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Lecture Building Planning FKIP UNMUL Banggeris Campus In Samarinda Emphasis On Artificial Lighting

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ABSTRACT

The design of the FKIP UNMUL Lecture Building on the Banggeris Samarinda Campus with an emphasis on artificial lighting is an effort to create an optimal learning environment for students and lecturers. Artificial lighting is the main focus in this design, taking into account aspects of energy efficiency, health and visual comfort. Through a holistic design approach, this lecture building is expected to be able to optimally integrate natural and artificial lighting concepts. Apart from that, it also considers aesthetic aspects and environmental sustainability. This design aims to create an inspiring and comfortable learning space for building users, while reducing inefficient energy consumption. Thus, it is hoped that this design can be an example for other lecture buildings in utilizing artificial lighting effectively.

Keywords: *lighting, building, minimalist, planning, Samarinda*

1. Introduction

Mulawarman University (Unmul) is one of the leading universities in Indonesia, located in Samarinda City, East Kalimantan. The Faculty of Teacher Training and Education (FKIP) is one of the faculties that has an important role in educating prospective teachers and developing educational science in the region. Along with the growth and development of FKIP Unmul, adequate facilities are needed to support academic activities, research, and community service. One effort to meet these needs is to plan the construction of a new, representative and functional building. Banggeris Campus was chosen as the location for the new FKIP Unmul building due to strategic considerations. Its affordable and strategic location provides good accessibility for students and staff, and allows for better integration with existing campus infrastructure. In planning this new building, artificial lighting is one of the most important aspects. Artificial lighting plays a significant role in creating an ergonomic and productive learning environment. Adequate lighting in a room, especially in the classroom, is essential for visual comfort and effective learning. This study analyzes lighting in the classroom with the aim of obtaining the right lighting design to provide visual comfort for students at night or during the day. Good lighting conditions in the classroom at night or during the day are important because they can affect the quality of learning and visual comfort [6]. The lighting system is also divided into 2, namely natural lighting or artificial lighting. Natural lighting comes from sunlight, while artificial lighting is produced from light

sources other than sunlight. The minimum standard for artificial lighting levels has been set by the government. The calculation of lighting levels can be done by taking into account the intensity reduction coefficient, usage coefficient, lamp lumens, and room area [7]. This study also discusses the minimalist modern architectural approach to building construction. Minimalist modern architecture pays attention to functionality and efficiency without neglecting the aesthetic aspects of the building [8]. This article discusses the application of reduction, horizontal, and vertical elements in minimalist modern architecture in buildings and utilizes materials as aesthetics [9]. In the case study analysis, it was concluded that minimalist modern architecture is the result of solutions to the problems of limitations and efficiency, as well as aesthetic value in building design [9].

1.2 Objective

The objectives in planning the FKIP Unmul lecture building, Banggeris campus in Samarinda, East Kalimantan are as follows:

The planning of the FKIP Unmul lecture building for the Banggeris Samarinda campus emphasizes artificial

lighting and the planning of the FKIP Unmul lecture building for the Banggeris Samarinda campus by paying attention to the modern minimalist style

The problem limitations in the planning of the FKIP Unmul Banggeris Campus Lecture Building, Samarinda, East Kalimantan are as follows:

Planning of the FKIP Unmul Banggeris Campus Lecture Building with a building mass consisting of 3 masses with a building floor count of 2 floors located at Street Banggeris No.89, Karang Anyar, Sungai Kunjang District, Samarinda City, East Kalimantan and Management of existing data designed to become the FKIP Unmul Banggeris Campus Lecture Building with a land area of 10,000 m2.

The limitations of the discussion material that is the focus of the research to find the form of artificial lighting in the classroom and the modern minimalist style of the FKIP Unmul Banggeris Campus lecture building. Meanwhile, the studies conducted to achieve these objectives include:

Analysis of artificial lighting in the classroom; In his book entitled building physics about understanding Light, heat, humidity, climate, earthquakes, and fires. Lighting in the classroom uses more even lighting, namely downlights because even lighting makes it easier to distribute throughout the room [4]. The principles of artificial lighting are to pay attention to aspects of artificial lighting divided into 2, namely: quantity, and quality Where the quantity aspect is objective and expressed in a nominal amount or size such as the number of light points, lamp size, and lamp voltage in volts while the quality aspect is subjective Where this aspect cannot be measured in nominal quantities but is closely related to emotional aspects such as classroom atmosphere, contrast, and beauty [3].

