Sense of dwelling in disaster relocation: temporary and public recovery housings after the 2011 earthquake in Japan

Izumi Kuroishi, Ph.D.*

*Professor of the School of Cultural and Creative Studies, Aoyama Gakuin University

This study examines people's displacement in Kesennuma and Rikuzentakata cities in Japan during the last 6 years from the earthquake in 2011 in order to inquire the factors of the sense of dwelling in disaster relocation. By examining how the relocations of houses impact on people's identity, what kind of social issues arose in the process, and how designing houses integrated with their community planning is essential to create a sense of belongings, it aims to explain how the idea of disaster relocation and social housing system should be reframed to adjust to the contemporary social issues. By comparing cases, I will explain how people keep striving to maintain their normal lifestyle, and how it is essential to create smooth integration between private and public space, and to help their own subjective engagement in the reconstruction of community in each stage of their relocations. In the era of displacement due to disasters, we need to reconsider the idea of house as the locus for people's identity and to reframe the idea of social housing and urban planning comprehensively and in process-oriented manner.

Key words: East Japan Great Earthquake, relocation, temporary housing, public recovery housing, lifestyle, sense of dwelling

Introduction

Seven years after the East Japan Great Earthquake, more than 13,500 people in the damaged areas are still living in temporary housing(kasetsu). After the disaster, the Japanese government proposed the initial funding to build thirty thousand temporary housing in two months, decided a basic strategy for refugees' relocation from a shelter(hinanjo) to a temporary housing, to a public recovery housing(fukkou kouei juutaku) or to a collective town development (shudan iten takuchi), which method were to be designed by each local municipalities. Meanwhile, not only for the scale of the damage but also for the long relocation process, many refugees could not recover their sense of dwelling, which a German philosopher Martin Heidegger suggested as the foundation of man's sense of being. From a larger and social perspective, disaster refugees have been continuously relocated throughout global history. Overall, relocation requires a large restructuring of the urban space, and generates social separation between peoples by disrupting their communal bond.

Even though the knowledges and methods gained through the Hanshin Great Earthquake contributed significantly to the 2011 disaster recovery planning in designing the process of the relocation of refugees with social systems to support their community formation, as the local cultural condition was so different in the northern part of Japan that the habitual issues of housing; socio-cultural and psychological issues and the interrelationship between the special condition and social systems, were hardly examined academically. The relocation and reconstruction of houses after 2011 was a critical turning point, indicating that dwelling and urban planning should be examined with a more social viewpoint.

Therefore, this study aims to examine the internal psychological problems faced by people relocated after the disaster and the impact of these changes on surrounding areas. To this end, we interviewed refugees and their local supporting groups. By referring to the people's voices, this study assesses the issues in architectural and urban planning and management that must be examined for reconstructing the refugees' everyday private sphere, their relationships with surrounding neighboring society, and other social systems that sustain their sense of dwelling.[1]

Post-disaster reconstruction

The high disaster magnitude of the Easten Japan Great Earthquake necessitated a rapid, large scale migration from the evacuation site of the residents to the temporary housing. In Kesennuma City, at least 26,124 houses and 9,500 households were affected by the disaster. Temporary housing provided 3,504 units for 8,288 people, and 4,737 people were allocated to provisional temporary construction for renting private rental housing. In 2015, the number of temporarily housed residents decreased to 7,137, and the collective town plannning developed 895 blocks (98%) at 45 sites at the end of 2015. Disaster public housing supplies provided 1,986 houses (92.8%) in 27 districts, completed at the end of 2015. In Rikuzentakado City, Iwate prefecture, the disaster affected 3,368 houses (99.5% of all households), and 2,148 houses were supplied to 51 temporary housing sites. Five hundred and sixty severn units were voluntarily rebuilt from the summer of 2011. Building disaster public construction of 989 houses, and collective town development of 562 houses were completed by March of 2014. Although the temporary housing aggregate started from 2016, 3913 resodemts are still accomodated in them.[2]

