Interior Design Of National Library With Environmentally Sustainable Materials

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Abstract. One of the goals of national library interior design is to facilitate the wider community who are looking for books to be more comfortable, more organized space organizations, to provide infrastructure for reading or seeking knowledge and to apply environmentally friendly materials into the interior. The interior library design besides wanting to improve the quality of functions, increase visitor interest, instill environmental care, this paper explores the evolution of design for sustainability (DfS), as well as fostering the empathic role of designers. The design research method refers to positive design. This article is based on data obtained using various qualitative research techniques, analysis of the application of environmentally friendly materials and analysis of interviews of environmental experts. This research presents an exploration of the library's interior design with environmentally friendly materials supported by green light by utilizing natural light through transparent glass walls. It examines environmentally friendly materials, uses used wood, optimizes room openings. The design process for creating meaningful spaces - visual representations are displayed in the form of image layouts and spatial perspectives. The article concludes that interior design with the application of environmentally friendly and energy-efficient materials must continue to innovate in triggering and developing society towards awareness on sustainable nature conservation.

Keywords: Interior design, library, environmentally sustainability materials

1. Introduction

The library as a support for learning for the community at the national level, strives to create environmentally friendly design pedagogies that can implement environmentally friendly materials. The lack of exposure to natural aesthetics into architectural interiors results in a lack of recognition of the use of used and environmentally friendly materials. Young designers who succeed in sustainability are also responsible for protecting nature, they need to be given understanding and awareness to preserve them through architectural works or interior design. Used wood is one of the materials that can be reused for building interiors. This used container wood has beautiful fibrous material specifications, warm for the room, easy installation, easily combined with other materials. Utilization of transparent wall materials is also useful for saving artificial light, namely by utilizing sunlight during the day.

The study was conducted with a design process with methods focused on functions and positive design. Environmentally friendly interior materials are developed on interior elements, especially on partition walls, ceilings and room decorations. Used wood container developed for interior elements after finishing will give a beautiful natural impression, library visitors can enjoy the created natural atmosphere. Utilization of used wood containers in the national library can introduce and make people aware of the nature preservation, not wasteful, minimizing tree felling. The meaning to be conveyed has a meaning that is closely related to environmental care and greening the earth.

Architectural interior materials in libraries, offices and residences, including the contributor of pollution without being realized, so that the impact on global warming. [1]. Material interior elements such as floors, walls, ceilings and furniture have a major role in achieving an environmentally friendly interior and is also healthy for its users. Environmentally friendly materials are currently still widely
found to be used and applied to interior elements of buildings. This environmentally friendly interior element material is expected to add insight and awareness to the important role of the interior in helping to reduce energy and natural resources that are wasted free of charge; and can help reduce the direct and indirect impacts of global warming that are happening. [2]. In addition, consideration of the use of materials originating from recycling, used materials, and local area materials is expected to help to improve the economy and maintain the cultural existence of the local area.

The need to innovate in interior design in public facility buildings to introduce used and environmentally friendly materials to stay awake and sustainable. Environmentally friendly materials for sustainable design "green design" need to get important attention from designers so that the environment is maintained[1].

One effort to educate the public at large in Indonesia is through the provision of a national library. Eco-friendly materials or eco-materials used to make the library interior feel more natural. Eco-materials or environmentally friendly materials are materials that can be renewed, recycled, and low in energy expenditure. Marial used in home interiors has an effect on nature, so choosing the right material to decorate the interior of a building is very important. [2]. Environmentally friendly material Wood used containers are one of the many material variations, especially in the fiber motif. The used wood can also be processed into a new form. The strength of wood materials is at the intermediate level between materials such as stone, concrete and ceramics, and soft materials, such as carpets. Wood is a material that is comfortable, cool on the feet, gives the impression of warmth in the space and includes a durable one. Wood is a natural material that comes from renewable nature.

In accordance with the demands of the times, the need for Green Interior is increasing. This happens because through the Green Interior a healthy environment will be created which will have an impact on productivity and creativity for the occupants of the building. With the development of environmentally friendly technologies and innovations, designers will be required to complete and use environmentally friendly products. The concept of environmentally friendly materials has the following criteria: (1). non-toxic, (2). does not produce substances that are harmful to the environment. (3). can be obtained easily and close (does not require costs or difficult processes, saves fuel energy, (4), can decompose easily naturally, (5), contains the principle of Renewable, Reuse, Recycle, & Reduce.[2][3][1]

Sustainability materials and Environmentally friendly implementation in building interiors including with,: [4][3][5]

a. Applying Eco-friendly Materials such as: wood, bamboo, straw, rattan, Materials from Hempcrete, Materials from Mycelium, Ashcrete Building Materials.

• Straw Bar material, a natural material used as an environmentally friendly material, especially for walls. Straw stalks that are used to replace brick, wood, or gypsum walls turn out to be able to produce excellent insulation when arranged properly. Straw is also relatively inexpensive and sustainable because it can grow quickly in nature. Straw also has benefits as a good heat insulator and serves as a silencer, will not feel hot easily.

