

Development of Eco-Friendly and Child Oriented Concepts in the Interior Design of Jakarta's Child-Friendly Public Spaces

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Abstract

As a downtown area with high population density, the Jakarta City Government is committed to creating an interior Child Friendly Integrated Public Space (RPTRA) with the concept of a safe and supportive environment for children in urban areas. With an increasing population, Jakarta needs more RPTRAs for effective educational facilities for children's growth and development. The Interior Design of RPTRA in Jakarta was created to respond to parents' concerns about the lack of adequate educational facilities. The *Eco Friendly* concept is applied to create an interior environment that supports children's well-being by integrating natural elements and eco-friendly materials. The research method involves a literature study to understand the concept of *Eco Friendly* and children's interior design needs, as well as site analysis and case studies of RPTRAs in Jakarta. The result is an RPTRA interior design that prioritizes building according to green building standards, utilizing used materials that are still suitable for interior elements, and child-friendly sensory stimulation, with a focus on natural elements such as plants visually, and the use of natural lighting. The design also considers the flexibility of the space to support children's various educational, rehabilitative, and recreational activities. It is hoped that the implementation of this design will create an engaging learning experience and increase children's awareness of the importance of education.

Keywords: *Child Friendly, Child Friendly Integrated Public Space (RPTRA), Educational Facilities, Eco Friendly.*

INTRODUCTION

The rapid movement of urbanization has led to an increase in the percentage of the child population from year to year. Based on data from PS DKI Jakarta, in 2020-2021 children aged 0-4 years increased by 20.87%, ages 5-9 years increased by 11.59%, and ages 10-14 years increased by 7.57%. The increase in the child population makes the Child Friendly Integrated Public Space (RPTRA) an important initiative of the DKI Jakarta Government to provide safe, comfortable, and meaningful open spaces. RPTRA is an informal learning space for children that aims to improve the quality of life of urban residents (Hartono, 2023). RPTRA is not only used as a place to play, but as an educational center that enriches children's learning experience and motor development. The existence of RPTRA is an important means to encourage a healthy and active lifestyle for urban communities, especially children (Prakoso & Dewi, 2017).

In addition to supporting education, RPTRAs help address disparities in access to education for children in Jakarta. These spaces provide opportunities for children from various social and economic backgrounds to gather, learn and play in a safe environment. The existence of RPTRAs is also expected to prevent children from engaging in negative behavior, such as brawls or other street activities, by providing positive places for physical and social activities.

Unfortunately, one of the main challenges facing some RPTRAs in Jakarta is the lack of proper and environmentally friendly open spaces and recreational facilities, especially for children (Sabila & Zulkaidi, 2015). This could include deterioration of facilities, poor hygiene, or child-harming environmental conditions. Although initially built well, over time, some RPTRAs in Jakarta have deteriorated due to lack of proper care and maintenance. According to field research, it is not uncommon for damaged and rusted playground equipment to be left unattended, making it dangerous for children to play. The aggregate material on the field asphalt is getting thinner so that children are prone to slipping. The condition of the room also does not utilize openings properly so that it tends to lack air circulation and less exposure to natural elements.

Children, as an important part of the city's population, need an environment that supports their physical, mental and emotional development. Naturally, humans, including children, have an attachment to nature. However, urban children are often deprived of the opportunity to develop emotionally, cognitively and physically due to lack of exposure to nature. Kellert (2005) stated that urban children have a deep need to return to nature as a response to living in an artificial environment far from natural elements. Nature is not only an escape from the pressures of highly structured and confined urban life, but also offers a space for children to play freely, channel creativity, and overcome the discomforts of modern rule-filled living. Interacting directly with the elements can provide various benefits, such as improved cognition, mental health, physical health, and support for children's social and emotional development (Barakat et al., 2019).

