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FOCUS ON GLASS AS THE MAIN BUILDING MATERIAL IN DESIGNING ARCHITECTURE CASE STUDY: MALANG ABROAD EDUCATION CENTER DESIGN

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Graphical abstract

Abstract

Knowledge are meant to be ruled by many activities, human action, and nature. General value in this case are brightly try to give understanding how much precious this aspect for humanity. As we know, that knowledge and education are completely unbreakable, it is give a wise act, a high quality of human action which is related by the human sources in every societies and mostly impact for environment. Indonesia according to national member of profession certifications shows a very low of human resources quality (WASPADA, 2012). The exposing of education information for oriented in this issue could be said as a danger situation. This project is design expose using material dominant glasses to create educational facilities to support government strategy increasing the quality of human resource. Glass Architecture itself as a modern-high technology processing material is the approach to give a contemporary solution for facilitating the educational planning on building style in Indonesia tropical condition. The using of dominant material is also the symbol of strategy for exposing the existence of these facilities in society. Thus, the people could be more aware. The glass material is contemporary give a very modern situational, and comfort in educational activity. Malang as the location for planning project are suit for this type of building because of humidity and low sunlight intensity and climate condition. The approaches in this processing planning architectural paper project are design by many filter in many analysis, comparison, and deduction. Therefore, this project paper could be a useful planning for supporting the government strategy as increasing the quality of human resource by education sector in architecture solution.

Keywords: Focus on material, glass, educational building, human resource, architecture

1.0 INTRODUCTION

Start on pragmatically understanding to many perspectives, Indonesian society generally aware of this education problematical, that having good education isn't only in locals. But there is more problem indeed, student otherwise societies in macro find a hard access on behalf of gaining information. On this surfaces case, architect try to completely facilitate all the information of abroad education system to be easily accessible for general societies in one system of building. A long with thematic design which is Focus on Material; Glass Architecture – Tropical Area, this project are design to be exposed.

This chosen theme of design is the strategy to expose building physically in the first place since of its disposition of material, modern and high tech style. Dominant use of glass material on building would surprisingly shows the existence of these system education facilities in the district, or society nationally – transparency information and education as the character material itself. Using well high tech of

processing material is also the step to create a green act for tropical Indonesia environment.

As we have concern that the wise act for environment would be priority for material of using in architecture project. The glass material was a bit extreme for tropical condition [1], but technology of processing has its own solution how to minimize the impact without changing much the concept. Combining another material like plastic interlayer, ribbon, silver layer, or even electrical system makes the greenhouse effect reduce its impact, lowing the sunlight reflection for creating urban heat island, or comforting indoor within intensity on the situation of tropical climate from outside. Malang in its condition not much really has clear days like most of tropical cities. Spread on the
400-600 MASL plateau, Malang has especially typical freshing-cold of highland. It has different sunlight intensity than others, makes the site suit to the project.

The contemporary in its building style are also design to introduce Indonesian locality, nationalism context in modern way. The students as user in the building are oriented to feel a different level of nationality in psychology as they facilitate by architecture contemporary-high tech design by glass material. The using of glass dominant material could make a much foundable place for gaining society be more aware of a better education, the accessible place, modern esthetic, and useful.

For those of reasons, in the future this architectural design project paper could be a solution to help government and specially the local society for increasing the quality of human resources. And by the time, Indonesia has a bigger plan to be more Independent. The purpose in this architectural design, Design of Malang Abroad Education Center is:

- Glass Architecture as the dominant material of using could give a very accessible government facilities in abroad educational information to increase quality of human resource, which is in long term could regenerate the broken system in societies.

By the all of the issues, the limitation of this processing design are:

- Location; Education district, Jalan Veteran Malang, Jawa Timur - Indonesia
Theme; *Focus on Material: Glass Architecture* is the chosen theme to create concept and focus design in processing by designing Malang Abroad Education Center

2.0 METHODOLOGY

2.1 Data Collection Methods

Collecting and processing data in this design process were divided as two categories, primary and secondary data. Primary is the type of data which is obtain by the first source, observe, and noted in the same time. Whereas, the secondary is the type of data from the second sources, literature, books, or journal research. The obtained data would not use as it self, but it would be in more processing, dividing, and sorting in the same topic and sub-category.

