5,854 units of temporary housing were constructed. These houses were layout in a linear configuration according to the shape of the piece of land provided. However, the layout was criticized for providing limited living space to residents. Hsu and Lin (2004) also stated that the housing layout varied according to the involved NGOs' design strategy and budget, which led to complaints of unfairness. Additionally, the temporary housing sites were located in remote regions far from the victims' original settlements and were scattered across multiple temporary settlements due to the government's hasty implementation (Peng, 2019).

The implementation of the PDR projects after Typhoon Morakot was different in that the government took the lessons learnt from the 1999 earthquake into consideration where the government decided to have more discussions with the collaborating NGOs. Given that big international NOGs had been conducting several PDR projects overseas before and collected tremendous amounts of donation from the public (Hsieh, 2012), the NGOs play a decisive role in the decision-making process. An NGO official stated the following statement in a policy discussion meeting

"We think that the temporary house is ideal, but this time we expect to prioritize the permanent house construction, because we have a huge construction team that can guarantee quick construction. Therefore, our ultimate goal is that the victims can move to permanent houses as soon as possible" (Feng, 2009).

After the discussion, the government more clearly ratified the regulation that prioritized the permanent houses' construction. Meanwhile, the government also kept the new temporary housing option open upon the request from the communities. Therefore, instead of constructing large-scale

temporary housing units, the permanent housing policy had been prioritized in the Typhoon Morakot PDR project. The meeting's results encouraged the local government to utilize the pre-existed public facilities (such as the military base and the school building) as temporary shelters to avoid unnecessary costs and time in temporary housing reconstruction.

The result clearly shows that during the discussion of temporary housing policy, the previous PDR experience, the limitation of government resource and time, and the opinion of the cooperated NGOs were some of the critical factors that determined the PDR temporary housing policy. The results indicate that the decision-making process was ad-hoc, lacking careful strategic planning.

The living satisfaction of residents with temporary housing

As mentioned before, the Hao-Cha community and Jia-Lan community are chosen for case studies given that Hao-Cha residents lived only in temporary shelters (refer to pre-existed public facilities in this research). In contrast, Jia-Lan residents experienced a stay at the temporary shelter as well as at temporary housing units (refer to newly built temporary dwelling in this research).

The Hao-Cha tribe belongs to the indigenous ethnic group of "Rukai." Their pre-disaster settlement was in the Wutai Township, Pingtung County. On August 8, 2009, Typhoon Morakot caused rainstorms and a landslide in the New Hao-Cha settlement. Eventually, the whole New Hao-Cha settlement was buried under the earth. Therefore, the government immediately demarcated the residential area for victims. Because of the government's relocation policy, the Hao-Cha people were asked to evacuate to the Ai-Liao military camp as the temporary shelter. The Ai-Liao was an abandoned military camp and served as their temporary shelter before the residents moved to the Rinari settlement on December 25, 2010, which was the permanent housing settlement for the Hao-Cha people (Figure 2). Since the whole residential area was destroyed in the disaster, the Ai-Liao military camp was chosen to ensure the residents' safety.

The Jia-Lan community belongs to the "Paiwan" and "Rukai" ethnic groups. Their pre-disaster settlement was in the Jinfong Township, Taitung County. Typhoon Morakot caused floods in the Taimali River in the southern part of the settlement, as a result of which 91 houses were washed away to the riverbeds. The residents quickly formed a community organization and set up tents in the local basketball court; they were later shifted to the government-owned temporary shelters (Malan Veterans Home). However, given the strong leadership and the well-functioning community organization, the community tirelessly negotiated with the Taitung country government to access the newly built temporary houses. The community's stand was that the residents needed to be together and live closer to the original settlement. Consequently, in the middle of December 2009, 50 temporary houses were completed (named as Jie-Da settlement), accommodating the affected Jia-Lan households. The temporary housing settlement was a five minutes' walk from the original settlement (Figure 2). Therefore, despite the short-term separation, the whole community got together after Jie-Da settlement was constructed. Since most of the original community facilities were not damaged, the residents could utilize those facilities during the stay in the newly built temporary housing unit.



Figure 2: The post-disaster moving trajectory of Hao-Cha and Jia-Lan community
(The relocation order is numbered in the map)

To understand the change in the living satisfaction of the two communities. The questionnaire survey was conducted which consists of five different perspectives: 1. Cooking, 2. Bathing, 3. Sleeping, 4. Privacy, and 5. Space Size. The satisfaction rate was measured through four parameters: 1 (very unsatisfied), 2 (unsatisfied), 3 (satisfied), and 4 (very satisfied). The survey was conducted a month after the disaster (September 2009), a year after the disaster (August 2010), and two years after the disaster (August 2011).

As shown in Figure 3, the post-disaster housing stages of the Hao-Cha and Jia-Lan communities are summarized along with the timings of the survey conducted phases.