Modern minimalist building facade style: Quote from a journal entitled Modern minimalist architectural approach to office buildings. Facade design on buildings includes simplicity in the use of color, the functionality of the building must be in accordance with its use, and the use of materials that tend to have texture and quality to create a clean and minimalist appearance [10]. Based on quotes from the journal, the aspects used in modern minimalist design are simple furniture, measured accents such as paintings, and the main needs of each element of modern minimalist design [13].

Artificial Lighting Standards: Lighting is one of the important factors in designing a space. A good school should be designed so that it can increase the effectiveness of the teaching and learning process. The standard for classroom lighting in Indonesia is a minimum of 300 lux. Meanwhile, the lamps used in classrooms are recommended to be lamps with a neutral white light color whose light can blend well with natural light [12].

Definition of Modern Minimalist Style : Planning of campus buildings must have an architectural aspect approach that is appropriate and supports the function of the building, the modern minimalist style also focuses on simple forms, neutral colors, and clean materials [15].

Minimalist Modern Style Principles: Modern minimalist architecture also has a principle of saving in the use of space aspects based on the study of space needs based on the arrangement and formation of space. The modern minimalist concept maximizes fairly large openings by minimizing building mass & dense design. Modern minimalist architecture maximizes the original characteristics of the building by exploring the structure and materials used which are used as aesthetic aspects of the building, one of which is by playing with geometric shapes that are reinforced by the formation of horizontal and vertical building lines [11].

Implementation of Modern Minimalist Design: Modern minimalist design prioritizes clarity of form, and the use of clean materials and colors in its application to educational buildings. Several components that are generally found in modern minimalist design are the geometric shapes of buildings: (1) Designs dominated by rectangular, square and circular shapes. (2) The use of straight lines and sharp angles creates an impression of firmness and clarity in an educational building [14].

Classroom Capacity Standards in Figure 1 according to the citation of the architect's data book volume 1, the number of building user capacity, especially students, will be based on the minimum number in accordance with the Regulation of the Minister of Education and Culture of the Republic of Indonesia concerning National Higher Education Standards in 2013 Article 21 which states that: The capacity of the lecture room is 30 people with a standard room area of 2 m2/student, minimum area of 20 m2. The Postgraduate Program provides at least one large lecture room with a capacity of 80 people with a standard area of 1.5 m2/student. The lecture room is equipped with 1 set of furniture/room and 1 set of educational media/room [1].

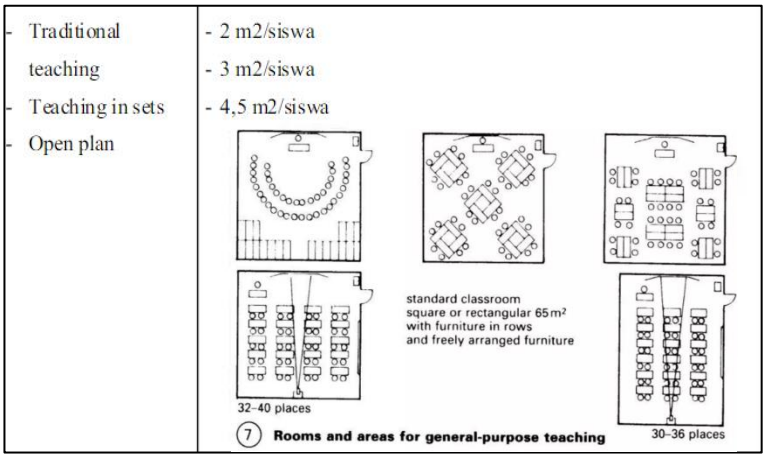

Figure 1 Classroom Capacity Standards (Architectural Data Volume 1, 2003)

The library space standards are explained in Figure 2 which is quoted from the architect's data book volume 2 and has dimensions of Area for a table 0.7 m x 1.00 m = 0.7 m², Area for two tables 0.7 m x 1.00 m x 2 = 1.40 m², Minimum distance between tables 0.6 m, Minimum space for movement 1.35 m - 1.50 m, Height of bookshelf with 5 levels 2.25 m, Bookshelf for students 1.70 m, Bookshelf for children 1.20 m [2].