2.2 Primary Data

The types of data are obtained by the result of observation and discussion;

a. Observation
This kind of method are specially doing for obtain data from the result of the comparative on another precedence of the closest similar architectural object directly. Also the other data which is closely related with planning location, detail condition about the real situation as it was in the field of project, which is include the method of documentation.

b. Discussion and Interview
In this type of method are explaining about the step that is obtaining data by doing discussion and interview on expert and person in related to project design, such as, government, student, lecturer

2.3 Secondary Data

This kind of data is the method of indirect approach for the project which is obtain by the standard data that was already available. Those are including literature or district policy for public consumption. The designers are the subject whom collected and integrated independently for project needs in the process. It is divided in categories;

a. Literature Studies
This are obtain by the relevant data which is generally collect to create basic perspective for processing the design project.
b. Internet
Data which is collect by browsing and sortiring relevant data in internet.
c. Comparison Studies
Indirect approach by learning the similar project on the books to create basic perspective for processing the design project generally

2.4 Design Analysis

Design analysis is the process to detailing where the result of each design element start from. It is one of the basic process to create high consideration which is every act of it would give an effect for the next step, and the environment indeed. Which is in this case, it is very vital issue. Glass architecture as the dominant material of using would have a big portion for consideration. For example the using of the

laminated glass in high intensity of sunlight without combining plastic interlayer in some percent would increase the urban heat island level outside of the building.

The first categories of analysis in this design process is Function Analysis, then Space and Room Analysis, User's Activity Analysis, Form Analysis included then Structure, and finally all of the form by the analysis would be adapted by the real field condition such as the shape of the project site, condition of the humidity and climate, sunlight intensity, wind orientation, etc

2.5 Design Concept

This part are the first result of the analysis, pragmatically defined, but more detail and structured. It was shown as one conceptual design which presented on a several part to give a micro perspective of all process, they are;

a. Basic Concept
b. Form Concept
c. Site and Space Concept
d. Material and Structure Concept
e. Utility Concept

3.0 RESULTS AND DISCUSSION

Malang Abroad Education Center project were designed to facilitate the government plan for gaining the quality of human resources by architectural solution. The issues that already rooted in the Indonesian society are the 'unavailable access for the solution itself'. The architectural projects are mainly design to give a full access for it, to create a big box for the plan, physically. The material glass in dominant of using is the plan to expose widely about the existence of the access and education. Figure 1 shows the object on 3D model.

Figure 1 The object on 3D model

Glazing material might be one of the most important innovations in human history on building technology [1]. It is one of the crucial research that allows having more processing high technology in a similar case. However, the using of the materials weren't always suit in every land on earth. Basically, glass are meant to reflect shadows, which is light are included. Sunlight intensity in several case would have always extreme for the environment, whereas the building itself also contribute the heat level or thermal condition of the area [2].

Indonesia climate conditions are mostly tropical with high humidity. Malang, as the city where the project planned to be design has its own climate condition of tropical type. The position is standing on 400-600 Plateau, highland, between active mountains. The sunlight intensity is mostly covered by the low temperature. The humidity are higher because the rain are mostly longer and often, not much of clear days, which it is would influence the treatment and processing material [3] of using glass.

3.1 Site Analysis Result

3.1.1 Zooning Analysis

The building positioning made up of have a very large influence on the thermal comfort inside the building, it is also define which side would be the most exposed by the sunlight as the main surface of all. In the project design, as the site were, building mainly oriented on east-west. The site project are lengthwise from south to north. It s challenging the design to create a cooler zooning for lowing the sunlight exposure on the side of east-west building (Wonorahardjo, 2015). Figure 2 shows the implementation of glass material.