In addition, the Office of Empowerment, Child Protection and Population Control, has a vision and mission to realize public facilities that utilize openings and natural elements to create an environment that is safe, comfortable, and supports the holistic growth and development of its users. So to realize the expectations of the Office of Empowerment, Child Protection and Population Control, the interior of this RPTRA is designed by optimizing sunlight and natural air circulation, using environmentally friendly materials that are safe for children and easy to manage, and presenting natural elements such as green parks, nature-based play areas, and open learning spaces. With an approach that prioritizes safety, comfort, and environmental education, this RPTRA aims to support children in playing, learning, and interacting while building awareness of the importance of maintaining environmental sustainability.

To maximize the potential of children's development, an interior design with an Eco-Friendly concept is needed where space is applied by optimizing green plants in open spaces to create a fresh and cool environment, which can improve concentration. The playroom is designed to integrate with nature, maintaining the original landscape such as large trees, wild vegetation, and ornamental plants, as well as small sandy stones that stimulate children's social skills and creativity. The use of environmentally friendly materials such as bamboo

and recycled wood reduces the risk of exposure to hazardous substances and provides a positive sensory experience. An example is the use of renewable energy such as solar panels and wind turbines used for play facilities, reducing pollution and teaching the importance of sustainable energy. The irrigation system uses the drip irrigation method for water efficiency, utilization of collected and filtered rainwater, and recycling of light wastewater for irrigation, ensuring efficient and safe water use.

METHODOLOGY

The design methodology that will be applied to this interior design process is organized based on *The Five Process* by Ballast (1992). This process is developed into several stages, among others:

1. Establishing Goals

Objectives indicate what the client wants to achieve and why it is important. The identification of these objectives is very important because it determines the direction of the program concept that appropriately suggests the physical facilities. In , a list of space types and area sizes is also needed so that the client understands the design purpose of the space and area. In the context of designing an RPTRA with an eco-friendly concept, many open spaces that blend with nature are provided to increase environmental awareness among children and reduce carbon footprint. There are also various skill spaces and interesting play facilities so that children do not feel bored and have opportunities for self-development.

2. Collecting Facts

Programming

The design concept development stage involves several systematic steps to meet user needs. First, a survey was conducted to collect data on RPTRA facilities in Jakarta. Then, interviews with managers were conducted to obtain additional information related to children's needs. Observations were conducted to get an overview of the RPTRA's interior atmosphere, while the literature study examined theories on RPTRA safety and comfort. Furthermore, zoning divides the area into four zones: public area (playground, waiting room), private area (toilet, prayer room), semi-public area (education room, mini library), and service area (staff room). The grouping of spaces is based on function and zone, while the amount of space is designed according to the number of users and furniture needs. Space organization uses a centralized pattern with one main area surrounded by other areas. Circulation flow is designed considering the physical condition and number of users, and the pattern of relationship between spaces is arranged based on direct, indirect, and no relationship between spaces.

3. Uncovering Concept

Please note that programming and design concepts are different things. Programming is the performance requirements of how a problem can be solved or a need met. Programming should develop abstract ideas that are functional solutions to the client's performance problems without defining the physical means by which they can be solved. A design concept is a specific physical response on how the program concept can be achieved. This process involves developing and exploring deeper and more focused design concepts.

In the "*Uncovering Concepts*" stage of designing an *eco-friendly* RPTRA, the process began with data analysis and evaluation that included the needs of children, the community, and environmental priorities, as well as how the space could support eco-friendly activities and education about sustainability. Next, themes and styles that reflect eco-friendly values are developed, such as the use of recycled materials and integration with nature. Visualization of the concepts was done through sketches, mood boards, and preliminary renderings depicting elements such as vertical gardens and natural play areas. The resulting concepts were evaluated and selected through discussions with the client and community to ensure their compatibility with the *eco-friendly* goals. Functional and aesthetic elements were then incorporated, including the use of local plants and eco-friendly materials. Finally, the selected concepts were documented in the form of drawings, descriptions, and presentations to guide further design development and communication with all parties involved.