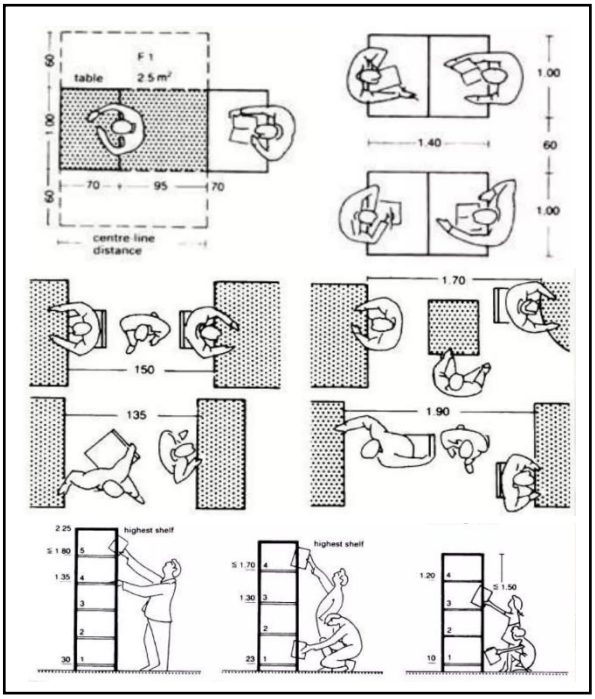

Figure 1 Library Space Standards (Architectural Data Volume 2, 2003)

The linear organizational pattern shown in Figure 3 is explained as being formed by a series of spaces that can be directly connected to each other and connected to different and separate linear spaces [5].

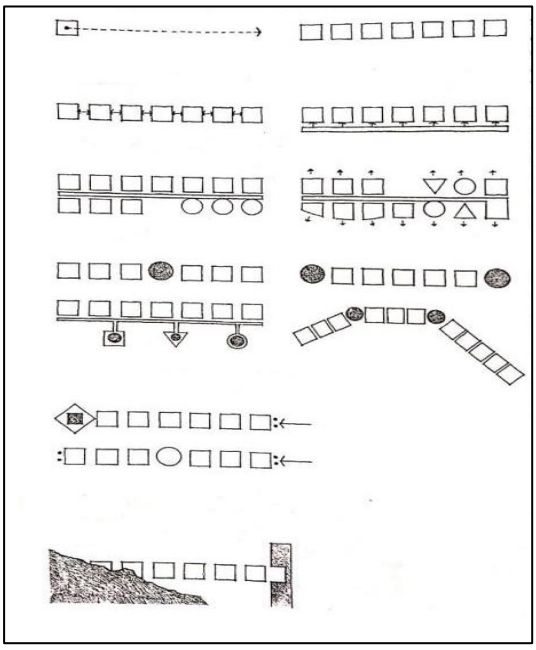

Figure 2 Linear Space Organization Patterns (D,K Ching, 1996)

1.3 Design Method

The method used in planning the FKIP Unmul Lecture Building, Benggaris Campus in Samarinda, places greater emphasis on the issue of Artificial Lighting. Apart from that, there is several literature that can be used and become a standard in planning FKIP lecture buildings for the Banggeris campus.

Identification of problems

The idea for building planning with the title Planning for the FKIP Unmul Lecture Building, Benggaris Campus in Samarinda. The emphasis on artificial lighting was formed because the layout of the existing buildings in the lecture building was still poorly organized and also due to complaints from students, especially complaints about narrow and dark classrooms. because there are more and more people interested in entering the FKIP Unmul major but it is not adjusted to the capacity and good layout. Therefore, a building for the FKIP Unmul Lecture Building at the Benggaris Campus in Samarinda is needed with an emphasis on artificial lighting.