The governmental and local institutional support systems for this large-scale migration needed continuous readjustment to the changing recovery process. Even though they have recognized the necessity to maintain the existing community in relocating refugees from evacuation shelter to temporary housing, in the places with huge damage, it was necesarrily to priotize the protection of the weak people apart from their original location. In the relocation from temporary housing to public recovery housing, there were difficulties to explain the people about the future lifestyle. Most obvious problem was the difference of the way of housing in these regions from that of urban areas, in which the Japanese housing bureau has established its public housing system. Before the disaster, 87% of residents lived in detached houses, and only a minority resided in mass housing. After the disaster, 62% of the displaced residents wanted to rebuild detached houses, but 34% were prevented from realizing their wishes by economic difficulties. The residents claimed a lack of support for them. Also, in the area lacking the flat undamaged land, most of the public recovery housing have to be built in mass collective style, and on the other hand, the maintainance of the social support for the housings located in remote areas became problematic.

Review of existing studies and research methods

Many architectural planning and technology studies have analyzed the number of needed construction, function and structural durability of temporary housing, and urban planning studies have examined the community space problems in temporary housing villages. However, owing to refugees' traumatic experience of a disaster, it has been extremely difficult to examine their memories of their lost houses and lifestyles, and their psychological experiences during the relocation process. Thus, most of the disaster relocation studies have conducted historical examination of past tsunamis and larger-scale urban policies and planning. Instead, scholars of regional sociology and welfare studies conducted interviews and on-site research actively. The architectural study of temporary housing livability has been difficult for the same reason. Until the report by Reiou Kimura, the author of the present study found no urban planning and regional studies investigating how the relocation of housing influences the existing community and urban structure. Kimura conducted interviews of refugees in the prefectures of Iwate, Miyagi and Fukushima to find most of them relocated more than three times, and felt negative impact on their psychological, health and economic condition, relationship with neighbors, and family's unification.[3]

Even in the above research, spatial issues, such as the residents' habit and behavioral experiences of their interiors and landscapes, are rarely addressed. However, historical studies by Kon Wajiro and Nishiyama Uzo investigated the lifestyles and behaviors in transforming housing conditions between the 1910s and 1950s, including the period of Kanto Great Earthquake and World War II, using detailed surveys and qualitative plan analysis. The former was based on ethnography and interviews, and the latter adapted statistical typological analysis aiming for a more scientific result. At the risk of comproising scientific relevance, this study takes the former approach. Specifically, it analyzes the sense of dwelling from a small number of interviews. The sense of dwelling comprises the

psychological aspects of the making, memory, and belonging, which is formulated between the sense of privacy and community.

Given the progressive nature of the relocation problem in the afflicted areas, an objective theoretical analysis on the personal and social group situation remains impossible. Therefore, this thesis is limited to the analysis and consideration of research materials. The research mainly reconsiders the implications of disaster relocation and regional transformation through interviews and surveys conducted at four temporary house villages: three in Kesennuma City and one in Sumita Town. The Kesennuma City villages include the Komaba Koen area, with 62 temporary houses built in the city, Senmaya area, with 228 temporary houses built outside the city, and the Niitsuki area with 22 temporary houses built inside the city. The three Simita Town sites contain different numbers of wooden detached houses (13, 17 and 63). We also conducted surveys and interviews at two public recovery housing sites, one in Kesennuma, the other in Rikuzentakata.(Fig.1)