4. Determining Needs

This programming step balances the client's wants with the available budget or sets a budget based on predetermined goals and needs. It is at this stage that "wants" must be separated from "needs". Because most clients want more than they can afford. So in designing an RPTRA with an *eco-friendly* concept, it is important to identify the functional needs of users, such as play areas, learning spaces, gathering places, and sports facilities, as well as green spaces for educational and recreational activities. Understanding eco-friendly needs involves the use of recycled materials, energy efficiency, and water management to minimize the carbon footprint.

Social and community needs also required include spaces for social interaction, community events, and family activities that are inclusive and accessible. Educational needs include learning gardens, recycling installations, and environmental education programs. User safety and comfort include adequate lighting, good supervision, and safe and comfortable facilities. Aesthetic needs should reflect the eco-friendly concept with the integration of natural elements, use of local plants, and harmonious design. Finally, maintenance and sustainability needs involve waste management systems, green space maintenance, and regular maintenance programs that involve the community.

5. Stating the Problem

The previous four steps are a prelude to succinctly stating the essence of the problem in just a few statements. The problem statement is the bridge between the programming and design processes. It is a statement agreed upon by the client and programmer, describing the most important aspects of the problem and serving as the basis for the design and as criteria against which solutions can be evaluated. There should be a minimum of four problem statements - one for each of the major considerations of form, function, economy, and time. In the context of designing an RPTRA with an eco-friendly concept, this involves identifying and articulating the major issues that must be addressed to achieve a successful design. These issues include limited green space that can support educational and recreational activities, limited budget for the use of environmentally friendly materials, providing safe skills facilities, and challenges in implementing sustainability features. In addition, accessibility issues need to be addressed so that all community members can use the RPTRA facilities, as well as the challenges of creating a design that is aesthetically pleasing but still functional and supports social interaction.

RESULT AND DISCUSSION

Based on the problems that exist in this RPTRA facility, it is necessary to design an RPTRA facility that can support the survival of children. The Child-Friendly Integrated Public Space in Jakarta is a special facility for children who carry out a series of intervention and self-development activities. The main activities at the Center for Therapy and Skill Development are grouped into three based on their objectives, namely education, rehabilitation, and recreation, with several activities including self-help activities, therapeutic activities, treatment, skills, and social interaction.

The concept of *eco-friendly* refers to practices, products or designs that aim to minimize negative impacts on the environment by utilizing natural resources efficiently and sustainably. In the context of interior design, the visual application of natural elements, such as the integration of greenery, the use of natural materials, and natural lighting, plays an important role in creating an eco-friendly space. According to Niche Interiors (2013), eco-friendly interior design focuses on improving indoor air quality and reducing the impact of furniture purchases on the environment. In addition, Agustina (2020) notes that the integration of natural elements, such as the use of indoor greenery, not only refreshes the atmosphere but is also able to increase occupant productivity and comfort.

So in the concept of eco-friendly and child-friendly interiors, it involves several important elements, such as creating buildings according to Green Building standards, child-friendly that visualize nature-themed

interactive areas, and the use of used materials for space elements. The situation can be even more challenging for individuals growing up in inadequate conditions, who require special support and attention. Improving the comfort, well-being and safety of children is therefore a crucial foundational principle in engineering and design (Zaniboni et al., 2021).