Data collection

Look for data and information regarding existing problems regarding how to design lecture buildings at the FKIP Unmul Banggeris Campus in Samarinda with an emphasis on artificial lighting, then collect data that can be used as a design guide. Data can be in the form of primary data obtained through direct observation in the field and secondary data obtained through literature or internet studies which can support references to related data.

Data analysis

The data and information obtained are then collected from both primary data and secondary data and will be analyzed according to the needs of designing lecture buildings for the FKIP Unmul Banggeris Campus in Samarinda with emphasis on artificial lighting to then be used as a reference during the process of creating the concept and design of the building.

Draft

The results of analyzing the data and information that have been obtained are able to provide solutions to overcome problems such as how to design the FKIP Unmul Banggeris Campus lecture building with an emphasis on artificial lighting and how to design the FKIP Unmul Banggeris Campus lecture building in Samarinda by applying a modern minimalist style with the preparation of design concepts appropriate.

Planning

After obtaining the design concept, then enter the planning stage to produce initial design ideas that can present the design concept that has been determined. The steps are as follows.

1.4 Data Processing Methods

The data obtained is then processed using an approach that is appropriate to the scope of the analysis and then a decision will be made on the alternative solutions to the problem being analyzed. This problem solving is translated into planning concepts. The steps in the data processing method are as follows:

Create a design analysis that includes:

Spatial Analysis such as User Activity, Needs, Space Area, and Zoning, the second Site Analysis such as Site Selection, Site Conditions and Sun, Noise, Access, Circulation, Views and Vegetation, the third Building Analysis such as Mass Composition, Building Appearance, Building Materials, Building Structure, and Building Color and Utility Analysis such as Building Utilities, and Environmental Utilities.

Creating a design concept includes:

Space Concept, Site Concept, Building Concept, and Utility Concept

Creating working drawings such as: Floor Plan, Elevation, Building Section, and 3d Exterior and interior Creating a cost budget plan (RAB) and work plan needs (RKS) according to applicable regulations Creating Exterior and Interior Animations.

1.5 Discussion

Space Analysis

This design analysis aims to find out all the activities that occur on the FKIP Unmul Banggeris Samarinda East Kalimantan campus and to obtain the necessary spaces, In figure 4 there is a structure of activities and management on the FKIP Unmul campus, including the head of the study program, head of the laboratory, secretary of the study program, treasurer of the study program, lecturers, security, cleaning staff, and students.

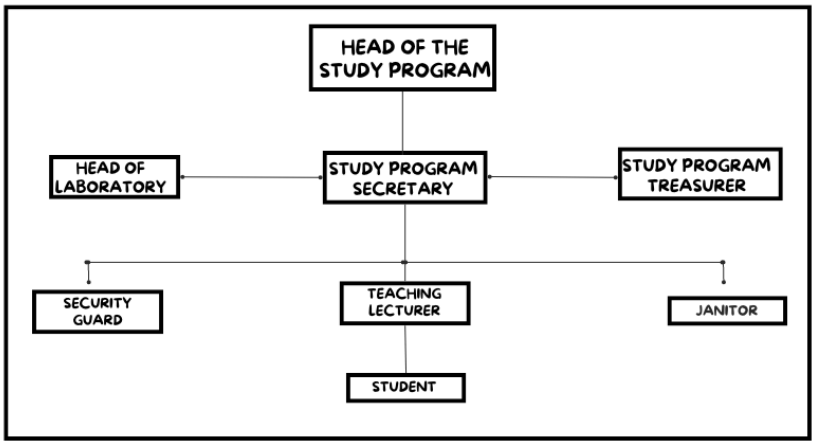

Figure 3 FKIP Unmul Banggeris Campus Lecture Building User Scheme (Private, 2024)

Activity Analysis

The activity analysis aims to determine the activities of users of the FKIP Unmul Banggeris Samarinda, East Kalimantan campus in order to obtain the necessary spaces according to user activities:

Space Requirements Analysis

In this organization, the goal is to provide maximum user meetings so that they can interact and socialize and facilitate access for building users. Room dividers must be used in every building, with the presence of room dividers can provide differences in each room that will be used [16]. The placement of building mass is the main thing in determining the planning pattern of the FKIP Unmul Banggeris Samarinda East Kalimantan campus lecture building. The room is divided into 4 parts, namely: (1) Private is the area that is furthest from noise and the surrounding environment. So this area is a closed area and must have access to the room; (2) This public area can be accessed by every user of the FKIP lecture building. For the Banggeris campus, the location of the public space is usually outside the room such as the lobby; (3) Semi Public is an area that can be crossed and used by users who can access this room; (4) Service is a supporting room in the building planning area. The placement of the service room is usually far from the public area but easily accessible to building users.

