The Interpretation of Tropical Architecture in Designing University of Sumatera Utara Student Dormitory

by Aida Mayaseva

Submission date: 11-Jul-2024 03:47PM (UTC+0700)
Submission ID: 2415148493
File name: ABSTRAK_-_VOLUME_1,_NO.4,_JULI_2024_hal_199-211.pdf (982.42K)
Word count: 2920
Character count: 16269

Abstrak : Jurnal Kajian Ilmu Seni,Media dan Desain
Vol. 1, No. 4 Juli 2024
e-ISSN: 3032-1670; p-ISSN: 3032-2456, Hal. 199-211
DOI : https://doi.org/10.62383/abstrak.v1i4.237
Available online at: https://journal.asdkvi.or.id/index.php/Abstrak

The Interpretation of Tropical Architecture in Designing University of Sumatera Utara Student Dormitory

Aida Mayaseva[1], Morida Siagian[2]

[1-2] Universitas Sumatera Utara, Indonesia

Alamat: Departement of Architecture, Faculty of Engineering, Univercity,20155, Sumatera Utara, Medan, Indonesia
Korespondensi penulis: mayaseva45@gmail.com

Abstract. *University of Sumatera Utara (USU) is a state university in Medan with many enthusiasts who want to study there. The provision of student dormitories and facilities is very important to support the development and development of the younger generation in pursuing higher education. The function of this dormitory is not only as a place to live, but also has a role in supporting non-academic activities such as sports, developing student interests, and talents through coaching programs that aim to shape student personalities. Given that the design location is a tropical climate with a fairly hot air temperature, the design of this student dormitory applies tropical architectural design principles.*

Keywords *: Dormitory, Students, University of North Sumatra, Tropical Architecture.*

Abstrak. Universitas Sumatera Utara (USU) adalah universitas negeri di Medan dengan banyak peminat yang ingin belajar di sana. Penyediaan asrama mahasiswa dan fasilitas sangat penting untuk mendukung perkembangan dan perkembangan generasi muda dalam menempuh pendidikan tinggi. Fungsi asrama ini tidak hanya sebagai tempat tinggal, tetapi juga berperan dalam menunjang kegiatan non akademik seperti olahraga, pengembangan minat dan bakat mahasiswa melalui program pembinaan yang bertujuan untuk membentuk kepribadian mahasiswa. Mengingat desain lokasinya beriklim tropis dengan suhu udara yang cukup panas, maka desain asrama mahasiswa ini menerapkan prinsip desain arsitektur tropis.

Kata kunci: Asrama, Mahasiswa, Universitas Sumatera Utara, Arsitektur Tropis.

1. INTRODUCTION

Student dormitories are residential facilities designed to accommodate college students. However, nowadays dormitories also have an important role as a forum for the formation of communities that support various activities. In general, the construction of dormitories is based on three main functions: as a place of social interaction, to improve academic achievement, and to improve student welfare. Student life in residence halls involves a variety of individual characters and personalities. This allows for a process of socialization among dormitory residents that can be seen in the form of social interaction and adjustment.

USU has 15 Faculties with a wide range of study programs in various fields, including social sciences, natural sciences, health sciences, engineering, agricultural sciences, arts, and humanities. In addition, USU also has Postgraduate, Doctoral, Specialist and Professional programs. With the increase in the number of new students every year, new challenges arise regarding the need for housing. Although many students have families in Medan, they decide not to live with their families. As an alternative, they are looking for rented houses or boarding

Received: Mei 12, 2024; Revised: Juni 28, 2024; Accepted: Juli 06, 2024;Published: Juli 11, 2024;
** Aida Mayaseva mayaseva45@gmail.com*

houses at affordable prices. However, the development of rented houses today is often uncontrolled and irregular, which can have a negative impact on the quality, health, and safety of its residents. Although there are some boarding houses that meet these standards, the cost is often not affordable for most prospective students, especially for those who have to face considerable distances from campus.

Students who come from outside the city of Medan certainly really need a place to live. Therefore, the design of the North Sumatra Student Dormitory is expected to be a solution for housing for students who come from outside the region, because in addition to cheaper costs, the level of security in the dormitory is high and students can also form a community and social interaction between others students of the University of North Sumatra.

2. LITERATURE REVIEW

Student dormitory is a residential environment as a student residence, which in further development, it is possible to have environmental facilities to complement it, such as libraries, book procurement, canteens, sports and other necessary facilities managed by students in the form of cooperatives. (Presidential Decree No. 40 1981, 2007).