     Sumita Town

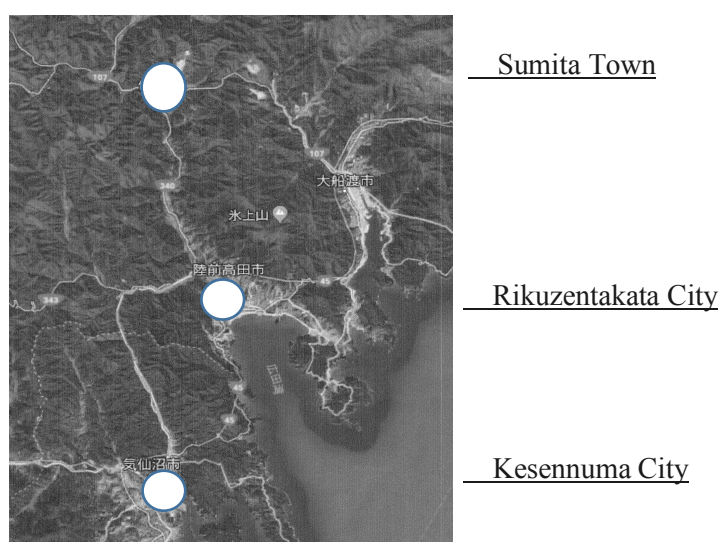   Rikuzentakata City

     Kesennuma City

Fig.1. Locations of the interviewed area based on Google map

When interviewing the residents of temporary housing and recovery public housings, we also interviewed the social workers and the collaborators with whom we have previously conducted workshops in disaster areas. To examine their private histories and psychological issues, we informed the targeted residents of our project's objectives, namely, to reexamine the relocation system and the designs of temporary and public housings. For each one- hour hearing, we prepared qustions that probed the characteristics of the lost houses, family structures, previous and current jobs, the neighborhood relationships of each resident, the relocation process from emergency shelter to current house, the period spent in each stage, the planning of the lost house, temporary housing and recovery public housing, and the good and problematic points of each house. We also queried the residents' reasons for chosing their current house, the most important element of their current house, their communication processes with neighbors in their current house, and how they conceptualize their future houses. The eligible subjects were 10 people in Sumita villages and 15 people in Kesennuma city. Among these, we interviewed 9 people living in two public recovery public housings, and 18 people living in temporary housing. (Table 1)

Temporary housing	Recovery public housing	

Kesennuma Komaba temporary housing v	8	Kesennuma Nango Recovery public mass housing	6
Kesennuma Niitsuki temporary housing	1	Rikuzentakata recovery public housing	3
Kesennuma Senmaya temporary housing	1		
Sumita temporary housing villages	8		
Total	18		9

Table 1. List of the housing locations and the number of interviewees

Interview Examination: Five issues regarding relocation and changes of lifestyle

In order to analyze the changes of living condition through relocation after the tsunami, it is necessarily to examine the three cases separately: from evacuation shelter to temporary housing, temporary housing to public recovery housing, and to self reconstructed housing. For this study aims to examine the basic psychological aspects of housing design, it focuses to the former two cases. There are also two types of public recovery housing: mass and detached, but at the stage of this research, detached housing were not completed in both cities. Thus, this study only examines the mass public recovery housing.

Through the interviews, we identified five processes and problems in the post-disaster relocation patterns of the residents. First, many of the residents experienced problems with their relatives. They initially moved from the evacuation shelter to their relatives' homes, but this situation proved burdensome for both sides in the long term.

The second problem was progressive household separation of the family, imposed by the limited size of the temporary housing and public recovery housing and the location of schools and workplaces. In the damaged area, the household and family system have traditionally consisted of multiple generations. The changes affected these traditional lifestyles.

Third, the limited housing functionality of temporary housing and public recovery housing affected the settlement of residents who operated fishing and in-house commercial businesses before the disaster. Such residents lost their economic independence and communication potentials.

Fourth, owing to the continuity of the communities in evacuation shelter and temporary housing complexes, residents tended to settle easily with many acquaintances and relatives, and often created new communities. In addition, as Sumita town employed an organization that encourages connection among the residents of temporary housing and their existing neighborhood through daily activities. Therefore, the good relationships among the temporary housing residents are easily extendible to the surrounding neighborhood.

Fifth, residents occupying temporary housing in peripheral location are affected by transportation problems. For example, in the former Senmaya temporary housing complex was located away from the town center. Consequently, people without a car reported difficulties in getting to work, hospitals and shops, and needed public support. On the contrary, residents occupying Komaba Koen temporary housing located near the center of the city, were able to build positive relationships with the neighborhood from the beginning.

