

Innovative Furniture Design for Lease House Occupant in Merauke

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Abstract— Lease house is one of the most residential which was built with gain less attention by comfort, as thermal comfort (temperature, humidity, solar radiation, etc) and activity comfort. All lease house's room was planned and designed without calculating the maximum quantity of room. It's just only impression that "the important thing is existing of the room". The purpose of this research is socializing the utilization of innovative furniture for increase support the comfortable of lease house in Merauke also make furniture that can be used in all of the rooms in lease house (except bathroom and water closet) by innovative furniture application. The result of this research is expected that will get an innovative furniture which effective, comfort, safe, healthy and efficient. The characteristic of this research is descriptive, evaluative and applicative. It means that collecting the data by observation, total population, age, height, weight, job measure, anthropometry measure (elbow high and vertical range, sitting motion, height) also literature study. Data analysis of this research is quantitative descriptive which using frequency tabulation also qualitative which using spatial pattern description. The average size of lease house for a unit in Merauke is 49 m² which use standard furniture for a bedroom (bed, cupboard and desk) and only 20% space of lease house for circulation. So, it will make the room becomes narrow. If we use innovative furniture, the space of lease house for circulation becomes 35%. It means that if we use innovative furniture, the circulation will increase 15% better than standard furniture. Furthermore, this circulation is so good for human, temperature also humidity in the lease house's room.

Keywords— Innovative furniture, ergonomics, Unmus, Merauke

I. INTRODUCTION

Alahudin, Jayadi [1], the Thermal condition of the lease house in Merauke are very uncomfortable with 29°C – 32°C of temperature and 72% - 80% of humidity while 0,3 m/s of wind speed in the building. The condition indicates that it is very uncomfortable although using the air conditioner. However, the economic condition of a resident in the lease house is unable to use the air conditioner. Besides the condition of lease house

which in a row (coupling), the environmental condition around the lease house is not good. In addition, there are so many furnitures and condition of furniture are not well arranged. So, it will affect the thermal condition in the building (uncomfortable), such as increased temperature and air circulation is not fluent. The narrow condition of lease house with many needs will require some furniture. If the furniture selection is not wise, it will affect to the building comfortable, the room will be full of the existing furniture. Especially for the market in Merauke, the size of furniture still very large and only have one function. So, the resident of lease house must complete all the furniture requirements and it a certainty the circulation of lease house will decrease if so many furnitures in there.

The idea for make furniture for the small house will get attention nowadays, but innovative furniture still hard to find it in Merauke. So that, it needs technology application research which compatible with lease house needs in Merauke. The finding target of this research is an innovative and multi function furniture model which effective, comfort, safe, healthy and efficient especially in Merauke.

A. Ergonomic Furniture

Beddu S, and friends [2]. In this globalization era, every human behaviour is demanded an effective and efficient activity in their job. In automatically, every human will need many various tools to support their job. Every tool includes furniture needed standard procedure based on human factors or the right Ergonomic accordance with Human Dimension (dimension of body measurement) when they were activating. Using of ergonomic will affect to the person who uses that furniture indirectly. The furniture user will feel comfort and relax if they use furniture rightly and correctly with human ergonomic standard elements [3].

B. Thermal Comfort

Alahudin, Jayadi based on his analysis of the measure, record and observation on lease house, thermal condition of its building are:

1. Air temperature influence, by result analysis of temperature range in the building is 29°C until 32°C, while the average temperature outside the building is 28°C until 31°C. All of the conditions are warm until hot.
2. Humidity influence, the average humidity inside or outside the building is 72% until 80%. At 08.00 until 09.00, its humidity reaches 80% which can be categorized as stuffy condition, after that it will decrease until less comfortable humidity at 10.00 until 16.00. the cause of high humidity is less of house's opening and unfluently of air circulation. it also causes by poor ventilation and the amount of excessive furniture.
3. Air movement influence, the speed of air movement is very important in creating a comfort condition. if seen by house's opening which less fulfills. the average of wind speed in the building is not exceeding 0,3 m/s while wind speed outside the building can reach 0,7 m/s. Obstacle factors of air entrance to the building are the orientation of building direction which not having the same aim with the wind movement, less of placement vegetation closely and less of house's opening.