A student dormitory is a residential structure used by students during their studies. Usually, these dormitories are located close to educational institutions that correspond to the intended student population. The main goal is to improve academic performance and enable social interaction to develop students' personalities.

The size, design, facilities, and capacity of dormitories vary. Usually, public bathroom facilities are available in dormitories intended for one or two students without private toilets. In addition, these dormitories often divide the sexes, with men and women living separately. In the dormitory, there are beds, tables, shelves, and wardrobes as standard furniture. In addition, common areas, shared bathrooms, dining/canteen areas, laundry/lounge facilities, and internet access are usually provided in the dormitory.

1. Dormitory Facilities by Type of Student Activities
   - As a residential facility
   - As an educational facility
   - As a social facility
   - As a service facility

2. Room Capacity
   - Privacy, Tranquility, and Comfort Well Maintained
   - Prevention Against Fights, Violence, and Deviations
   - Creating Independence and Paying Attention to the Social Environment
   - Efficient Use of Floor Area.

Based on the above considerations, the capacity of each room is as follows:

- In one room occupied by one person (single room):

  Pros: High level of privacy, allowing to form better self-discipline, as well as supporting more efficient individual learning methods.

  Disadvantages: Reduced sense of community, requires larger space, and high maintenance costs.
- In 1 room capacity 2 persons (Double room)

  Pros: Encourages a sense of community, facilitates effective group learning, and reduces maintenance costs.

  Disadvantages: For those who are used to studying alone, they may feel disturbed and will cause conflict
- In 1 room capacity 3 people (Triple room)

  Pros: Provision of sleeping space is quite efficient and a high sense of community.

  Disadvantages: Privacy tends to be reduced, disruption to the learning process is higher and one of the residents will feel left out.
- In 1 room with a capacity of 4 people (four-student room)

  Pros: Increase the sense of community in the group, as well as reduce maintenance costs.

  Disadvantages: Privacy is less guaranteed, individual learning becomes less efficient, increases the potential for violations of applicable regulations, and can create feelings of insecurity (Kumalasari, 1989).

3. METHODE

The method of research stages carried out in the University of North Sumatra Student Dormitory Design project is by descriptive method, namely describing and explaining theories obtained from various literature. By collecting, processing and analyzing data to produce a conclusion.

There are several steps in the design to achieve the design objectives, so a long and continuous process is needed in determining the function and implementation of facilities and infrastructure. Many factors support several steps in designing to achieve Site selection for USU Student Residence Design by considering several supporting aspects and special considerations through literature study.

4. RESULT AND DISCUSSION

1. Site Location

The project designed in this scientific paper is the University of Sumatera Student Dormitory with a Tropical Architecture approach located in the USU campus area. This project is located on St. Universitas, Medan Baru sub-district, Medan City which has an area of ±1.5 Ha (15,000 m2).

Figure 1. Site Project

The location of the design project is in a strategic location because it is located on the main road of the USU campus which is easily accessible and there are many public facilities

that can meet the needs of students.

Figure 2. The function of the building around the site

2. Space Programming

Rooms are defined based on activity and users. Each room is distinguished by zoning. The zoning consists of public, semi-public, private and service. This dormitory building is designed by separating residential, manager and supporting areas. The separation is applied by grouping spaces according to their respective types of functions.

The area of the room needed based on the use of the area on the furniture according to the Time Saver Standard book is:

Furniture	Quantity	Standard Size (Furniture + Circulation)	Area
Single Bed	2	4 m^2	8 m^2
Study Desk	2	1,6 m^2	3,2 m^2
Cupboard	2	0,8 m^2	1,6 m^2
Bookshelf	2	0,8 m^2	1,6 m^2
Total Area			14,4 m^2

Based on the calculation analysis above, a space with an area of ±14 m2 is needed to be occupied by two people. However, the size can change by considering several factors, including comfort factors, freedom of movement, modules / grids of building structures and other factors.

Some alternative forms of the bedroom with furniture arrangement as shown below.

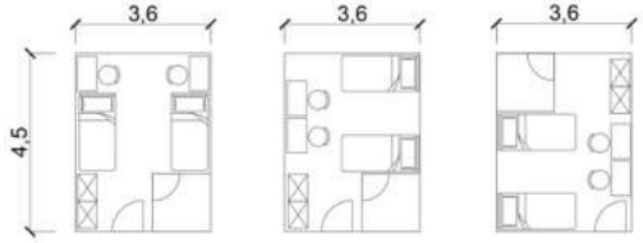


Figure 3. Bedroom Layout

Rooms are defined based on activity and users. Each room is distinguished by zoning. The zoning consists of public, semi-public, private and service. This dormitory building is designed by separating residential, manager and supporting areas. The separation is applied by grouping spaces according to their respective types of functions.