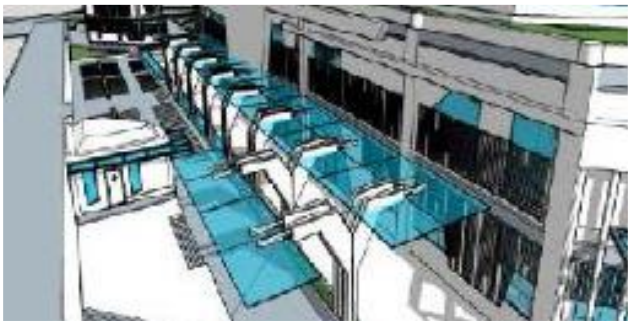

Figure 2 The using of glass material

To be informed there are several massive building that already been standing on the west side of the site, it is giving a thermal impact of the condition, and also increasing the urban heat island level which is, the architect designed the west side of the site as a green area, giving much more vegetation and open space to create a good circulation for the air moving [4].

Whereas on the using of glass material type in this west side, it is macro designed as the lowest dominancy of glass material, however there is still part of room that need more view access on the side, such as canteen. The type of of using is mainly laminated glass with green layer to reduce light intensity from outside. It is also designed not open on the top to create air circulation, avoiding the using of

AC for energy saving.

3.1.2 Sunlight Analysis

The analysis about the sunlight should have done intensively by a lot of aspect and measurement in every thermal research. The using of reflection material could make a surprising result with new unpredictable variables. This project research using a simple simulation with computer program to have a glimpse about the sunlight orientation, also an graphical analysis to create synthesis conclusion. Figure 3 shows the sun oriented analysis

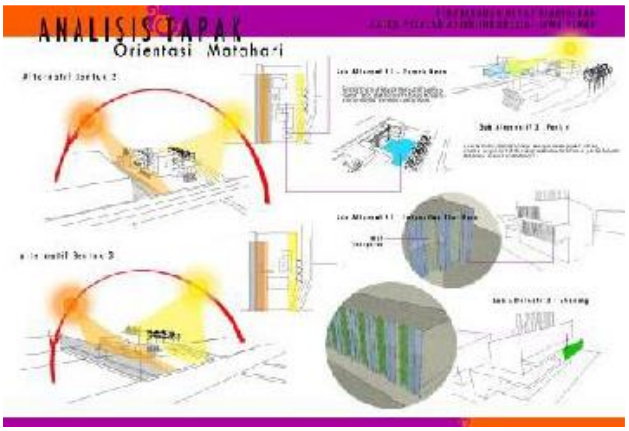

Figure 3 Sun oriented analysis

This research provide 3 kind of similar form to be simulated simply, which is every form has its own face of sunlight exposure. The second form has less surface design to be exposed by sunlight on west side. The design has the capability to create the vertical grid system that allows sunlight to be pass by and not reflected as the other design on the side. The type of material on the exposure side are using by high technology such as electrical glass to create shade and consume the sunlight intensity and decrease it.

On the bellow part, are more using a laminated type of glass with different interlayer rayben colors by certain percent to cover the heat from outside light. The combination also providing an aesthetic exterior and light-changing interior.

3.1.3 Wind Analysis

The thermal condition could indicate the sustainability of the project in the future. The wind speed and orientation aspect was the focus which impact on thermal measurement comfort on dominant glass of using architecture project. In the site of the project, there is a dominant wind orientation that is begin from open space, which is in this project are the street, the street garden, and there is also a green space for cemetery. Figure 4 shows the wind analysis.

