Utilization of natural lighting influence on the Building design forms for Children's Traumatic Center in Banda Aceh

Mira Alfitri[1], Totok Noerwasito[2], dan Sri Nastiti[2]

1. Architectural Design Postgraduate Student, Faculty of Civil Engineering and Planning Institute Technology Sepuluh November, Kampus ITS Sukolilo, Surabaya, Indonesia, Email: mira_arstk@yahoo.co.id
2. Lecturer in Architectural Design Department, Faculty of Civil Engineering and Planning, Institute Technology Sepuluh November, , Kampus ITS Sukolilo, Surabaya, Indonesia.

Abstract

Traumas experienced in children is a bad thing that could adversely affect the child's future. The trauma center is the psychological trauma rehabilitation center for children (7-12 years) who experienced with trauma. The approach to designing trauma center chosen by the child closer to the natural features, is to bring natural lighting into the space that can provide benefits for the child's trauma, as well as an influence on the shape of the building, where the shape of the building should be able to optimization of natural light. The research process do to with "Cyclical Design Process", which is the end result of the research is the schematic design of the child trauma center idea forms. It is utilizing of natural light into the building.

Keywords: child traumatic, trauma centers, natural lighting, concept, schematic design.

1. Introduction

Age of children (7-12 years) are particularly vulnerable affected by traumatic events such as natural disasters, death, violence and child-many respond sensitively to such events so that the child will tell about what a natural disaster happened with them repeatedly, and demonstrate the attention to safety also prevention of danger, experiencing sleep disorders, aggressive behavior, excessive fear, exile, loss of interest in social activities (Ehrenreich, 2001). Designing of traumatic rehabilitation center is needed for traumatic children to get soon better and get a better life. Therefore, the design, building of the rehabilitation traumatic center will be done by looking at natural approaches that could have a positive effect on traumatic's children. One of the natural features that are good for children and can have a positive effect by removing traumatic stress in children is to bring natural light into the room. Utilization of natural light in the design besides giving a good influence for traumatized children, design utilizing natural light will also affect the shape of the building. It is caused by, the using of lighting and getting the natural light on each side of the North-South and East-West are different. Moreover, the problems faced was the heat into the room. It is necessary for analysis to determine how solutions to address the problem to avoid direct sunlight and get a good natural light for traumatic's children.

2. Studies Theory

2.1 Psychic Trauma in children

Psychological trauma that occurs when a person have a traumatic experience repeatedly so that the patient experiences pain deep (Terr, 1992). Psychological trauma (traumatic) will lead to suffering children with Post Traumatic Stress Disorder (PTSD). Some of the events that cause psychological trauma include the natural disasters, violence, and medical procedures. Psychological trauma will eliminate most of the happiness of his future child's life that will shape the character of the child in the future. Therefore, it is a necessary trauma trauma center as a rehabilitation center for children aged (7-12) years old who experienced traumatic psychological trauma that children can return to normal life as a child.

2.2 The Natural Light for Health

Natural lighting during the day give a good impact on the improvement of human health, including children's traumatic. (Kandel et al, 2013 in Browning, WD, Ryan, CO, Clancy, JO (2014) Terrapin Bright Green, page-7) through his research, states that natural lighting can regulate the circadian system in the body through the light captured by the human eye. Yellow sunlight during the morning, and the sky that contains many light blue, light occurs when the afternoon can produce the hormone serotonin in the body, and changes in light of the late afternoon sky with light reddish sky without the light blue of the human body can respond to the start the formation of the hormone melatonin. Serotonin is a hormone that is found during the day are useful to treat depression. Serotonin deficiency causes rapid changes in feelings such as grief, stress, and depression. While melatonin is a hormone that is formed on a night that regulate the body so it can sleep soundly, a natural anti-oxidant, neutralizing the body of harmful substances (Reiter, 1995 in Boubekri, Mohamed (2008) .Daylighting, Architecture and Health). Natural light is good for health is the light that the human eye can be captured with a wavelength of 380-700 NM, below the wavelength of light that is made from chemicals, while light thereon has properties very hot (Satwiko P, 2008). So that if the child is a traumatic look of natural light that is comfortable for human eyes or glare in the morning, afternoon to evening will help the child's body to produce the hormone serotonin which can suppress high stress levels in children traumatized.

