

Utilization of Sago Bark as a Multifunctional Innovative Furniture

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Received: May 16, 2019

Accepted: August 11, 2019

ABSTRACT

The thermal conditions in rental houses in Merauke are very uncomfortable, one of the reasons is the presence of many household furniture in rental houses and not well organized causes the circulation of space to be not smooth. In addition to small type rental houses, the environment around the rental house is not well conceptualized, minimal house ventilation and the number of rental housing units in one coupling built. This study uses the experimental method, the data analyzed include: how many activities can be accommodated by innovative multifunctional furniture, the amount of circulation after the multifunctional innovative furniture is in the room, the amount of sago bark used, and how to install it. Innovative furniture designed to have more than 4 functions. Multifunctional furniture in the bedroom can combine several pieces of furniture including: bed, wardrobe, study desk, bookcase, chair and other functions (6 functions). space circulation to 45% for 9 m² of bedroom space, better circulation of space, circulation needs based on the comfort of occupants' physical movements are fulfilled. The number of sago bark needed for one innovative multifunctional furniture is 90 sticks with a size of 5cm x 100cm. Sago bark has a beautiful fiber/texture in the form of straight fibers (in the same direction/ parallel), with a brownish color. With this application, furniture looks more ethnic, natural and artistic. Estimated costs of using multifunctional innovative furniture are more economical. Residents of a rental house no longer need to buy a lot of furniture for their room.

KEYWORDS: Innovative furniture, Multifunction furniture, Sago bark, Merauke

1. INTRODUCTION

The average rental area per unit in Merauke is 48 m², for bedroom furniture consists of wardrobes, beds, study tables and chairs while there are two occupants living in the bedroom. In one coupling of rental housing there are an average of four rental housing units, the recording and observation of rental housing the thermal conditions of the building are as follows:

- 1) Temperature; The temperature in the building is 29°C - 32°C, while the average temperature outside the building is between 28°C to 31°C, all in warm comfortable conditions to heat.
- 2). Humidity; Average humidity inside and outside the building between 72% and 80%, at 08.00-09.00 the humidity reaches 80% which can be categorized as stuffy after it decreases until the humidity is uncomfortable at 10:00 - 16:00. One of the factors causing high humidity is the lack of openings and poor air circulation. This is because among others; poor ventilation and excessive amount of furniture.
- 3). Effects of Air Movement; Velocity of air movement is very important in an effort to create a comfort value. If you see the openings in the sample house does not meet the requirements. The average wind speed in the building does not exceed 0.3 m/s while the wind speed outside the building can reach 0.7 m/s. The orientation of the building that is not in line with the movement of the wind, the lack of placement of vegetation that is tightly packed and the lack of openings is an inhibiting factor for the entry of air flow into the house. [3] From thermal research on rental houses, it is found that thermally rental houses are not comfortable to inhabit, factors that influence include; the size of the room is small, the number of occupants is enough for one room, the ventilation is not good and the dimensions are small, the amount of furniture needed for one room is quite large, while the dimensions of the furniture in the market are quite large. With the above background it is necessary to design innovative multifunctional furniture (one furniture can accommodate many functions), while furniture materials using wood and sago bark because in Papua especially Merauke has many Sago trees and currently Sago bark has not been utilized.

2. MATERIALS AND METHODS

This study uses the experimental method, the data analyzed include: how many activities can be accommodated by innovative multifunctional furniture, the amount of circulation after the multifunctional innovative furniture is in the room, the amount of sago bark used and how to install it. Innovative furniture

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designed to have more than 4 functions (multifunction). Testing of furniture is carried out in the architecture department of Musamus University.

3. RESULTS & DISCUSSION

Rental Houses in Merauke – Papua

In rental houses in Merauke, there are some furniture in the bedroom space including; 1). Bed, 2). Cabinets, 3). Study Desk, 4). The chair and is occupied by 2 people with a total furniture area of 7.26m², with 9m² of space only having a remaining circulation of 20%. With innovative furniture in the next bedroom, it only contains furniture: 1). Bed, 2). Multifunctional cabinets and occupants of two people, the circulation area increases 15% of the total area to 35%. With a circulation of 35% of physical comfort needs, this circulation is good for the room used by two occupants. The recapitulation of the use of innovative furniture can be seen in table 1.[1]

Table 1. The amount of space before innovative furniture is in the room

Space type	Types of Furniture	Length (m)	Width (m)	Sum	Total (m ²)
Bedroom	Bed	2.16	1.36	1	2.9376
	Multifunction Cabinet	1.2	0.4	1	0.48
	Human	1.2		2	2.4
	Total area				

Source : [1]

Multifunctional Innovative Furniture in Rental Houses in Merauke – Papua

In table 1 the amount of furniture still has two pieces of furniture, this is considered still reducing outside space because it was developed again in the space just placed one piece of furniture, the goal is that the circulation of space becomes even greater so that the physical comfort of space users is better. Of course, with the amount of furniture that has less air circulation in the room becomes better so that thermal comfort in the increased space is good and comfortable to inhabit. The recapitulation of the use of innovative multifunctional furniture can be seen in table 2.

