The study of building material quality of a low cost flats in Jakarta

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Abstract. The form and layout of dwelling unit in low cost flats which provided by the government as a substitute for landed house in slums or high density neighborhoods, is very different from their homes. Physical quality of building materials is very standard and often it does not meet the expectations of the residents. Currently the use of environmentally friendly materials (eco-materials) in buildings is being actively socialized by the government to support sustainable development programs. This research was conducted with the aim to know the type of physical changes made by the residents to their residential unit, and the dominant building materials used by residents when making physical changes, as well as the proposed environmentally friendly materials that can be used by residents. The results showed that the dominant physical changes were performed by occupants: (1) physical changes that are related to the aesthetic reasons and improving the quality of dwelling unit (aesthetical and physical adjustment); (2) physical changes that are related to the fulfillment of function of dwelling unit in low cost flats (functional adjustment). Wall paint and ceramic materials are dominant materials that are often replaced and used by residents when making physical changes in residential unit. The proposed of wall paint and ceramic materials are used even from the beginning of the construction of low cost flats there are eco-materials and interior furnishings that good quality and minimize chemical emissions also promote good air quality.

1. Introduction

The government provides dwelling units in low cost flats for low-income communities in urban areas, as well as in Jakarta. People live in low cost flats with new hope for their dwelling units and bring their habit of living from old neighborhoods. The form of dwelling units in low cost flats provided by the government as a substitute for their landed house is very different from their old houses. The physical quality of buildings and its building materials are very standard and often does not meet the expectations of residents.

The previous research which conducted at Kebon Kacang Flats - Central Jakarta shows that many occupants make physical changes in their homes to improve the quality of their dwelling unit [1]. This phenomenon indicates a discrepancy between the quality of dwelling unit which expected by the residents and those are received by the residents. It also shows that there is needed a better quality of space compared to those provided in low cost flats.

The residents make adaptation and adjustment actions to their dwelling unit due to their low level of satisfaction with their unit. Residents will make changes, improvements and upgrade the physical quality of their unit according to their expectations and capabilities [2,3,4,5,6]. Adaptation action is done by occupants by changing the behavior of dwellers, changing the norms and values adopted by the family as long as they stay in low cost flats. While the adjustment action is carried out by residents by expanding their dwelling unit both

horizontally and vertically, improving the physical condition of their unit, as well as improving the quality of interior (interior decorations for aesthetics, renovation, etc.).

Currently environmentally friendly materials (eco-materials) are being actively socialized by the government for use in building construction in order to make green building and better environment, also to support sustainable development programs.

This research was conducted with the aim to find out the types of physical changes made by residents to their dwelling unit, and the dominant building material used by residents when making physical changes, as well as the proposed environmentally friendly materials (eco-materials) that can be used by residents in the future for good residential unit quality and easier the maintenance of their residential unit.

2. Research Methodology

The study of the quality of building materials in low cost flat and the proposed environmentally friendly materials, was conducted using descriptive method. Data collecting was done through survey and field observation of four low cost flats in Jakarta as case studies, namely Rusuna Tambora IIIA in West Jakarta, Rusuna Bendungan Hilir 1 in Central Jakarta, Rusuna Sukapura in North Jakarta, and Rusuna Bidara China in East Jakarta.

The data was analyzed descriptively to be able to answer the research questions related to the physical changes made by the occupants in their dwelling unit, and to propose the kind of environmentally friendly material that can be offered to the residents or the government for maintaining physical quality of the building, and for the construction of the low cost flats in the future.

3. Results and Discussion

The residents of four low cost flats in Jakarta (Rusuna Tambora IIIA, Rusuna Bendungan Hilir I, Rusuna Sukapura, and Rusuna Bidara Cina) generally make physical changes after they live in their dwelling unit. The physical condition of dwelling units that do not give satisfaction to the residents is significantly influencing residents to make physical changes in their unit. As in the case of Rusuna Sukapura, the physical condition of the residential building which initially only from brick wall and cement floor supports the change of physical condition in Rusuna Sukapura occurs at an earlier stage, because the resident's satisfaction level on the physical quality of the dwelling unit is low, and there is a gap between the expected physical quality of the dwelling unit with obtained by residents at the beginning of entry to low cost flats (see figure 1).

Time of implementation of physical changes in four low cost flats modestly varies: there is implementation of changes in the same year with the residents enter and live in low cost flats, some are implementing the changes after 11 years. But most residents make physical changes in their dwelling unit in the same year when they enter and live in low cost flats.