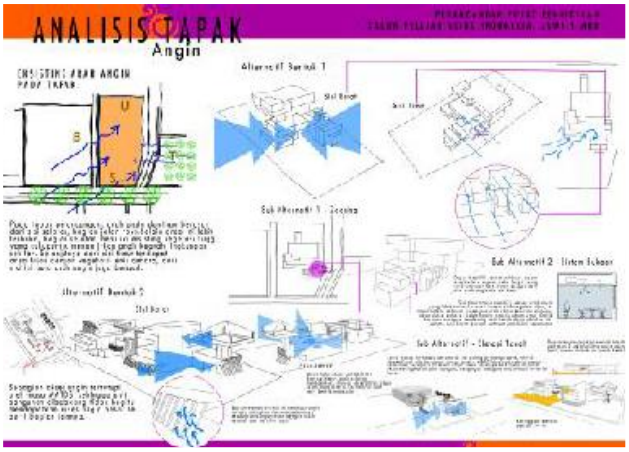

Figure 4 Wind Analysis

The designer provide 3 kind of form to be analyze. Each of it has vertical element that works like passive ventilation. It is massive and orient the wind to be caught on a spot to create a new circulation for lowing the heat temperature. The using of this kind of material are mostly by the steel or another massive material. In some case, like in order to caught the wind from cemetery green space (east side, It has an active ventilation that move actively to adapt with situation [5].

3.1.4 Noise Analysis

The site condition are more likely crowded because of the downtown location. The noises dominantly come from the vehicle activity (south side). The first strategy to stay out of it, is enlarge the building setback. The noisiest spot are on the south side, the using of certain type of glass material could be the good solution and aesthetic way. It is classified as type of tempered glass with triplon system. The combination with stained system also give an aesthetic condition for making it catchier.

3.1.5 Accessibility and Circulation Analysis

This analysis are more likely explain a zooning design for creating an accessible site object for user than material of using. The types of vehicle circulation, etc.

3.1.6 Material Analysis

The using of glass material are the specific methods in this research project to create an exposure of user accesbility in visual contact of the building. The high technology of glass also the similiar strategy to present the awareness of the object existance. There is certain of glass material to be applied in this project design, such as Laminated Glass, Tempered Glass, Smart Glass (Electrical Glass), Accoustic Glass, or the combination between those type of glass. The main structure doesn't use the dominant materials, the using of steel material are the design pattern to show

combination and element of expose. Fortunately, the floor are very compatible to be made by glass material. Figure 5 shows the glazing floor. Figure 5 shows the glazing floor.

Figure 5 Glazing Floor

The design of this part might be one of the most complex glass system in this project architecture. This type of glass are contains by 16m2 with and 12mm thickness glass, structured by 3 layers of laminated glass which needs more than 700C in the preproduction process to create the density strength. This type of glass material are outstandingly safe for living load movement (human). It is also covered by silvered layer to create one-way system, thus the below user couldn't access on the top view. The using of tempered glass mostly to create a high-privacy room level in this project. It needs silent comfort to educational activities, and thus applied on certain room, class, language laboratory, etc.

3.1.7 Urban Heat Island Analysis

The using of dominant material such as glass or the reflected surface material has the ability to make the heat to be unabsorbed by another element, it could be organic or anorganic. The existance of landscape help absorbing the heat to be change by another energy, minimaze the hard open space (park area, square, plaza, etc) to let the hat going into another layers of elements.

Global warming, urban heat island, and such things were always to be concern by many expert for a long time. Every actual product could've have prevent the phenomenon, or using it for another energy to make many more green production.

This project research has done a very simple analysis about the impact if the project was realy stand on the ground, the effect generaly called by Urban Heat Island. This level of temperature showing the schematic of the thermal condition in some sites because the existence of some objects. In some case, the glazing process on building could be very extreme, it is almost absolute that it depends on the land condition, the climate, the sunlight intensity, the thermal situation. Malang as the site of project has a different climate and temperature of most the Indonesian cities, it is has an often rain intensity which is impact on humidity and lowing temperature, and a bit more cloudy as the sunlight cover, the existence of green area are also larger

4.0 CONCLUSION

The education information has should be accessible for all society. It is as one of the base aspect to create a qualified human resource and must be applied in many methods. The government strategies to facilitate the plan were actually needed more. In order to have more quality of the education, this project giving a solution for giving a full access and information for being transparent. This project are design expose using material dominant glasses to create educational facilities to support government strategy increasing the quality of human resource. Glass Architecture itself as a modern-high technology processing material is the approach to give a contemporary solution for facilitating the educational planning on building style in Indonesia tropical condition. The using of dominant material is also the symbol of strategy for exposing the existence of this facilities in society

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