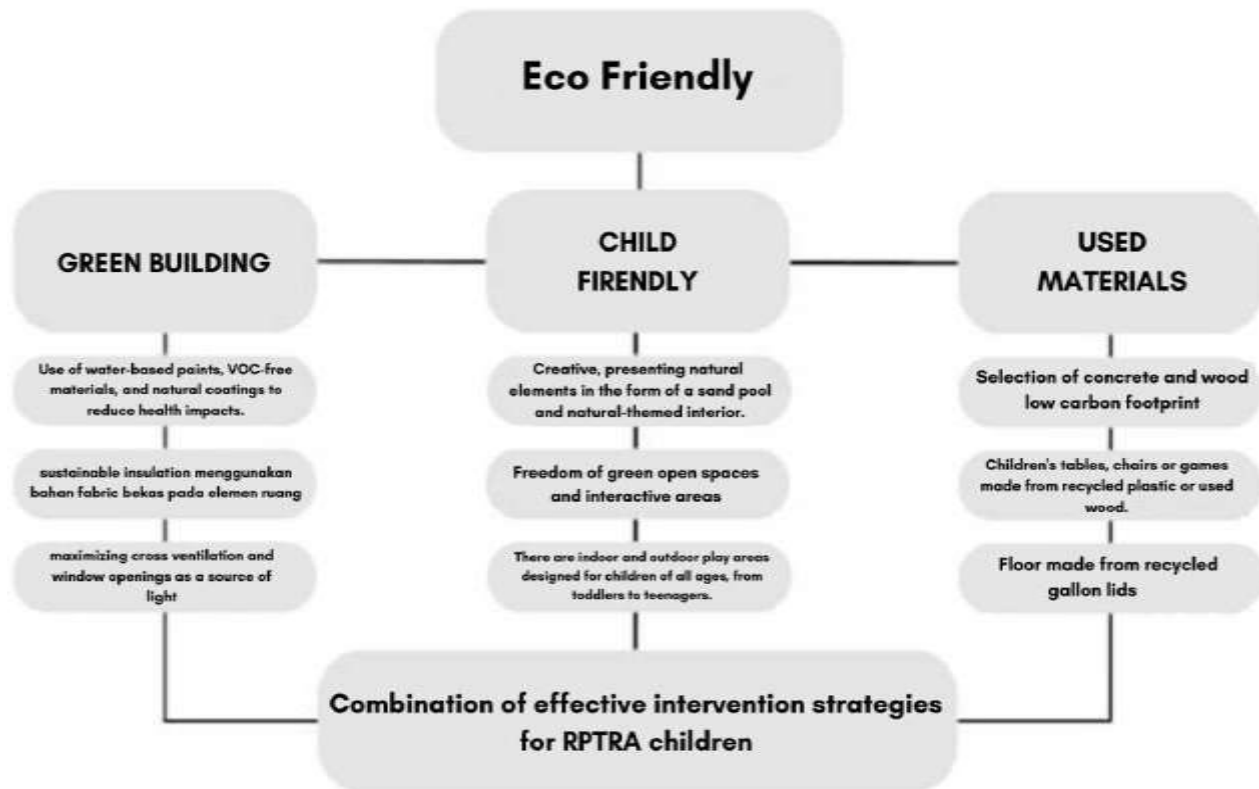


Figure 1. Idea and Concept Scheme, creations by Shirly Angela., 2024

Green Building

To create a comfortable environment in the interior of the RPTRA, the building needs to optimize the Green Building standard with several factors that need to be considered, including acoustics or noise level insulation, cleanliness that affects children's health, the choice of water-based and VOC-free paint materials, and lighting, use of textures, and optimal air circulation (Syauqi, 2024).

To achieve optimal acoustic levels, several steps can be applied, including the use of primary and additional materials that have soundproof properties. In this design, the walls use lightweight brick materials, while additions such as ordinary carpets, fur carpets, and padded walls can help reduce noise. In addition to materials, the layout of the room needs to be considered. The therapy room and family development room are serious therapy rooms that require a level of tranquility so that a separation needs to be provided between the area where children actively play and the therapy area. In this facility, the therapy room is separated by the waiting room lobby and is located on the right side, adjacent to the staff room so that tranquility is guaranteed. Meanwhile, the skills room is on the left side next to the music room, performance hall, and others which also have high noise levels.

Meanwhile, maximum air circulation can be overcome by using cross ventilation, especially in buildings facing outwards such as Music Room and Mini Library. Cross ventilation in green buildings offers various benefits, such as energy savings by utilizing natural air flow to cool or heat the room, reducing dependence on artificial cooling or heating systems. It also improves indoor air quality by reducing air pollution, regulating humidity,

and creating a more comfortable environment for occupants. In addition, cross ventilation supports environmentally friendly design by reducing energy consumption and carbon footprint, and can reduce the use of expensive mechanical cooling systems, making it an efficient and cost-effective solution in sustainable buildings.