Analysis of Space Size

From the table of space requirements above, it can be concluded that space and zones can be determined in planning the FKIP Unmul lecture building, Banggeris Samarinda Campus, East Kalimantan.

Zoning Analysis

This zoning analysis aims to determine the division of zones consisting of public, private and service zones in the FKIP Unmul lecture building, Banggeris Samarinda campus and obtain the spaces needed for building user activities inside.

2. Method

2.1 Site Condition Analysis

Description of existing site condition:Location: Street Banggeris No. 89, Karang Anyar, Sungai Kunjang District, Samarinda City, East Kalimantan Has an Area: 10,000 m² With Topography: No contours And Road Width: 6 M With City Ditch Size: 1 M And Has a Tropical Climate.

2.2 Solar Analysis

The objective of solar analysis is to know and calculate what is being done to support the planning of the FKIP Unmul Banggeris Samarinda Campus, East Kalimantan. This solar analysis is carried out to determine the direction of the morning sun and afternoon sun entering the site and also the building.

2.3 Achievement Analysis

The FKIP Unmul Banggeris campus lecture building site is on Jalan Banggeris. This road has access to the main road which is often passed by public, private and private transport vehicles. The condition of the site has a road width of 6 meters without a road median and has two lanes with one lane. The purpose of this achievement analysis is to determine the location of achievements within the site, namely the main entrance (ME) and site entrance (SE).

2.4 Circulation Analysis

The purpose of this circulation analysis is to obtain and create good circulation according to site needs, both human circulation and vehicle circulation.

2.5 View and Orientation Analysis

Building The FKIP Unmul Banggeris Campus Lecture Building is located on Jalan Baggeris, image caption::

In the North are shops, the Northeast is housing, the East is empty land (negative), the Southeast side is empty land (negative), the South side is empty land (negative), the Southwest side is DDI Cendana Middle School, the West side is Ulul Albab Mosque, and the Northwest is shops.

2.6 Green Management / Vegetation Analysis

The green layout/vegetation analysis aims to determine and arrange the layout as well as the types of plants needed on the site to suit its function and needs.

3. Result and Discussion

3.1 Spatial Organization Analysis

Arranging spatial organization patterns can determine comfort and safety for users of the FKIP Unmul Banggeris Campus Lecture Building because there are many different rooms according to their needs. The spatial organization pattern applied in this building is a linear and centralized organization pattern. The advantage of this space organization is that it can provide maximum user meetings or overlap so that students and staff can interact and socialize and facilitate user access in the building.

3.2 Shape the Space Layout

The layout of the FKIP Unmul Banggeris Samarinda Campus layout for rooms uses a closed layout where the rooms are separated according to their respective functions and uses.

3.3 Artificial Lighting Analysis

Analysis of artificial lighting in the FKIP Unmul Banggeris Campus Lecture Building is the process of evaluating and designing a lighting system that uses artificial light sources, such as lamps or other lighting devices, to achieve optimal lighting conditions in a space. The main goal is to create an environment that is visually comfortable, energy efficient, and meets the functional needs of the space.

The following is a simulation of artificial lighting based on the results of the planning analysis for the FKIP Unmul Banggeris Campus lecture building using the Dialux EVO 12 application. The simulation was carried out to find out how light is distributed in the room.

3.4 Mass Composition Analysis

This building was formed from the results of the analysis that has been carried out. The initial mass of the building was rectangular in shape and was reduced at the back and front. The mass of the building comes from the formation of a plan which is given a room volume and then divided into 3 building masses consisting of masses a, b, and c. After being divided into 3, the mass composition is in accordance with the analysis of the FKIP Unmul Lecture Building, Banggeris Samarinda Campus, East Kalimantan.