• Bamboo material, a wood substitute material that has been used in several countries for thousands of years. Bamboo material is also increasingly popular to be used as building material because of its strength that is able to deal with heavy loads besides being environmentally friendly. Although known for its strength, bamboo still has light weight and is very fast growing in nature. Bamboo can also be an earthquake resistant building material.

• Material from wood, has many advantages including environmentally friendly. Processing wood for building interior materials does not require much energy. Using wood in buildings can also make it cooler during the day.
• Material from Hempcrete, which is concrete made from hemp plant fibers. The fiber is made by being mixed with lime to form a concrete-like material that is strong but still lightweight. Despite its light weight, hempcrete material is able to withstand heavy loads.
• Material from Mycelium, a type of fungus that is now often used as a strong and environmentally friendly brick. Mycelium is usually grown around organic materials such as straw stems and others.
• Ashcrete Building Material, an innovation material made from fine ash to replace traditional cement with a strong adhesive strength compared to other building materials. This fine ash is a product of coal combustion which is currently being developed.

b. Space with an open concept (Open Floor Plan)
The design concept that removes boundaries or barriers between rooms can give the impression of relief because of exposure to sunlight from outside to all corners of the room. Can create good air circulation so the house feels cooler even without air conditioning. Space with an open concept is equipped with large windows and doors to the outside. The concept of open space is very helpful in saving electricity usage so it greatly helps reduce the effects of global warming.

c. Maximizing space
Make maximum use of space able to save space. Various models of multi-double furniture or smart furniture

d. Smart Space Concept
With the advancement in technology, slowly began to apply the control of the building situation remotely otherwise known as smart space. With telephone or internet connection, we can manage open-close doors, arrange lighting inside or outside the house, monitor all activities that occur at home remotely

2. Method and materials
The research method used uses multi-methods in the form of qualitative methods through the design process [6] [7] and refers to positive design. The design process by analyzing the application of environmentally friendly materials or 'green' interiors is described in a positive design [8]. National library interior design that is useful for personal satisfaction at this time, for the satisfaction of the general public in the long run, a design that invites others to be virtuous by facilitating the general public to obtain knowledge, as well as designs that care about the environment.

3. Results and discussion
Green architecture, or green interior design in a national library is an approach to buildings that minimizes the effects of damage to the green environment and saves electrical energy for lighting. "Green" architects or designers strive to protect air, water and earth by choosing environmentally friendly building materials and recycled materials. Green building design challenges designers to go beyond code to improve overall building performance while minimizing environmental impacts, life cycle and costs.

The results of the national library interior design by utilizing environmentally friendly materials in the form of used wood container types of Teak Dutch after going through the finishing process. Dutch Teak Wood with characteristics; smooth texture, attractive fiber motif, clean wood color, strong wood character. Eco friendly and the use of materials that are not used need to be continuously recommended to designers. The interior design of the national library also applies transparent material for the utilization of natural light during the day, thereby saving electrical energy

3.1. Interior design guidelines for sustainable and energy efficient design
The highest aim of green architecture is to be fully sustainable. Designers do things "green" to achieve sustainability. Ventilation and opening systems are designed for efficient lighting, heating and cooling. Timber obtained locally, eliminating long-distance transportation can save costs and transportation. Used wood reused can be used as a rescue of recycled architecture. Efficient use of
space, optimal location, maximizing sunshine, and wind in a sustainable manner must be part of the overall design process, right from the start of the project. Implementation of sustainable and energy saving designs can be seen in table 1 below. Implementation of sustainable design into the interior

Table 1. Green Architecture Interior Implementation Based on Sustainable Concepts

| Sustainable Concept (Green Design) | Implementation of sustainable design the interior |
|-----------------------------------|--------------------------------------------------|
| Energy saving (embodied energy reduction) | Minimize artificial energy sources (natural lighting and ventilation). Apply transparent walls |
| Apply Environmentally Friendly Materials | Reducing waste, pollution and environmental degradation. Applying wood, bamboo, straw, rattan, Materials from Hempcrete, Materials from Mycelium, Ashcrete Building Materials for interior space design. |
| Space with an open concept (Open Floor Plan) | The concept of interior design that removes boundaries or barriers between rooms can give the impression of relief because of exposure to sunlight from outside to all corners of the room. |
| Maximize Space | Make maximum use of space able to save space. Various models of multi-double furniture or smart furniture |
| Smart Space Concept | With the advancement in technology, slowly began to apply the control of the building situation remotely otherwise known as smart space. With telephone or internet connection, we can manage open-close doors, arrange lighting inside or outside the house, monitor all activities that occur at home remotely. |
| Paying attention to economic problems | Applying material that is easily available, easily produced, and cheap or economical |
| Waste reduction | Reducing the amount of waste material produced |
| Recycled content | Applying used materials. |
| Durable Material | Durable material, reduced new material, produces less waste. |