Figure 2. Window Applications on Music Room and Mini Library, creations by Shirly Angela., 2024

In determining the number and size of openings that meet the standards in each room, the WWR (Window to Wall Ratio) formula can be used. The WWR formula is used to determine the ideal proportion between window and wall area. By using this formula, the optimal window size can be determined for each room, according to the standards set by SNI (Indonesian National Standard) in order to create an eco-friendly RPTRA. Based on SNI (Indonesian National Standard), ideally the WWR is in the range of 15-25%. This means that around 15-25% of the wall area should consist of windows or other openings. In eco-friendly RPTRA, the WWR value can be adjusted to the location of the building and its orientation to the sun to maximize natural lighting without causing excessive heat. So in this calculation, a minimum WWR of 25% is used.

$$WWR = \frac{\text{Total luas jendela pada suatu fasade}}{\text{Total luas dinding fasade tersebut}} \times 100\%$$

Figure 3. Window to Wall Ratio Calculation, photos by Togatorop, 2016

The entry of heat from sunlight can be overcome with low-emissivity (Low-E) glass which can reduce heat from sunlight without reducing the intensity of its light. This glass is coated with a microscopic layer that reflects infrared and ultraviolet radiation, thus maintaining a stable indoor temperature (Ahsani et al., 2016).

For ventilation, materials such as bamboo or wood that are certified environmentally friendly can be an option. Windows in children's play areas should be placed in a position that is higher than the reach of children, such as above 1.5 meters from the floor. In addition, it is recommended to use tempered glass, which is stronger and safer than ordinary glass. If broken, this glass will shatter into small, non-sharp shards, reducing the risk of serious injury. Windows can also be equipped with additional security such as grilles or bars that do not interfere with natural lighting, but prevent children from trying to open the window or climb out. In addition, the use of safety locks on the windows is also recommended so that children cannot open them easily.

To implement the child-friendly concept and create a comfortable environment for children, the lighting level in each room needs to be adjusted to the average minimum lighting level recommendations according to SNI (Indonesian National Standard). Some rooms will be equipped with decorative lighting. The types of lamps used are hanging lamps, LED strips. Both types of lamps will be used in the lobby area, waiting room, and rooms that can be accessed by children to give an attractive impression.

$$N = \frac{E \times L \times W}{\Phi \times LLF \times CU \times n}$$

Figure 4. Calculation of Lamp Quantity, photos by Daud et al., 2020



Figure 5. The Type of Lamp Used on Corridors and Perform Hall , creations by Shirly Angela., 2024

In addition, experts recommend a soft and natural color palette to realize eco-friendly RPTRA, in order to create a safe, comfortable, and enjoyable atmosphere for children. According to Birren (1950), colors such as pale blue and soft green are known to create calmness, which can help children feel safe and comfortable in their environment. Colors such as light mustard, khaki, ivory, beige, soft gray are also recommended in certain spaces to create a harmonious and enjoyable atmosphere. This is important to help children feel more connected to their environment and support their emotional well-being. (Wright, 1984).

Some panels can be coated with water-based eco-friendly paint. Water-based eco-friendly paint is paint that uses water as its main solvent. This paint is safer for the environment and health because it does not emit a pungent odor and contains fewer hazardous chemicals. By using natural and safe materials, this space promotes the health of its occupants while preserving the environment. Unfortunately, water-based paint tends to fade faster if exposed to UV rays and high humidity, especially if no additional protection is used. Then you can use a clear coat type of paint protector, namely an environmentally friendly water-based or acrylic-based coating, which does not change the original paint color and provides a matte, satin, or glossy finish according to your choice.