These five relocation issues can result from three themes; the livability of the spatial character and function of the house, community formations, and relationship with the neighborhood environment. Thus, in the following section, it examines how these thiree themes relate to the sense of dwelling in temporary housing and public recovery housing, with their residents' voices.
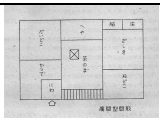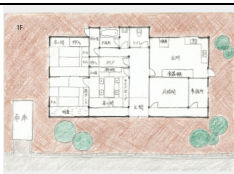
Relocation to temporary housing: its livability and architectural design [4]

The architectural character and site planning of the temporary housing affected the residents' psychology and lifestyles.[5] Prefectures constructed temporary housing in accordance with the Disaster Relief Act issued in 1947, sourcing their expenses from the national treasury. Conventionally, members of the standard building group of the Prefabricated Building Association sign an agreement with the prefectures. Because of the enoumous number of needed houses after the 2011 disaster, the Ministry of Land, Infrastructure and Transport requested temporary housing from other members of the Prefabricated Building Association, the affiliated association of the Japan Federation of Home Production Organizations, and the Japan Wooden Housing Industry Association. In the Iwate, Miyagi and Fukushima prefectures, scholars and architects experimentally selected local companies to utilize the local resources and create jobs for displaced residents. However, the Prefabricated Building Association's standard building group provided approximately five times more supplies than the other groups, excerting an overwhelming influence on the residents' conditions.[6]

Primarily, temporary housing is constructed on the vacant sites, such as public and state-owned land, and land on which agreement is concluded. Temporary housing mainly aims for the rapid construction of large quantities, so after consultation with each local government, the standard and basic quality specifications satisfying the size, basic budget, and mechanical performance are determined within a short time. The problems depend on the location, local environment and management systems of the temporary housing, and on residents' adaptation to the local lifestyle. All of our interviewees reported problems with storage, bathing, dew condensation around the windows, and mold. Related problems included lack of underfloor ventilation, moisture at the base portion, and gaps around the entrance. Moreover, during summer, heat dissipated from the roof remained in the room. These inadequacies, imposed by insufficient insulation performance, become a heavy burden for refugees who cannot maintain the expense of air conditioners. The condition of temporary housing is also negatively affected by noises. Temporary housing is usually designed in a long terrace-house style, which lacks bulkhead thickness. Consequently, neighboring house noise is transmitted by the steel structural materials.

Most of the refugees had previously live in detached wooden house, so were psychologically distressed by the impairment of their pre-disaster comfort and privacy. Space limitation preclude the maintainance of traditional lifestyle in temporary housing. In the prefabricated temporary housing, the living-room space serves multiple functions, operating as a dining room, a bedroom, and a Butsuma (alter room) with a size of 6 tatami mats. Visiting family cannot stay, and communication with neighbors is prevented by the insufficient entrance space.

These problems of housing performance are directly connected to the residents' habit of living. In the research titled *Housing Revitalizatin Research in the farming, mountain and fishing areas of Northern part of Japan*, researchers presented two prototypes of house plan: hall and corridor types.[7] In our current research about the residents' lost houses, these historical types are still remaining in more than half cases, and others are their variations. (Fig.2) Their entrances and kitchens are big enough to have visitors and semi-public activities connecting the resident with local community. The minimum size of temporary housing cannot afford such lifestyle and social relationship.

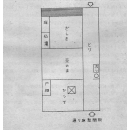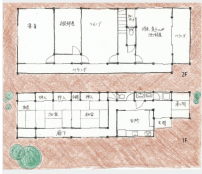|	Historical local house plans	Refugees' Pre-disaster house plans	Researched Temporary housing	Public recovery mass housing
Hall type				
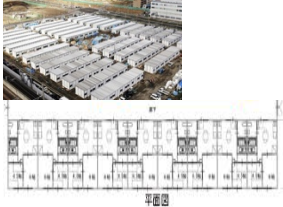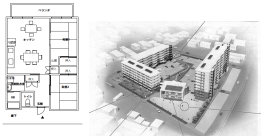
Corridor type				
Combined type				
Urban collective house type				
Long-terrace prefabricated type				
Detached wooden house type				
Collective RC mass housing type				

Fig.2 Typologies of historical local houses, refugees' lost houses and recovery temporary housings based on the interviews with refugees and the

The role of self-construction in "owning" a temporary house

As temporary housing is constructed and operated as a short term rentals, it is unavailable for later renovations. Thus, the space is not easily fitted to individual needs. Particularly in prefabricated mass housing, as the damages cased by nailing are hardly fixed, residents cannot even put a calender on the wall. Our interviews and researches clarified that if residents could alter the space, they would gain a stronger sense of ownership.