Physical changes in low cost flats occur not in one phase, but can be repeatedly until the residents feel more satisfied with the physical condition of their dwelling unit. Usually after the first phase of physical changes completed done by residents, they will adapt again to their unit that has been changed. If they have better economic capabilities, they will make physical changes (second phase) to their unit, to better suit their needs and expectations. The process of adaptation and physical changes in this dwelling unit occur repeatedly during their stay in a low cost flats. This process will stop on the adaptation action, if the economic capability of the occupants has not increased, or the physical and non-physical condition of the dwelling unit is approaching the occupant's satisfaction or as expected by the occupant (see figure 2).

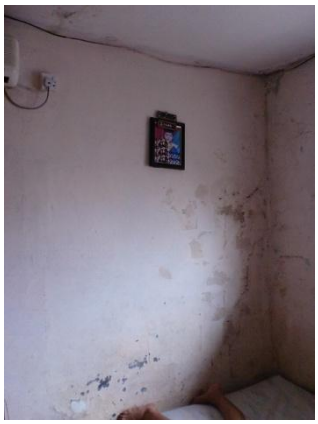

Figure 1. Physical quality of housing unit at low cost flats before occupant changed the wall material.

Figure 2. Physical quality of housing unit at low cost flats after occupant changed the wall material.

Table 1. Types of physical changes in dwelling unit of low cost flats in Jakarta (N = 106)

Types of physical changes in dwelling unit	Rusuna Bendungan Hilir I (%)	Rusuna Tambora IIIA (%)	Rusuna Bidara Cina (%)	Rusuna Sukapura (%)
Change of building materials	26,0 %	40,0 %	46,0 %	35,0 %
Change the color of wall paint	46,0 %	30,0 %	27,0 %	43,0 %
Expansion of the dwelling unit	12,0 %	0,0 %	12,0 %	0,0 %
Demolition of walls/doors/windows	2,0 %	3,3 %	1,0 %	0,0 %
Change of space function	14,0 %	26,7 %	14,0 %	22,0 %
	100,0 %	100,0 %	100,0 %	100,0 %

The results of analysis to the types of physical changes in the four low cost flats (see table 1) illustrate that the dominant physical changes occur that are aesthetic (changes the color of wall paint), or the physical quality improvement of dwelling units (changes of building materials). Both types of change can be categorized to the aesthetical and physical adjustment. While three other types of physical changes (functional changes, dwelling unit expansion, and wall/door/window demolition) are physical changes that are related to the fulfillment of dwelling functions in low cost flats, so it can be categorized as the functional adjustment.

From the comparison between the type of physical changes made residents can be seen that the physical changes that are aesthetic and physical quality improvement of dwelling units become the dominant aspects which is done by the residents in four flats. While the physical changes that are functional are carried out in three flats (Rusuna Tambora IIIA, Rusuna Bendungan Hilir 1, Rusuna Bidara Cina). The special condition in Rusuna Sukapura, only the change of space function is done by the residents, while the activity of expansion of dwelling unit or the demolition of the wall/door/window almost not done by the residents in Rusuna Sukapura.

One of the most important aspects of ecological architecture and green building is the use of building materials with low environmental impact. The main advantages of this eco-materials are the low CO2 emissions and minimize the use of natural resources [7]. One effort to apply the green concept in interiors is the use of environmentally friendly building materials, there are finishing materials and interior furnishings that minimize chemical emissions and promote good air quality [8].

From the results of the analysis can also be seen that changes the color of wall paint is the most activities performed by the residents, then changes the ceramic material for walls and floors. Environmentally-friendly building materials (eco-materials) that can be proposed to be applied to buildings or dwelling units in low cost flats are (1) ceramic materials with their basic materials and production processes that pay attention to environment-friendly aspects and the concept of reduce-reuse-recycle; (2) wall paint produced with environmentally friendly approach, durable, anti-fungal and anti-moss material, easy to clean, water-soluble paint material, odorless, contains no carcinogenic ingredients (Lead, Mercury, Formaldehyde, APEO, Chromate), has a low VOC (Volatile Organic Compound) content and complies with applicable Green Label standards.

4. Conclusion

The results of analysis to the types of physical changes in the four low cost flats illustrates that there are two dominant types of physical changes that occur, namely (1) physical changes that are aesthetic reasons and improvement the quality of dwelling unit (changes the

color of wall paint and changes of building materials), which can be categorized to the esthetical and physical adjustment; (2) physical changes that are related to the fulfillment of dwelling functions in flats (functional changes, dwelling unit expansion, and wall/door/window demolition), which can be categorized as the functional adjustment. Wall paint and ceramics are the dominant materials that are often replaced and used by occupants when making physical changes in their dwelling unit. For the next construction, eco-materials and interior furnishings that are good quality and minimize chemical emissions can be maintain good air quality. Wall paint and ceramic which adopt eco-materials approach are used even from the beginning of the construction of the flats.

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