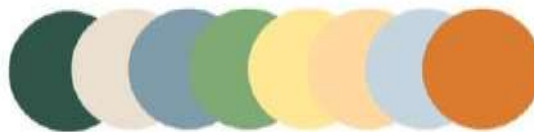


Figure 6. Color Scheme, creations by Shirly Angela., 2024

Child Friendly

Creativity as a means of educating children about nature also plays an important role. One relevant design approach is the natural interaction design strategy, which includes natural elements such as sunlight, wind, rain, colors, and sounds of nature. Naturally, humans, including children, have an attachment to nature. However, urban children often miss out on the opportunity to develop emotionally, cognitively, and physically due to lack of exposure to nature. Kellert (2005) stated that urban children have a deep need to return to nature in

response to living in an artificial environment far from natural elements. Nature is not only an escape from the pressures of highly structured and limited urban life, but also offers a space for children to play freely, channel creativity, and overcome the discomfort of modern life full of rules (Bellamy et al., 2020). Interacting directly with these elements can provide various benefits, such as increased cognition, mental health, physical health, and support for children's social and emotional development (Barakat et al., 2019). Therefore, incorporating natural elements into the RPTRA design is key to creating an environmentally friendly environment that supports children's freedom and optimal creativity.

Some aspects of nature that will be applied to this facility are elements of trees, or plants that are dominated by green colors. All elements that display images or motifs of trees and natural elements can improve children's emotional well-being. Kaplan & Kaplan (1989) explained that although visual elements of nature do not replace the physical presence of nature, elements with natural motifs can imitate calming visual aspects, thus helping children feel more comfortable and relaxed in the space. Elements that display nature can also function as interesting educational tools. Chawla (1999) noted that visual exposure to natural elements can increase environmental awareness and promote sustainability values. Children can learn about various types of plants and ecosystems through informative and interesting element designs.

Modified tree shapes are used as wall panels that are integrated with the ceiling as a light source, such as in the Library bookshelf and the skill room play area. In addition, other natural elements such as panels inspired by the curved shape of bushes are also presented, especially on the padded wall of the therapy room, the Library bookshelf, and the wall panels of R. Keterampilan. Trees as design elements are the main inspiration for the structure of the room. The sturdy tree trunk represents the vertical element, which can be translated into large pillars that support the building, resembling a trunk that grows strongly upwards. These pillars not only function as structural elements, but are also used as decorative parts that remind us of nature. The transformation of trees is also applied to room partitions, furniture, and floor and wall elements of other rooms.



Figure 7. Form Transformation 1 and the Applications, creations by Shirly Angela., 2024

Meanwhile, lower and denser bushes are translated into horizontal elements that fill the space. These elements are represented by low furniture, room partitions, or wall elements covered with vegetation, giving a natural

impression that is alive and colorful. With intelligent placement, these elements also increase privacy without sacrificing the openness of the space, creating comfortable zones. Wall panels with tree and bush themes not only provide aesthetic benefits, but also have a significant impact on psychology. Research shows that visualizing nature in interior spaces can reduce stress, increase creativity, and improve emotional comfort. The presence of these nature-inspired panels creates a feeling of being outdoors, strengthening the occupants' connection with nature even when they are indoors.



Figure 8. Form Transformation 1 and the Applications, creations by Shirly Angela., 2024

In addition, natural elements are also visually presented in the interior of the facility to bring visitors and staff closer to the environment. The application of indoor artificial plants is maximized in several areas, such as above the windows in the lobby area, on the ceiling of the waiting area, and in most of the office areas. In addition, potted plants are also placed in several other rooms to add a touch of green throughout the facility.



Figure 9. Nature Elements on Waiting Room and Perform Hall, creations by Shirly Angela., 2024

Creating outdoor playground areas and other playing fields can be a form of nature integration in RPTRA design for children. In addition to providing space for play, this area can also be used for outdoor activities and self-development creativity programs. The involvement of natural elements in RPTRA is considered to provide significant benefits for children, including increasing their freedom and development. Therefore, the implementation of a comfortable, safe, and enjoyable environment that involves natural elements maximally

in RPTRA design will support the creation of an effective eco-friendly concept, as well as support the optimal development of children in an environmentally friendly context.