2.3 Strategy Design of Utilizing The Natural Light

According to (Lechner, N, 2007) design that utilizes natural light can be achieved by using the following strategies:

1. The orientation of the building
   Indonesia is located in the humid tropical climate, so throughout all of the year will have experience just summer and rainy. The orientation of the building will greatly affect the perceived comfort of sunlight in the room.
2. Opening the wall through the window as natural lighting
   The lighting of the window has a different problem with the lighting of the roof. To maintain the quality of natural light during the day can be done by adding vegetation, and provide shade in each window.
3. The shape of the building
   Ensuring shape of the building that can provide natural lighting throughout the room. It can be done by designing the shape of elongated and thin, designing atrium, and designing the courtyard in the center of the buildings.

2.1 Design Criteria

Table 2. 1 Design criteria beased on the studies theory

Strategy design	Criteria
The orientation of the building	-The primary design of orientation building on North-South -Using the best possible potential siteplan in the area.
Opening the wall through the window as natural lighting	-The window does not block the view towards children -The light entered is not a non-glare light -Having reflective field to block direct sunlight -The primary design of the windows on the North-South side -Using Additional protection on the East-West side window as horizontal grille, as well as vertical sloping field
The shape of the building	-The shape of the building can optimize natural lighting throughout the room -Pay attention to the buildings around

3. Research Methodology

Cyclical Design Process (Duerk, D. P, 1993), consist of:

1. Analysis
   At this stage of the analysis, conducted baseline data that related to the title of the study, the data will be obtained by searching through the internet, library, and direct field observation. The data obtained will be a reference for determining the design criteria.
2. Synthesis
   In the synthesis stage, early in the design criteria used as the basis of assessment in the analysis process. The analysis carried out so that the design criteria can be met.
3. Evaluation
   In the evaluation phase, the research has produced a concept design ideas form. Prior to the drawing, the concept is adjusted back to the design criteria. If there is a depiction of the suitability of the process, it can be immediately implemented.

4. Analysis and Design

4.1 Location of The Design Building

The selection of the location of the design is done with some consideration, such as far from the center of town, has an interesting view, adequate land area, so that the researchers chose the vacant land located beside of Soekarno-Hatta street, Darul Imarah districts. The location was chosen to be the outskirts of Banda Aceh with low noise levels, easy to access location, adequate land area and has a view that is quite interesting as paddy fields and mountains.

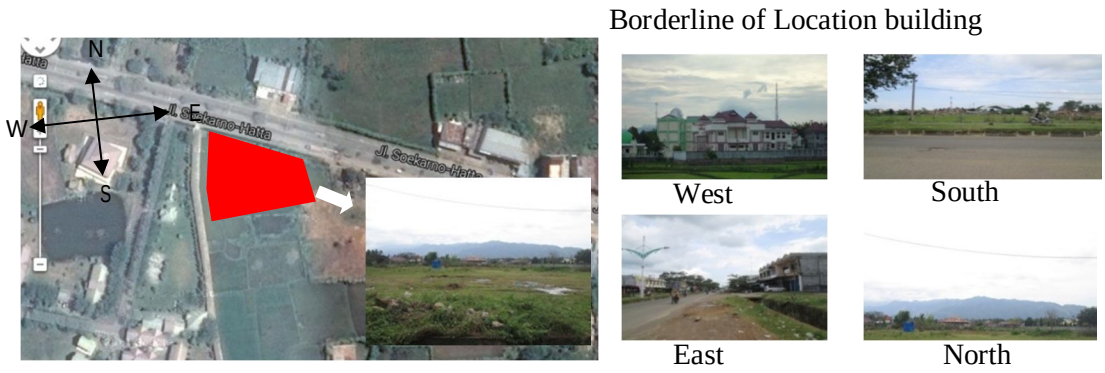

Figure 4.1 Location of children traumatic center building

4.2 Analysis of the Sun.

Analysis of the Sun is done by using the motion of the sun simulator, which can estimate the trajectory of the sun, the case study is Banda Aceh, located at latitude is 5º 34 'N and longitude is 95º 19' E. Sun trajectory forecast data taken when the sun at the equinox and solstice in March, June, September and December so that it can be used as a natural lighting analysis.