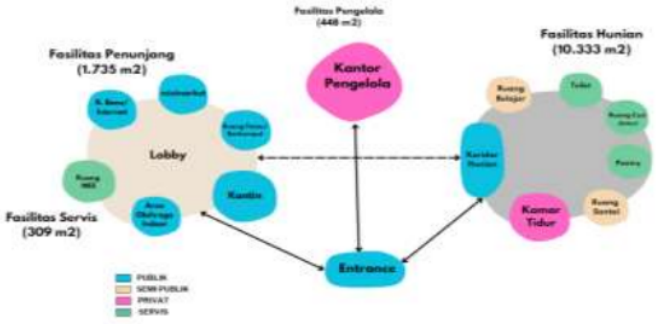


Figure 4. Bubble Diagram

3. Tropical Architecture Application

Figure 5. Tropical Architectural Concept

Medan City is located in a tropical climate, with plenty of rain and sunshine throughout the year. Therefore, in designing student dormitories, special attention needs to be paid so that the building can last a long time and save energy. In addition, indoor comfort also needs to be considered. In the design of this student dormitory, emphasis will be placed on lighting and ventilation to create energy-efficient accommodation without sacrificing aesthetics so that students can live comfortably in the dormitory.

The application of tropical architecture in the University of North Sumatra Student Dormitory is in the following ways:

1. Pay attention to the orientation of the building in relation to thermal comfort.
2. Material selection and opening orientation that allows buildings to apply energy-saving concepts.

4. Outdoor Space Design Concept

The basic shape of the mass of the building is rectangular and then shaped like the letter U. The dormitory building that will be designed consists of 2 types, namely boys and girls. The two masses are divided by the road to gg.sumber and jamin ginting street.

Figure 6. Mass layout

Figure 7.Outdoor Space

Access to the site from Jl. Universitas. Vehicles can only pass in front of the parking site. For loading dock vehicles, there is a special service line so that it does not interfere with the main circulation.

Between the male dormitory building and the female dormitory is a pedestrian path from Jl. Jamin Ginting, the path is used by public transportation users because in the USU area public transportation is not allowed to pass.

5. Zoning Concept

In the public zone which is a supporting and managing facility on the 1st floor of the dormitory building, with the aim of maintaining the privacy and security of dormitory residents. While on floors 2-4 is a private zone which is a special facility for dormitory residents.

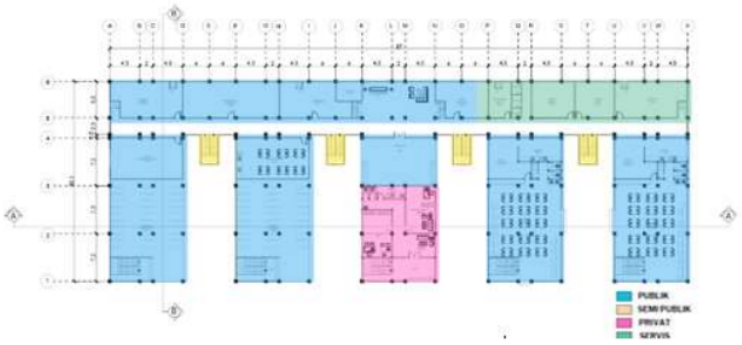


Figure 8. 1st Floor Plan

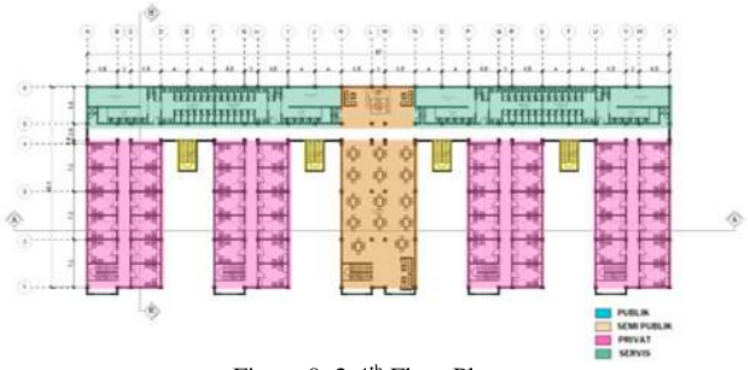


Figure 9. 2-4th Floor Plan

6. The concept of Mass and Façade

The dormitory building consists of 4 floors with the same mass shape on each floor. The shape of the mass is taken from a block that is shaken uniformly so as to produce a repeating shape.