The Climate influence on room's thermal also measures results.

1. Lease house Condition
 - Lease house area : 7,20 m x 3,50 m
 - Window : 70 cm x 130 cm for window's dimension using jalousie window with two windows on the front side.
 - Door : 210 cm x 80 cm for door's dimension with two doors, it consists of living room's door and bedroom's door while the dimension of bathroom's door is 210 cm x 70 cm.
 - Roof material : Fabrication material such as corrugated iron sheets.
2. Environmental Condition
 - Vegetation : The vegetation around Lease house is very less. The nearest vegetation is a cermela tree.
 - Other Building : the sample of Lease house is a part of a long building which divided by some partition, another building is Lease house exact in front of sample house and mutual facing. Location of sample house in the dense area of the building.
3. The Climate influence on room's thermal also measures results.
 - a. Air temperature influence

Difference of inside and outside temperature :

 - 08.00 – 10.00 : Warm Comfort, building inside temperature is 29°C until 31°C and

building outside temperature is 28,5°C until 31°C.

- 11.00 – 13.00 : Hot, building inside temperature is 31°C until 32,5°C and building outside temperature is 30,5°C until 31,5°C.
- 14.00 – 16.00 : Hot, building inside temperature is 31°C until 31,5°C and building outside temperature is 30°C until 31,5°C.

b. Air humidity influence

Air humidity influence (%) inside building (average : 75,5%, minimal : 74,04% and maximum : 76,6%) while outside building (average : 76,28%, minimal : 75,7% and maximum : 78,6%). If seen by the percentage of humidity is known that 70% entrance of humidity in the category of less comfortable, while the percentage of humidity in the house 70% above average. So, it categorized as less comfortable nearest the stuffy condition with 80% of humidity percentages.

c. Wind speed influence

Wind speed influence (m/s) inside building (average : 0,04 m/s, minimal 0 m/s and maximum 0,08 m/s) while outside building (average : 0,4 m/s, minimal 0,3 m/s and maximum 0,5 m/s).

4. Information

- The peak temperature condition of Lease house is at 11.00 until 13.00, while the highest temperature condition is at 12.00.
- The building condition and environmental around is very influencing the thermal inside building. Besides of that, the less vegetation will increase the temperature inside the building.
- Roof material is influencing temperature and humidity inside the building.
- The existance of building around will be the obstacle factors of air entrance to the building.

The less of house's opening will make the air entrance into the house are very less. So, it is not influencing the building thermal.

II. RESEARCH METHOD

Steps of this research include Lease house study (ergonomic space and occupant anthropometry). The steps are :

1. Measuring the occupant anthropometry of Lease house
2. Setting up plans of innovative furniture
3. Making the innovative furniture
4. Testing of furniture (Trial process at Universitas Musamus)
5. Completing the furniture
6. Testing of innovative furniture operational at the field (Lease house which is as research place and general society)

There are documentations by observation result directly. This observation which is as watch closely are quantity by every lease house unit, quantity by every space in the lease house, the quantity of furniture and furniture in amount.

Besides of that, the direct interview has a purpose to get information by an informant (Lease house owner and tenant) for collecting the data.

By interview, we can get some information, they are :

1. Unit of lease house in amount
2. Measure of lease house
3. Data of tenant (height, weight, age and occupation).
4. Furniture owned in amount.

Data processing for review the respondent's answers (information) in each question which has been submitted during an interview to conform to the established rules. After that analysis the data. The analysis is :

1. Building analysis (area of lease house, space area in lease house, furniture in amount for each space in lease house, the quantity of furniture and circulation).
 2. Anthropometry analysis
- Occupants analysis by sex, age, weight and height.

III. RESULT AND DISCUSSION

This research was done on lease house which randomly selected because there are many lease house in Merauke. Research result shows that the average of lease house area is 48m². Study object for bedroom shows that its area is 9m² (3m x 3m).