Table 4. 1 Angle data approximate of the sun on the horizon by the motion of the sun simulator updates on 3 April 2015 at 15.00 pm

	Time trajectory of the sun	The angle of the sun on the horizon	10.00 am	12.00 pm	02.00 pm
Equinox	22 maret	*Suns's altitude*	57,8º	85,6º	61,1 º
		Suns's azimuth	79,9 º	150 º	281,6 º
Solstice	22 Juni	*Suns's altitude*	48,6 º	61,3 º	49,4 º
		Suns's azimuth	44,8 º	0,9 º	316,1 º
Equinox	22 September	*Suns's altitude*	61,4 º	84,4 º	57,7 º
		Suns's azimuth	80,1 º	340,2 º	278,4 º
Solstice	22 Desember	*Suns's altitude*	56,1 º	71,9 º	55,7 º
		Suns's azimuth	125,3 º	180,9 º	235,1 º

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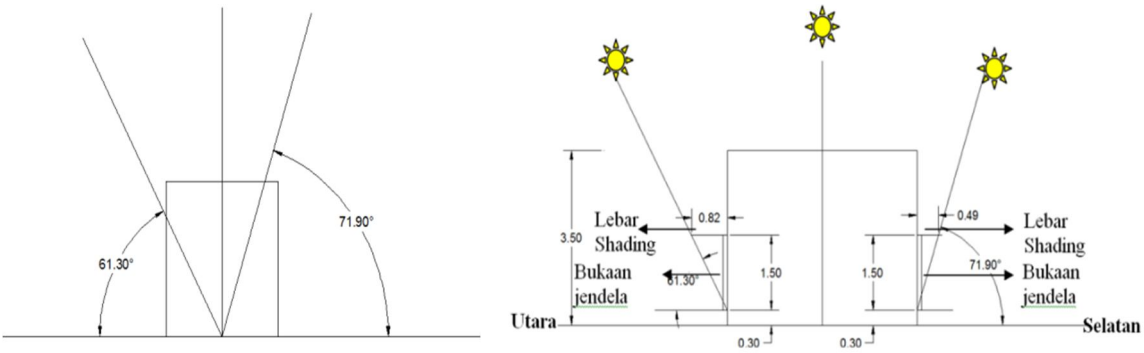

Figure 4. 3 Analysis sun with altitude angle

Table 4. 2 Analysis of natural light in the schematic design of the building idea form for children traumatic center building

Strategy design	Kriteria	Analisa
The orientation of the building	-The primary design of orientation building on North-South -Using the best possible potential siteplan in the area, such as exploiting the potential of not blocking the view to the child's views to the outside, especially areas that have an interesting view.	-Based On the results of site analysis, the site presents a great opportunity to get orientation on the North-South side. However, the side directly facing the highway, the site is perfectly located in the North direction, but the direction of the Northeast, while the South side of the tread face to face with the expanse of paddy fields and mountains. North-South orientation can be put to good use especially if it can be the front side facing the opposite direction of the Northeast into the North.
Opening the wall through the window as natural lighting	-The window does not block the view towards children -The light entered is not a non-glare light -Having reflective field to block direct sunlight -The primary design of the windows on the North-South side -Using Additional protection on the East-West side window as horizontal grille, as well as vertical sloping field	-North-South -Orientasi by opening a wider surface area in the North-South area. -Making void, atria or courtyard in the center of building with open roof where the area is difficult to get sunlight.
The shape of the building	-The shape of the building can optimize natural lighting throughout the room -Pay attention to the buildings around	To give comfort the children to see the light without glare on the North-South side, the sun should be reflected through the reflective field in the form of shading on the windows to reflect light at 12 noon, and reflective vertical field on the left side and right side to reflect sunlight at 10 am and at 2 pm, because at that time the sun at a low angle.

Based on the results of the above analysis can be determined schematic design concepts trauma center is idea concept form, it is consist of :

Table 4. 3 Idea concept forms on the schematic design of the children traumatic center

Design Building	Concept
Form idea	1. North-South orientation by utilizing the potential of the site. 2. The form must be able to focus better observer of the Southwestern and Northwestern. 3. The shape of the building should really be able to capture the natural light into the room, especially the North-South side. 4. North-South side aperture using shading to the size specified in the analysis of the sun. 5. East-West side openings must be protected with canted vertical shading fins, in order to reflect sunlight into the room. 6. If there is a room that does not get optimal natural lighting, then the central part of the building used as a courtyard, and a playground for traumatic children. 7. If there are additional floor for traumatic children, should choose to raise up the floor on the South side.

Before performing the imaging process, the concept of the idea of the shape and the results of the analysis in the evaluation so that the results obtained are consistent with the design criteria. Results concept form idea is the brainchild of analysis tailored to the criteria, so that it can be said that the concept of the idea of the form in accordance with the criteria for design and imaging process can be resumed.