Table 2. Room Size with Multifunctional Innovative Furniture

Space type	Types of Furniture	Length (m)	Width (m)	Sum	Total (m ²)
Bedroom	Innovative Furniture (Beds, Cabinets, Study Tables, Bookcases, Chairs, Collection Cabinets)	2.8	0.9	1	2.52
	Human	1.2	1	2	2.4
	Total area				

Source : [2]

The total area of bedroom furniture is 5 m², using innovative multifunctional furniture in indoor circulation 9 m² to 45%. According to circulation standards 45% meet the comfort of physical circulation, this circulation is good for the room used for two occupants. [2]

Characteristics of Sago

Sago bark is one of the side products from sago processing which has the potential to become waste and pollutants for the environment if not utilized. About 17% of the sago stem is bark. The sago bark contains lignin which binds to hemicellulose. Sago bark is generally used by the community as sago factory floors, walkways, bridges, wall material, fences, and firewood, and has the potential to produce beautiful handicrafts and termite resistance [14].

Table 3. Class of wood strength based on compressive strength and MOR

Class	Parallel Press Strength (N/mm ²)	MOR (N/mm ²)
I	> 65,0	> 110
II	42,5 – 65,0	72,5 - 110
III	40,0 – 42,5	50,0 – 72,5
IV	21,5 – 30,0	30,0 – 50,0
V	< 21,5	< 30,0

Source : [17]

The strong class of wood based on MOR in table 3 shows that the sago bark in wet and dry wind conditions is in the class II category, and in dry conditions the oven is in class III [17]. SNI 01-0608-89 requires that the strength of wood for the needs of building structures and furniture at least a strong class III.

Table 4. Compressive strength and MOR of sago stem skin under various conditions

Treatment	Parallel Press Strength (N/mm ²)	MOR (N/mm ²)
Wet conditions	143,28	81,96
Dry Wind Conditions	64,09	87,29
Dry conditions Oven	42,59	59,72

Source: [20]

The test results for MOR in oven wet, dry, and dry conditions were 81.96 N/mm², 87.29 N/mm², and 59.72 N/mm². If the MOR test results of the sago stem skin were compared to the JIS A 5908-2003 standard, the MOR of sago bark meets these standards, where the MOR standard for particle board must be at least 30.0 N/mm² for dry conditions and a minimum of 15.0 N/mm² for wet conditions.

Sago Habitat

Sago can grow to an altitude of 700 m above sea level, but the best production of sago is found up to a height of 400 m above sea level. According to the Schmidt and Ferguson classification, climate types A and B are ideal for sago growth with an annual average rainfall of 2,500.0003,000 mm / year. The optimal temperature for sago growth ranges from 24.5°C - 29°C and the temperature is at least 15°C, with relative humidity of 90 percent. Sago can live in a state of guaranteed high soil moisture, both by periodic inundation, soil power storing large amounts of water and by shallow groundwater [16].

The main sago distribution in Indonesia is Papua, Maluku, Sulawesi, Kalimantan (West Kalimantan) and Sumatra (Riau). The area of sago based on a number of approaches from various sources made by Notohadiprawiro and Louhenapessy (1992) states that the sago area in Papua is 800,000 ha, in Maluku 50,000 ha, in Sulawesi 30,000 ha, in Kalimantan 45,000 ha, in Sumatra 72,000 ha and in Java 2,000 ha. The largest natural sago forest is found in Papua along the coastal lowlands and river estuaries. The sago area in Papua consists of 3 percent of plants (cultivation) and 97 percent of natural forest. With the sago land area owned by Papua, Sago's natural resources are quite abundant. So that the rest of the processing of sago (waste) in the form of sago bark is quite a lot.

Utilization

The results of the study shows that one furniture had 6 functions, including: beds, study tables, wardrobe, bookcase, bookcase and desk that could be used for other activities. Innovative furniture plans are used for two occupants.