From the mass form, the main façade of the building faces west, precisely leading to the university road which is the main road of the USU campus area. Therefore, the design of the façade on the dormitory is made in harmony with the buildings along the university road.

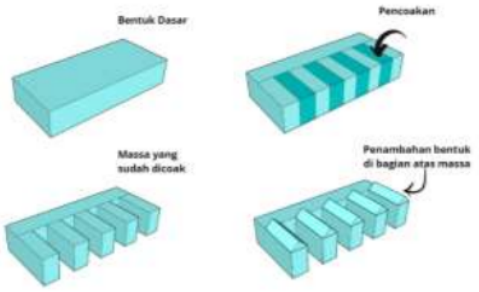


Figure 10. Mass composition

Figure 11. Facade

7. Air and Lighting Concept

To maximize natural air, openings will be made on all sides with a cross ventilation system. This natural air is applied in all rooms, especially in residential areas and outermost rooms that get natural and cool air, such as lobbies, canteens, waiting rooms, etc. Cross-ventilation is done by ventilate the air in the room such as giving breezeblock on the wall.

Figure 12. Use of breezeblocks in dormitory buildings

Natural lighting in buildings is a concept that involves using sunlight and other natural light sources to provide indoor lighting. This concept aims to create optimal lighting conditions in buildings without relying too much on artificial light. In this USU student dormitory building, natural lighting is made with wide openings and the use of shading to avoid excessive heat and glare. In addition, the choice of color and material will also be considered because it affects the lighting of the room.

Figure 13. Lattice grid as light ventilation

8. Structure and Construction Concept

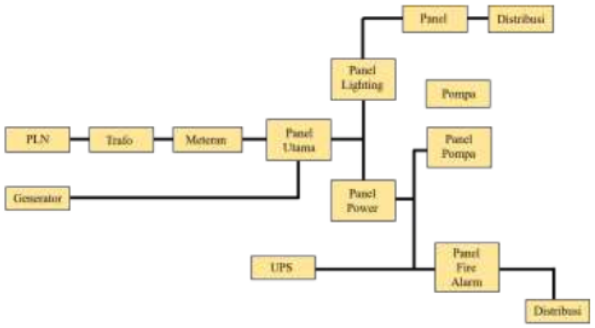
The lower structure used in the USU student dormitory building is a type of palm foundation because the building consists of 4 floors. In addition, the soil condition at the site is good and stable. In the middle structure of the building using columns and beams of reinforced concrete type. This material was chosen because the manufacturing and maintenance process is relatively easy and fireproof.

The structure at the top of the building uses a lightweight steel frame and combines with concrete dak which can be used as a service area.

Figure 14. Foot Plate and Coloum

9. **Utility Concept**

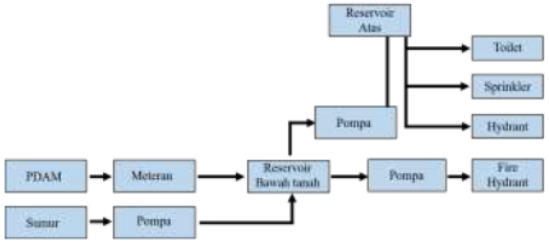
The main source of electricity for this building is PLN. However, as a backup power source and to prepare for power outages, generators or generators will be used. The majority of electrical infrastructure is underground. This technology has a more aesthetically pleasing



visual appearance and is said to be safer.

Figure 15. Electrical Concept

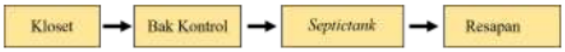
Using a down-feed mechanism in student dormitories, water is collected in the lower tank and then pumped into the upper tank. After that, water is distributed throughout the



building. The advantage of this system is that the pump does not have to work continuously to drain clean water. Water is always available at all times without the need for continuous pump assistance, without the need for supervision, and without automatic devices.

Figure 16. Plumbing Concept

The remaining water from the bathroom and the washed water will be processed through the sewage treatment plant (WWTP). After going through the process, wastewater will be treated in such a way that it can be discharged into public channels
without problems.



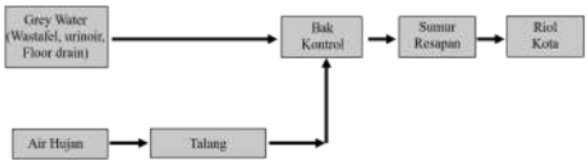


Figure 17. Plumbing Concept (Black Water)

5. CONCLUSION

The design of the University of North Sumatera Student Dormitory is a residential forum for University of North Sumatra students who come from outside the region. USU student dormitories are designed by meeting existing dormitory standards, the building design aligns with existing USU buildings so as not to lose the characteristics of USU. The design of this dormitory is expected to be able to facilitate all student activities in supporting the educational process and carrying out daily activities. Therefore, the provision of facilities that can support the learning process and character building needs to be considered so that students feel in a comfortable environment for learning. The application of tropical architecture in USU student dormitories is in the form of openings that can produce air circulation and natural lighting, considering that this student dormitory building is designed economically both in terms of design and maintenance.