4.3 Designing of Idea Form

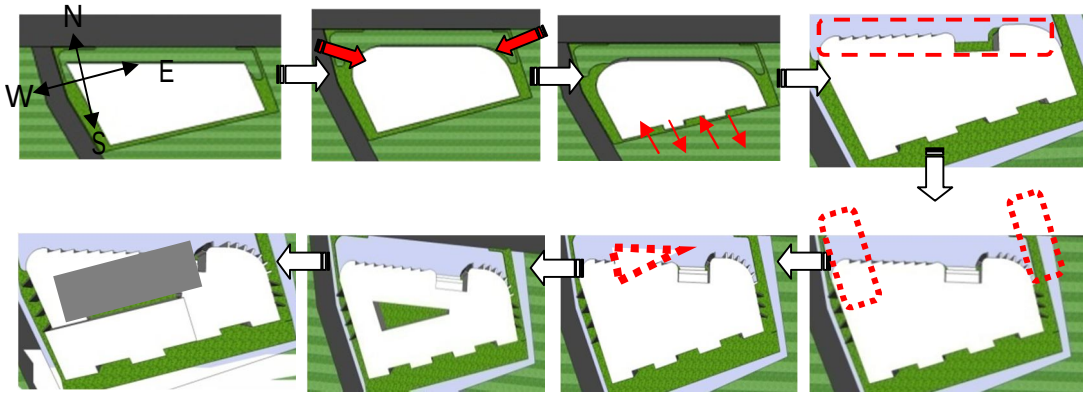

Figure 4. 3 Sun's analysis with altitude angle

In the first process design, the shape of the building follows the shape of the site, which using the potential of the site and the orientation of the building on the North-South side.

In the second process design, the corners are rounded taper which serves to not cover the surrounding buildings as well as the focusing people on the rounded side so that the building is easily recognizable, memorable and found.

In the third process design, so that natural light can be optimized on the south side, the wall area was expanded by way of advance and rewind the wall. This was done to increase the openings on the side walls of the retreat.

In the fourth process design, parts of the Northeast side formed by exploiting openings on the incline North side. Windows was added in the room as far as 80 cm, so that the outer side into a rectangular frame and shading on the openings.

In the design process of the fifth, East-West side openings protected by vertical shading, which is tilted 45 ° to the side of the East and West to reflect direct sunlight on East and West side.

In the design process of the sixth, to incorporate natural light into the room evenly, especially at the hard part to get sunlight, in central part of the building in the holes and used as a park with an open roof or the name of it is courtyard. it can later be used as a children's playing area.

In the design process of the seventh, the southern part of the building in the push up to the top that is used as a shelter for traumatic children. Selected parts of the South because the South side will get a better natural lighting then other side, as well as get an interesting view that the green rice fields and mountains. The following display forms intact idea trauma center by utilizing natural light into the room.

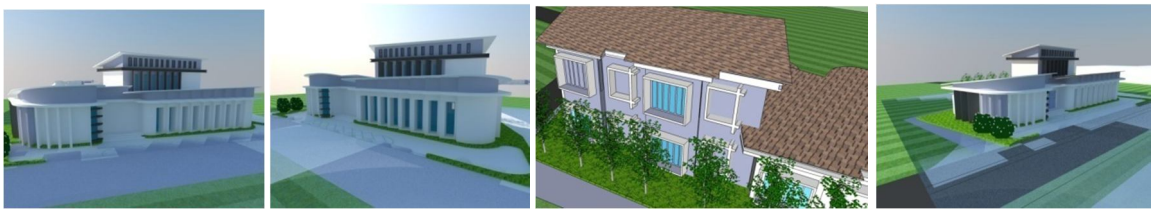

Figure 4. 4 the result of ideas forms based on the design process

5. Conclusion

Based on the criteria, analysis, concepts and ideas shape the design process can be concluded utilization of natural light for the children to be more on the side of the North-South. This was done due to the utilization of natural light on the South side is the best side for children to enjoy and see the light. However, openings on the South side is protected by shading at the top, so it does not restrict the child when he saw the light and outdoor space, especially the view from the South side is the best side. On the side of the West-East have openings but covered with sloping vertical shading that would restrict the view from inside to outside the room. Therefore it can be concluded that, the design which is utilize natural light into the space will make different buildings on each side so that it has the beauty and uniqueness.

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