Figure 10. Outdoor Area, creations by Shirly Angela., 2024

Used Materials

All parts of the RPTRA are specifically designed for the safety and comfort of children. Therefore, the materials used have been carefully selected to meet the needs of children in an environmentally friendly place with a low carbon footprint. The materials used include soft parquet and carpet, easy-to-clean ceramics, and rough surfaces to avoid slippery areas, especially on the terrace and outdoor areas. In addition, elements of wood and bamboo as sustainable natural materials and modern elements such as glass are also applied, all adjusted to the eco-friendly principle. The selection of these materials aims to create a safe, comfortable environment that supports the development of children in the RPTRA. In realizing the eco-friendly theme, the use of used materials is also very much needed, so the 3R concept (Regenerative, Reuse, Recycle) is emphasized in the concept of space.



Figure 11. Material and Color Scheme, creations by Shirly Angela., 2024

Regenerative is a material whose material can be re-cultivated, in the form of organic plant materials that can be applied directly without transformation. Materials such as FSC (Forest Stewardship Council) certified wood, or bamboo fiber are used to make Library partitions. These materials are not only easily biodegradable, but are also produced with minimal environmental impact, reducing the carbon footprint. In this design, regenerative uses wood and bamboo for the ceiling, walls, columns, and furniture that can be seen in the Library Room and Science Room.



Figure 12. Regenerative Applications on Library and Science Room, creations by Shirly Angela., 2024

Reuse is the reuse of building materials whose quality and form are still suitable for use for the same or new function. In this design, reused wood materials are used for several sides of the walls and partitions in the Skills Room. This wood uses low carbon footprint wood with a process starting with the selection of fast-growing tree species, such as bamboo, acacia, or eucalyptus, which are planted in managed forests using an agroforestry system to maintain biodiversity (0–1 year). Trees are maintained sustainably without pesticides or chemical fertilizers, while their carbon absorption capacity is monitored until they are mature (1–20 years). Logging is carried out selectively by ensuring regeneration through planting replacement trees and managing wood waste into biomass or derivative products (21–22 years). Wood is processed using a natural drying method to reduce energy consumption, followed by a cutting process using energy-efficient machines, and waste is utilized (22–23 years). Finishing uses non-toxic water-based coatings and natural materials, as well as environmentally friendly packaging (23 years). Transportation is carried out with a low carbon footprint logistics system,

accompanied by sustainability certification (FSC or PEFC) and consumer education about the benefits of sustainable wood products (23–24 years), ensuring a process that supports the ecosystem and the environment.



Figure 13. Reuse Applications on Skills and Sensory Room, creations by Shirly Angela., 2024

While *Recycle* is the process of reprocessing waste or unused materials into materials that can be reused. In this design, the recycled material uses gallon bottle caps that are crushed and reprocessed for the entire floor of the facility, for example in the lobby of the waiting room.



Figure 14. Recycle Applications on Waiting Room, creations by Shirly Angela., 2024

CONCLUSION

Child-Friendly Integrated Public Spaces (RPTRA) in Jakarta are designed as self-development facilities that support children's growth and development through educational, recreational, and rehabilitative activities. With an eco-friendly and child-friendly concept, the interior design of RPTRA prioritizes buildings that meet Green Building standards, are child-friendly, visualize interactive areas with a natural theme, and use recycled materials for room elements. Several factors that need to be considered to create a green building are acoustic factors or noise level insulation, cleanliness that affects children's health, the choice of water-based and VOC-free paint materials, and lighting, use of textures, and optimal air circulation. Outdoor areas such as interactive parks, playgrounds, and community gardens are designed to support children's creativity through nature exploration, free play, and arts and crafts activities. Also, the use of low-carbon footprint materials can help realize maximum eco-friendliness. RPTRA is also a means for parents to get parenting information, making it an inclusive space that helps children maximize their physical, mental, and social potential.

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