Redevelopment of Huai Khwang Housing Project Responsive to Users' Spatial Behaviors

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Abstract. Huai Khwang Housing is a public residential project, developed since 1972 in a fringe area of Bangkok at that time. The city has been gradually expanding, so now Huai Khwang Housing turns to be in the center of the city. There is a subway station 400 meters away from the site; therefore, the land value and potentials of this housing project has been increased. However, the physical conditions of the buildings are rather rundown since they have been utilizing for more than 50 years. The National Housing Authority of Thailand, the owner of this residence, has a plan to redevelop this housing project. The preliminary public hearing was set to inform the community about the future changes and intend to receive the opinions from the residents, who are elderlies residing in this community since it was built. Therefore, this paper aims to investigate the spatial behavior of elderly residents in this housing. The methods used include interviews and observations. The results show that the housing units are used in multi-functions and the spatial requirements include storage areas, a smell-locked and partitioning cooking area, a ventilating and sun-drying area for laundry, and spaces for air-conditioning units as well as satellite discs and washing machines. It is suggested that the redevelopment housing scheme should meet these requirements.

1. Introduction
Huai Khwang Housing Community is a low-income housing community developed by the National Housing Authority of Thailand in 1972. Formerly, this area is located in a suburb. It is now a city center with routes and a subway station just 400 meters away. The area's potential is much higher, evident in the surrounding condominiums, as well as the FAR adjustment to 1:8. While the Huai Khwang Community Housing is in decline due to its lifespan of more than 50 years, the National Housing Authority will redevelop the Huai Khwang Community Housing under the 20-Year Housing Development Strategic Plan (2017-2036). After conducting a public hearing to hear the initial opinion, it was found that residents were concerned about their daily use, especially the elderly who have lived since the construction started. This article aims to analyze the use of space among elderly residents of Huay Kwang housing in their daily life. The results of the study can be informative for further design.

2. Literature review
An excellent example of this research was selected from a public housing study in Singapore. It found that adaptation from horizontal to vertical living in public housing in Singapore affected the use of the elderly, which National Housing Authority should be given a priority. A review of the literature summarized the behavior of the elderly in general as having repetitive daily life, spending the most time in accommodation, reducing external interactions due to physical limitations, but more demanding for
interaction because of loneliness [1]. Some behaviors of the elderly affect the space using, such as from a wardrobe to a clothesline, as it is easier and more convenient to use [2]. Another example is the increasing the status of semi-public spaces in front of the dwelling to allow residents to talk with the owner who responds to take care of space [3].

The current conditions of Huai Khwang Housing are on the land of 183 rai (0.2928 sq.km.) with 38-building (Figure 1). Each building is 5-story residential (Figure 3). The ground floor is an open space (Figure 4). The second to the fifth floor is a residence with a floor plan as a single corridor (Figure 2).

![Figure 1. the site of Huai Khwang Housing](image1)

![Figure 2. Residence floor plan](image2)

![Figure 3. Huai Khwang Housing atmosphere](image3)

![Figure 4. the open space of ground floor](image4)
Figure 5. room layout

The room has a size of 49 square meters, divided into 1) area for resting and reception, 2) bedroom, 3) bathroom, 4) cooking and washing area (Figure 5).

3. Methodology
As a rule of thumb, the residential design focuses on the living behavior of the individual, which is the psychology of design. The housing design also needs physical hygiene but also appealed to the residents as well. This study is based on the conceptual and theoretical framework of environmental behavior study. Various study methods such as questionnaires, tracing analysis, interview, and observations depend on the required data [4]. One of the required data for the analysis of housing quality is activities and independence [5]. Therefore, it collects data of daily activities by talking and observing the residents for one day and recorded with empirical evidence in the room that can be used to confirm the behavior of residents.

4. Results and discussions
From the methodology, the results of the study are as follows:

4.1 Timing and routine analysis

The use of space in daily life in the room found that the resting and reception areas are the most used. Sometimes, the occupants go outside the room by occasional. This area serves as multi-use. Therefore, this area is adapted for the most in the room (Figure 6).
4.2 Using analysis

From interviewing and observing, it was found that the space inside the room was used differently according to personal needs as follows: Be a part for night sleep of the child, Be a place to make a career, Be the awning and place additional items, Be installed the satellite receiver and compressor of the air-conditioned. The characters of these areas show the adaptation of space applications to their daily uses. Also, we found drying clothes in front of the room due to the sunlight and fresh air, which rooms did not have space to support this activity (Figure 7).

5. Conclusions

The results of the study can be summarized and suggested as follows.

1. The resting and reception area has a variety of activities, should be designed to facilitate the adjustment of use such as living room, living room/relative, additional sleeping area, occupation (beauty salon, computer repair, sewing).
2. A need for more personal shelving or storage space.
3. Some cooking inside the room needs a proportioned space and can block the smell.
4. A need for a dry area that is full of sunlight and adequate ventilation.
5. Space for installing future facilities such as air conditioning, satellite receiver, and washing machine.

Besides, there should be an area similar to the front porch where the occupant can sit outside the room, which increases the activity of talking to relieve loneliness.

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