In the temporary housing of Sumita, increasing numbers of residents self-constructed the above-mentioned ceiling back-storage, and one resident ingeniously constructed small storage and shelves (Fig. 3). This resident expressed much attachment to his temporary home and a reluctance to leave it. Alterations have extended from interior spaces to the exterior; for instance, entrances have been decorated with flower arrangements, and intermediate areas have been connected with neighboring houses. In the Sumita housing, all units possess a flexible dividing wall, and the layout is freely adaptable to multiple functions, while the entrance and kitchen are relatively large. As the housing plans in this area were traditionally flexible, with tatami mats and sliding shoji, the Sumita temporary

housing appears more suited to the residents' lifestyle than the fixed plane configuration, which allocates an area per number of people.

Fig.3

Spaces and methods for formalizing a sense of community

In the parallel arrangement of mass produced prefabricated temporary housing, the meeting place is often set near the site entrance, and each row of terraced houses faces the back side of another row of terraced houses. This arrangement leaves no space for residents' interactions and communications. To the contrary, in the temporary housing village of Sumita Town, most of the intermediate space between the detached houses is used for purposes such as laundry, tool storage, and planting shelves. Moreover, the large entrance space of each house has facilitated the connection between the inside and outside spaces, like the historical house types, helping residents to communicate with their neighbors. Within the community, such usage of the intermediate space and entrance area has created a warm atmosphere that is shared by everyone. The houses are angled to match the irregular shape of the site, and a small shared space occasionally appears between the buildings. Moreover, as vacant houses in Sumita Town can be utilized as communal meeting places, they provide spaces for daily casual communications. These cases show that the creation of a community space largely depends on the design of entrances, arrangement and management of housing blocks.

Temporary housings are often located on isolated sites, with limited access to social services and mobility through public transportation. In large-scale temporary housing villages such as the Senmaya high-school temporary housing, residents are supported by Kesennuma City, and self-govern their association activities and watching. However, community activities in the temporary housing village are inaccessible to many households, such as single households, and are not usually joined by residents in the surrounding area.

Relocation from temporary to public recovery housing

The impact of relocating from temporary housing to public recovery housings also consists of issues of architectural design, owning relationship and community formation. The housings investigated in the present study contain more than three floors of reinforced concrete. They were built in a single-

corridor arrangement consistent with the prototype public housing in postwar Japan, prioritizing the sunshine direction and ensuring efficient circulation. Thus the problems faced by refugees when relocating from the temporary to public housing excluded the environmental issues of humidity and insulation. Most of the residents had never resided in mass housing, but were satisfied with aspects of the physical environment, such as the sound and heat insulation. However, the high privacy imposed by concrete walls and steel entrance doors tends to isolate the tenants, and residents reported numerous concerns with their neighbors and anxiety about the community. In contrast, there were few complaints on the structure of the temporary housing. Some rooms are divided by concrete walls, others are connected by sliding shoji. This spatial structure is more easily adapted by residents than prefabricated temporary housing.

However, most of the elderly residents expressed their problems in adjusting to the modern lifestyle expected in the public recovery mass housing. They dine on carpets around low tables rather than on chairs around desks. The modern style of eating and sitting in the combined kitchen and dining space is incompatible with the traditional lifestyle. Also, residents on the higher floors perceive the distance from the ground as a separation from society, because their original ground-level houses were closely connected to the surrounding natural and social environment. Even though the official management regulation prohibited self-construction in those houses, residents invented simple renovation methods to domesticate the space. One couple who moved from temporary housing to recovery public housing in Kesennuma reported an inability to settle in their temporary house, but after moving to the public recovery housing and constructing their religious alters of Buddhism and Shintoism, they regarded the house as their own.