6. ACKNOWLEDGMENTS

I would like to thank all those who have participated and helped in conducting this research, especially to my Supervisor Mrs. Morida Siagian, friends, and all those involved in the Department of Architecture at the Faculty of Engineering, University of Sumatera Utara.

7. REFERENCES

Adi, K. A. (1992). Apartemen Sebagai Suatu Alternatif Hunian Sewa dengan Tinjauan Privasi. Jurusan Arsitektur UGM.

Blimling, G. S. (2015). Student Learning in College Residence Halls. San Fransisco: Jossey-Bass.

Cahyani, O. I. (2018). Penerapan Konsep Green Architecture Pada Bangunan Perpustakaan Universitas Indonesia. Application of Green Architecture Concept in University of Indonesia.

De Chiara, J., & Callender, J. H. (1981). Time-Saver Standards for Building Types (3rd ed.). New York: McGraw Hill Book Company.

Idham, N. C. (2016). Arsitektur dan Kenyamanan Thermal. Yogyakarta: CV. Andi Offset.

Karyono, T. H. (2013). Arsitektur dan Kota Tropis Dunia Ketiga: Suatu Bahasan Tentang Indonesia. Jakarta: Rajawali Pers.

Kementerian Keuangan Republik Indonesia. (2004). Keputusan Menteri Keuangan Republik Indonesia, Nomor 197/KMK.03/2004. Jakarta: Kementerian Keuangan Republik Indonesia.

Mediastika, C. E. (2013). Hemat Energi & Lestari Lingkungan Melalui Bangunan. Yogyakarta: CV. Andi Offset.

Nugroho, H. P. (1995). Apartemen di Yogyakarta sebagai Rumah Susun yang Berwawasan Lingkungan. Jurusan Arsitektur UGM.

Riyono, M. S. (2014). Apartemen di Daerah Istimewa Yogyakarta. Diakses pada 16 Februari 2022 dari https://e-journal.uajy.ac.id/6220/3/TA213704.pdf.

Sekretariat Negara Republik Indonesia. (2007). Keputusan Presiden Republik Indonesia Nomor 40 1981, 2007. Jakarta: Sekretariat Negara Republik Indonesia.

Wulandari, R. (2016). Analisa Kaitan Desain Asrama Dengan Perilaku Penghuni. Jurnal Desain Interior & Desain Produk, 3.

The Interpretation of Tropical Architecture in Designing University of Sumatera Utara Student Dormitory

ORIGINALITY REPORT

7%	7%	2%	3%
SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS

PRIMARY SOURCES

1	repositori.usu.ac.id:8080 Internet Source	1%
2	publikasiilmiah.ums.ac.id Internet Source	1%
3	Submitted to Binus University International Student Paper	1%
4	eprints.ums.ac.id Internet Source	1%
5	jurnal.untan.ac.id Internet Source	1%
6	www.mmf.ibu.edu.tr Internet Source	1%
7	Submitted to University of Central Oklahoma Student Paper	<1%
8	ejurnal.stie-trianandra.ac.id Internet Source	<1%
9	archpostgrad.wordpress.com Internet Source	<1%

10	jurnal.ugm.ac.id Internet Source	<1%
11	www.slideshare.net Internet Source	<1%
12	eprints.itenas.ac.id Internet Source	<1%
13	jurnal.umj.ac.id Internet Source	<1%
14	Mohammad Imran, Novita Shamin, Rahmi Budi As'Adiyah. "The utilization of paving blocks as environmental heat reduction materials", ARTEKS : Jurnal Teknik Arsitektur, 2020 Publication	<1%

Exclude quotes	Off	Exclude matches	Off
Exclude bibliography	Off		

The Interpretation of Tropical Architecture in Designing University of Sumatera Utara Student Dormitory

GRADEMARK REPORT

FINAL GRADE

/0

GENERAL COMMENTS

PAGE 1

PAGE 2

PAGE 3

PAGE 4

PAGE 5

PAGE 6

PAGE 7

PAGE 8

PAGE 9

PAGE 10

PAGE 11

PAGE 12

PAGE 13