3.5 Analyze Building Appearance

The appearance of the building will be adjusted according to the emphasis on artificial lighting and a modern minimalist style. This building is to adapt to the concept of the Indonesian capital (IKN) and can follow the weather climate patterns in the city of Samarinda.

3.6 Analysis of building materials and colors

This analysis of building materials and colors is an analysis to determine the building materials and colors that will be applied to the design of the FKIP Unmul Lecture Building, Banggeris Samarinda Campus, East Kalimantan.

3.7 Building Utility Analysis

This analysis aims to determine the utility system that will be designed for the FKIP Unmul Lecture Building, Banggeris Samarinda Campus. Utility analysis consists of network sanitation systems, piping, waste disposal, lighting and indoor ventilation, electrical systems and fire prevention systems. The FKIP Unmul Banggeris Campus Lecture Building uses utilities

4. Conclusion

Based on the results of the design of the FKIP Unmul Lecture Building, Banggeris Samarinda Campus, East Kalimantan, several conclusions can be drawn as follows: (1) To emphasize the artificial lighting used in the FKIP Unmul Lecture Building, Banggeris Samarinda Campus, East Kalimantan, it can provide a bright and happy room atmosphere in the teaching and learning process; (2) The building concept for the FKIP Unmul Lecture Building, Banggeris Samarinda Campus, East Kalimantan was obtained through a mass composition process using linear space organization and a modern minimalist style approach where the materials used are environmentally friendly materials and are able to adapt to tropical climate conditions; (3) Each material certainly has its own advantages and disadvantages, as users maximize the concept of environmentally friendly materials.

5. Acknowledgements

We would like to express our deepest gratitude to all parties who have contributed to the planning process of the Faculty of Teacher Training and Education (FKIP) lecture building at Mulawarman University, Banggeris Campus. This report, which focuses on the aspect of artificial lighting, would not have been possible without the assistance and support of various parties.

First of all, we would like to thank the management team of Mulawarman University for the support and facilities provided during this planning process. Their cooperation and commitment have provided a strong foundation for the development of this building.

We would also like to thank the architects, engineers, and lighting consultants involved in this project. Their knowledge and expertise in designing efficient and environmentally friendly lighting systems are invaluable in creating an optimal learning environment for students and teaching staff.

Our special appreciation goes to the lecturers and students of FKIP who provided input and feedback on lighting needs in classrooms and other learning areas. Their reviews are an important part of designing a lighting system that is in accordance with academic needs and teaching and learning activities.

We also appreciate the support of all staff and team members who worked behind the scenes, ensuring that all technical and administrative aspects of this project ran smoothly.

With this gratitude, we hope that this report can be a useful guide in the development of educational facilities at Mulawarman University and other institutions. Hopefully our joint efforts in this planning can provide long-term benefits for all users of this lecture building.

6. Confilct Of Interest

In the development of this report on the planning of the Faculty of Teacher Training and Education (FKIP) building at Universitas Mulawarman, Banggeris Campus, with a focus on artificial lighting, all contributors have made efforts to maintain transparency and integrity. The authors and contributors declare that there are no financial, professional, or personal conflicts of interest that could have influenced the content or conclusions presented in this document.

Specifically:

1. **Financial Interests**: No financial interests, such as investments or ownership in companies providing lighting solutions or related technologies, have been held by the authors or contributors that could be perceived as a conflict of interest.
2. **Professional Relationships**: The contributors to this report do not have any professional relationships with the suppliers, contractors, or consultants involved in the planning and implementation of the lighting systems that could bias the recommendations or findings.
3. **Personal Interests**: No personal relationships exist between the contributors and individuals or entities involved in this project that could have influenced the objectivity of this report.

This declaration aims to ensure that the report is based solely on objective analysis, unbiased data, and professional judgment, with the goal of providing a fair and accurate assessment of the artificial lighting considerations in the building's planning process.

Should any potential conflict of interest arise in the future, it will be promptly disclosed and addressed in accordance with the ethical guidelines and standards of Universitas Mulawarman and relevant professional bodies.

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