Figure 1. Innovative Multifunctional Furniture Prototype

In the work process a lot of wood material is 'wasted' because the design with the finished product is different due to the idea when the product is made. Because the furniture was tried immediately. As an example for the staircase, the researcher united with a bookcase and hobby cabinet, its existence would actually hamper the smooth movement of the closet (cabinets can be moved between places). Finally the ladder is made like a chair but can also function as a ladder. The following is the process of making multifunctional innovative furniture:



Figure 2. Workmanship on innovative furniture Multifunction

Utilization of sago bark is not in the core structure of furniture. Sago bark only becomes 'upholstery' from furniture. Sago bark is made with a size of 5 cm in width for a long size following the part that will be covered with sago bark. When the sago bark research was very difficult to obtain, the people who used to harvest Sago did not take the skin sago bark, they used to leave the sago bark. So far, the sago bark is still considered as waste and the processing of skin processing has not been understood by the community. As a result of the sago bark, the sago bark usually becomes damaged due to being submerged by water and also during the dry season the remains of the sago bark are burned by the community. Indeed, there are some who use the sago bark skin as a fence and also livestock cages, but because it is considered not strong and sago bark is quite heavy when it is just anchored, residents are reluctant to take it home.

The testing of furniture is carried out in the Architecture Laboratory, the space is simulated with the average area of the room in a rental house in Merauke with an area of 9 m², testing is done to find out the percentage of circulation in that space.



Figure 3. Testing of innovative furniture

The result of extensive testing of furniture and human size is still 5 m² from the spacious bedroom of 9 m², calculating the percentage of space circulation to 45% with circulation. Innovative furniture can provide comfort for both human circulation inside and circulation of space.

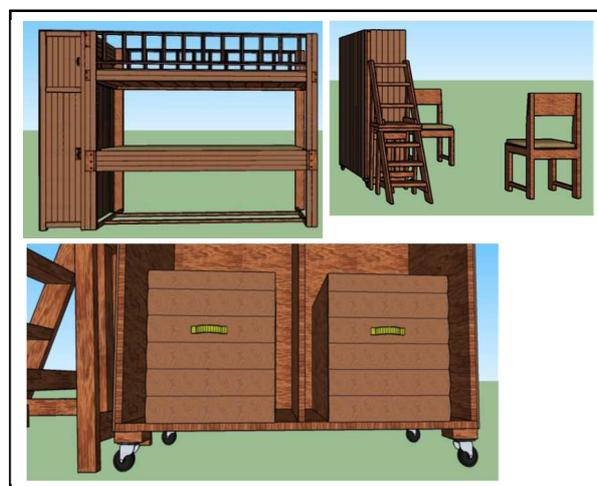


Figure 4. Installation in Innovative Multifunctional Furniture

From the results of the analysis of sago bark, the used sago bark is around 90 sheets with a size of 5 cm x 100 cm (or following the length according to the furniture). Installation of sago bark using yellow Fox glue and reinforced with bolts (try the bolt does not appear) directly after bolt is put together according to sago bark color.



Figure 5. The results of Innovative Multifunctional Furniture Designs after the application of Sago bark

Sago bark has a beautiful fiber/texture in the form of straight fibers (in the same direction/parallel), with a brownish color. With this application furniture looks more ethnic, natural and artistic. To make the Sago bark more durable can be used finishing with varnish or previously painted with anti-termite liquid can also use traditional ingredients using water from collisions of turmeric, areca nut and betel lime.

Meanwhile, for estimating the cost of furniture, it is reviewed, among others; 1). Furniture needs; 2) number of furniture in 1 bedroom space. The need for furniture for bedrooms in general is; bed, wardrobe, study desk and study chair (requires about 4). With the price of a bed (double bed) Rp. 5,000,000; 2-door wardrobe Rp. 2,200,000, -; study desk and chair Rp. 1,500,000, - a total of Rp. 8.5 million while with innovative multifunctional furniture only requires 1 piece of furniture for the bedroom with funds of Rp. 7,000,000.

4. CONCLUSION

In planning and designing Innovative Furniture Multifunction Sago bark material can be summarized as follows:

1. Innovative furniture has a size of 90 cm x 200 cm with additional motion cabinets (cabinets can be moved) with a size of 35 cm x 85 cm so that the total length of furniture is 90 cm x 285 cm. Furniture made has functions 1). Beds (two occupants, bottom and top), 2). Study desk, 3) Wardrobe, 4) Bookcase, 5). Wardrobe hobby and 6). Ironing table. For the chair can be used as a ladder. Percentage of circulation in the presence of furniture becomes 45% with the circulation of space being comfortable (both circulation of occupants and air circulation)
2. Sago bark that is used with a width of 5 cm while the length follows the length of the furniture parts coated with sago bark. The amount of sago bark needed for furniture size 90 cm x 285 cm requires + 40 sticks.
3. Estimated costs of using multifunctional innovative furniture are more economical. Residents of a rental house no longer need to buy a lot of furniture for their room.

ACKNOWLEDGMENTS

Acknowledgments given by Universitas Musamus for providing 2018 Featured Research grants to researchers, especially LPPM who have provided support for this research and to other parties who participated during the research, contributed to the publication of the article. Thanks are also given to the Department of Architecture, Musamus University Merauke, which has provided support for research activities

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