Figure 3: The post-disaster housing process with timeline

Survey	One month after disaster (1st Survey)		One year after disaster (2nd Survey)		Two year after disaster (3rd Survey)	
Group	Hao-Cha (N=56)	Jia-Lan (N=46)	Hao-Cha (N=56)	Jia-Lan (N=46)	Hao-Cha (N=56)	Jia-Lan (N=46)
Cooking	2.32	2.41	2.41	2.96	3.09	2.96
t		-0.5		-3.34**		1.65
Bathing	2.3	2.48	2.34	2.91	3.09	2.87
t		-0.95		-3.3**		2.27*
Sleep	2.09	2.17	2.13	2.89	3	2.93
t		-0.65		-8.9**		0.69
Privacy	2.11	2.02	2.13	2.89	2.98	2.89
t		0.63		-7.41**		0.87
Space Size	2.09	2.02	2.13	2.89	2.98	2.91
t		0.5		-7.2**		0.67
Average	2.18	2.22	2.23	2.91	3.03	2.91

*p≤.05;** p≤.01

Table2: The Survey result

To understand the divergence of the residents' satisfaction in each survey period, the Independent Sample t-Test is applied to analyze the survey result. The result is shown in Table 2. According to the survey result, one month after the disaster, when Hao-Cha residents lived in the Ali-Liao Military Camp while Jia-Lan residents lived in the Malan Veterans Home, the average satisfaction rate of the two communities did not indicate significant differences in the above-mentioned five perspectives. Moreover, the average satisfaction rate in both communities was relatively low.

Regarding the survey result conducted one year after the disaster when Hao-Cha residents were still housed in the temporary shelter, Jia-Lan residents moved to the newly built temporary houses. The difference in the satisfaction rate between the two communities was significantly high in all five perspectives. As per the average satisfaction rate, Jia-Lan residents' satisfaction improved to 2.91, while the Hao-Cha residents' satisfaction remained low at 2.23. This result clearly indicates that the newly built temporary housing units were beneficial for the disaster victims.

Two years after the disaster, Hao-Cha residents moved to the Rinari settlement, which was their permanent housing settlement, while Jia-Lan residents still resided in the temporary housing units. Typically, the living satisfaction of permanent housing is supposed to exceed the one in temporary housing. However, according to the result, apart from the bathing satisfaction rate, which showed a significant difference ($t=2.27^*$), the remaining four perspectives did not show any change. Given that the Hao-Cha resident's evaluation of the permanent housing shows merely different from the Jia-Lan resident's evaluation to the temporary housing, the "permanent" and "temporary" label is not the critical factor influence the satisfaction. However, the true factors need further investigation.

Regarding the key-informant-interview results, the Hao-Cha residents stated that the abandoned military base did not have hot water, something which made bathing and cooking inconvenient. Because of the unsuitable spatial layout, residents did not have a private room or partitions to allowing them a semblance of privacy. The bed was double-layered and designed to accommodate the maximum number of people (Figure 4). Therefore, all residents complained that their privacy and sleep quality was affected. The other reason was the settlement location. The military temporary shelter site was remote and far from the original settlement, it makes difficult for the residents to adjust to the

new lifestyle. These two reasons explain the low satisfaction rates during their stay in the Ali-Liao military camp.

On the other hand, due to the active negotiation with the government, Jia-Lan residents successfully acquired access to the newly built temporary housing units (Figure 5). During the interview, most of the Jia-Lan interviewees stated that they were satisfied with the living conditions in Jie-Da settlement. Each household was able to acquire one temporary housing unit. Therefore, the problem of household separation and privacy was avoided. Moreover, the temporary housing settlement was very close to the original dwellings. The residents stressed that they remained connected with their community even after the disaster. The community's unification helped residents consider a future in the relatively stable and satisfying temporary housing environment.



Figure 4: Inferior living environment in Ai-Liao military camp (Taiban, 2016)



Figure 5: Newly built temporary housing unit for Jia-Lan community (Yang, 2012)

CONCLUSION

In conclusion, the post-disaster temporary housing policy, the decision-making had been greatly influenced by the previous experience and the cooperative stakeholder, especially the big international NGOs. As for the temporary living satisfaction of two communities, the quantitative data shows that the newly built temporary housing was superior to the pre-existed temporary shelter given the former had been evaluated much higher. Furthermore, the qualitative data shows that living convenience, privacy, and location selection might be critical to the divergence of satisfaction.

This research suggests that the temporary housing policy decision-making process should consider the disaster victims' interests. A pre-established policy can prevent the ad-hoc policymaking consequence. The temporary dwelling planning should take account of the proximity between the original settlement and secure sufficient privacy and community facilities in the settlement. In COVID-19 scenario, same as this emergency response case, it is important to have well planned policy implementation, and at the same time, participation of community to improve the living environment safety and comfortability is essential.

Despite some critical limitations of this research, such as the limited interviewees and the unclear satisfaction-related factors highlighted in second year of the time-series survey. It clearly addresses some important implications regarding the post-disaster temporary housing issues. The research should consecutively focus on the cross-community comparison and research the core satisfaction determined factors to contain a more comprehensive result.

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