Particularly for elderly people, the living qualities of disaster-recovery housing were considered to be closely related to community formation and management methods. Many of our elderly interviewees favored the smaller-scale communities in their previous temporary housing over their current situation in the disaster-recovery public housing. As mentioned above, when discussing the multiple stages and arrangement of community spaces in temporary housings, the community space in the housing complex serves two functions. First, it connects the private internal area with the social external area; second, it provides a social gathering space. When interviewed, the residents in Nango public housing suggested three levels of networks—groups of 3–5 units, horizontal networks on each floor, and vertical networks between the floors—to prevent the isolation of elder residents. Transitions and combinations of different levels of community space are especially important in disaster-recovery housing, because the steel doors create rigid barriers. Methods that expose the atmosphere of the rooms to external corridors are probably required. Such methods would facilitate the creation of a daily gathering space for residents of closely neighboring houses, and a public community space with high accessibility and visibility on a flowline to the ground floor.

Concluding remarks: disaster relocation of housing and urban/regional planning

A disaster destroys the affected area, but recovery buildings such as temporary houses and disaster public housing alter the landscape and social conditions of the area. Consequently, the construction has changed the entire landscape and infrastructure of the area. Also, whereas the construction of disaster public housing is financially supported by the country, its subsequent maintenance is handed to the local municipalities, and forms a significant part of their budgetary responsibility. Therefore, a new flexible management method, enabling a long-term change of community, is urgently required.

After examining the impact of relocation on the refugees' sense of dwelling, we recognized that social and psychological issues are closely interconnected with the physical constructions of the housing units. The research findings emphasize the need for continuing the refugees' habitual lifestyle, such as their living and societal customs, considering their regional needs. In addition, given the aging

population, forming relationships among the housing, the neighboring community, and the municipal social and communication services is more important at each stage of the relocation process than in normal times. Engagement in renovating the living space and creating community spaces can significantly assist refugees in recovering their sense of owning the place. In many instances, the refugees effectively created multiple-layered relationships between their private dwellings and the public/community space, which further elevated their sense of belonging. After post-disaster relocation, the most important problems were isolation from the existing regional space and networks, and the local society, which is closely connected to above issues of belonging. As a French philosopher Pierre Bourdeau claims, a house is a social medium connecting people with surrounding society through his engagement, restructuring the system of public housing, and the relationship between the refugees and their local society should be reconsidered.

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[1] This study is based on two projects of interviewing refugees about their lost houses. One was conducted in temporary housings in Kesennnuma by the author and her students in 2015. Another is "Ikinobiru tameno Ie," which was collaborated with Satoko Shinohara and Mamiko Miyahara, and was funded by Lixil Research Fund in 2016.

[2] Report of the "Okyu kasetsu jutaku, minashi kasetsu jutaku no hisaisha no jokyo" on the home page of the Iwate prefecture, 30th June, 2015.

[3] Reiou Kimura, "Mindsettings of refugees toward recovery ", *The Report of the Recovery Situation of East Japan Great Earthquake,* wrote and edited by the members of Hyogo Shinsai Kinen 21th century Research Bureau, 2017, pp23-35.

[4] "Kasetsu jutakuchi ni mirareru kadai," Higashi nihon daishinnsai karano fukko ni mukete, by Toshi konsarutanto kyokai, 2015.

[5] This study examines the case of temporary houses built by the Prefabricated Building Association in Kesennuma city and local constructor's buildings in Sumita town.

[6] The data of the Ministry of Land, Infrastructure and Transport Ministry of 2012,

[7] Kon Wajiro and Dojunkai, *Housing Revitalizatin Research in the farming, mountain and fishing areas of Northern part of Japan Vol 3,* Nihon Gakujutsu Shinkokai, Tokyo, 1941, pp63