3.2. National library interior design results with environmentally friendly materials and energy efficient

The green design shown has many names and related concepts related to it. Library interior design emphasizes ecology and environmentally friendly design, environmentally friendly architectural interiors, and arcology. Eco-friendly interior design or earth-friendly architectural interiors, natural themes, and have aspects of green architecture. Biomimicry is a term used by architects who use nature as a guide for green design

Furniture layout design was developed with a dynamic atmosphere, the application of curvature in the layout reflects the dynamism. Adequate circulation distance makes library visitors feel comfortable. National library furniture layout design can be seen in Figure 1 below. The concept of material used with used wood containers and some combined with rattan. The concept of material wood from wood from a long box or called a wooden pallet and belongs to the type of Dutch teak wood. The used wood container material has a great use after it is no longer used as a container and its initial needs. The concept of sustainability or eco friendly is applied in this design
Figure 1. Reading plan and book collection in the national library

The results of the interior design of the reading room and book collection in the national library with natural color compositions that apply used wood container materials. The programmatic concept formed the theme of eco friendly space. Geometric shapes are implemented for wall and floor elements while eco friendly materials include the use of used wood containers. Eco friendly is a design that uses environmentally friendly materials such as used wood, rattan, bamboo and natural stone. In the reading room, sitting using a solid color sofa, eco friendly material partition, a combination of rattan and used wood containers. The design of the reading room and book collection can be seen in Figure 2 below.

Figure 2. Interior design of reading rooms and national library book collections; (a) Fertile geometric motifs with used wooden container material, (b) Rattan material, (c) Transparent glass wall material, (d) Used wooden container material, (e) combined rattan and bamboo material

The perspective of the national library reading room is an effort to provide communication to other parties in presenting a picture of the design results. The reading area wall applies translucent or transparent material to optimize sunlight so as to save electricity. This interior design can be seen in Figure 3. The combination of geometric shapes with used wood and bamboo materials is also applied to the walls and floor in the reading area.
Figure 3. Reading area perspective in the national library with environmentally friendly materials and green light (a) Walls with transparent materials maximize natural lighting (b) and (c) comfortable and soft seat sofas, so that they feel at home reading

The result of the interior design of the national library reading room that applies used, transparent and environmentally friendly material. Eco friendly space theme with transformation of geometric shapes. Geometric motifs are implemented for partition elements while eco friendly materials include the use of rattan and used wood containers. In the reading room, it uses eco-friendly material partition, which is a combination of rattan and used wood container by using a sofa chair and carpet so that it is comfortable and relaxed when reading. The results of the interior design of the reading room can be seen in Figure 4 below. The aesthetic concept can be seen through the composition of the shape and color of the material (floor, walls, ceiling) and furniture.

Figure 4. Interior design library reading room and book collection national library; (a) Floor of used wooden container material, (b) Ceiling of geometric motifs of used wood, (c) vertical walls of rattan, (d) Transparent walls of glass material

The interior design of the lobby space was developed with a dynamic atmosphere forming a semicircle, the application of the curve to the partition reflects the dynamic. Adequate circulation distance makes visitors comfortable. The interior design of the room partition uses transparent material so as to maximize sunlight during the day. The design of the lobby can be seen in Figure 5, below. The concept of materials with used wood containers and some combined with rattan. The concept of used Dutch teak wood material is quite strong, solid, needs to be shaved finishing so that the wood motif appears. The used wood container material has a large use after it is no longer used. The concept of sustainability or eco friendly is applied in this design.
The perspective of the reading room and collection room of the national library book is an effort to provide communication and present the results of creativity, problem solving in conveying the picture of the design results. The aesthetics of space apply geometric motifs and material motifs used. Geometric motifs applied to walls, ceilings and floors in the library book reading area. The combination of geometric motifs is also applied to the reading area and book collection. Furniture reading area uses a soft and comfortable seat couch so that visitors relax while reading and attract a pleasant reading interest. Transparent walls are applied to maximize lighting with sunlight during the day. The national library seeks to display interior designs that are comfortable, relaxed and friendly which contain philosophical meaning that seeking knowledge can be from anywhere and at any time during his life. The perspective design of the reading room and collection of national library books can be seen in Figure 6 below.

4. Conclusion
Interior Design National library an effort to improve function, value and solve design problems as a reading facility for users at large. Positive and sustainable design produces works that benefit individual users, the wider community, both now and in the long run. Positive design by displaying geometric motifs and beautiful fibers from the material used helped to preserve the sustainability of the green earth. Interior design by utilizing used wood material 'eco friendly' will create an informal or relaxed, and youthful atmosphere. The result of the design analysis is that the use of used materials needs the finishing process 'reuse', more practical, Renewable, Reuse, Recycle. Energy-saving designs can be applied through open or transparent walls.
Acknowledgments
The researcher would like to thank the Jakarta State University and the directorate of research and community service at Tarumanagara University in Jakarta for contributing to this research.

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