TABLE I. ROOM QUANTITY BEFORE USING THE INNOVATIVE FURNITURE

Room Type	Furniture Type	Length (m)	Wide (m)	Amount	Area (m ²)
Bedroom	Bed	2.0	1.8	1	3.60
	Cupboard	1.2	0.4	1	0.48
	Desk	0.8	0.6	1	0.48
	Chair	0.5	0.4	1	0.20
	Human	1.2		2	2.40
Total Area					7.26

The total area of bedroom furniture is 7.26m² while lease house area is 9m² which filled by a double bed, a cupboard, a desk and 20% from the area for circulation. Based on circulation standard, this 20% use for circulation needs, while this 20% of circulation is not good enough because there are two or more persons in that room.

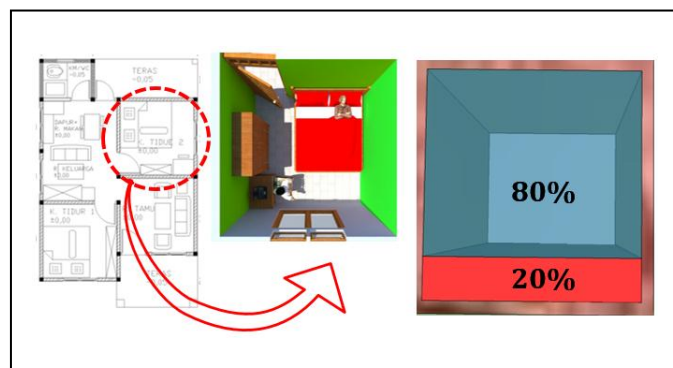


Fig. 1. Room circulation before using the innovative furniture

TABLE II. ROOM QUANTITY AFTER USING THE INNOVATIVE FURNITURE

Room Type	Furniture Type	Length (m)	Wide (m)	Amount	Area (m ²)
Bedroom	Bed	2.16	1.36	1	2.9376
	Multi-function cupboard	1.20	0.4	1	0.48
	Human	1.20		2	2.40
Total Area					5.8176

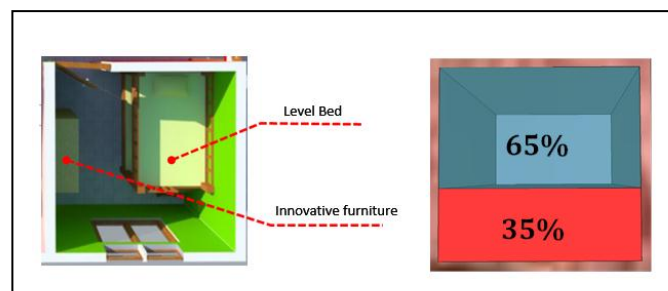


Fig. 2. Room circulation after using the innovative furniture

This innovative furniture ever tested to the society (on Universitas Musamus Celebration, November 19th, 2016) which was done as many as 27 furnitures into the innovative furniture. By 47 respondents of this research, 46 respondents said that this furniture is so innovative and satisfied, while one respondent didn't answer anything.



Fig. 3. Result of innovative furniture design

IV. CONCLUSION

By the research of innovative furniture design for lease house in Merauke, we can conclude that:

1. The tenant of lease house has not a choice when purchasing furniture for their needs.
2. The average area for a unit of lease house is 49m².
3. By using furniture which exists in the market and bedroom standard needs (bed, cupboard and desk), only 20% space for circulation from 9m² of the area. So, the area becomes narrow while if we use innovative furniture, the circulation becomes 35%. It means that by

using innovative furniture, the circulation will increase 15% better than standard furniture. this thing is so good for human circulation, air and humidity temperature in the building.

Suggestion:

1. The tenant of lease house must more carefully in choosing the furniture which will use.
2. Laying down of furniture must have attention in the narrow room.
3. Need more design development for other innovative furniture for lease house (bed, chair and others).

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