E-ISSN : 2775-7528

Vol.5, No.1 Edition, January-June 2025

RUSTIC
Jurnal Arsitektur

9 772775 752002

Published by:
ARCHITECTURE PROGRAM
INSTITUT TEKNOLOGI & BISNIS AHMAD DAHLAN

RUSTIC: Jurnal Arsitektur
Vol. 5, issue No. 1, January-June 2025, pp. 1~12
e-ISSN: 2775-7528, DOI: doi.org/10.32546/rustic.v5i1.2869

A Case Study: House Condition of Stunting Children at Tidung Island, Jakarta, Indonesia

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Article Info

Article history:

Received Nov 16, 2024
Revised Dec 7, 2024
Accepted Dec 27, 2024

Keywords:

Housing;
Living condition;
Stunting children;
Sustainability;
Tidung Island.

ABSTRACT

A house or dwelling is one of the essential architectural elements designed to meet human needs. A house serves as a shelter, a place for protection, rest, and various activities. Houses and dwellings are designed to support their occupants by providing essential needs, security, aesthetics, a sense of pride, and even contributing to the occupants' health. Housing is an element that is often challenging to access and address in detail, including residential homes on Tidung Island. The varying sizes of houses and their increasing proximity to one another due to limited land availability have resulted in many homes losing access to natural lighting and ventilation. Previous research has indicated that the living environment significantly influences the prevalence of stunting in children. Stunting is a condition of malnutrition in children under the age of five that often affects their health and growth. The Jakarta city government of Indonesia already tries to reduce stunting rates among children by ensuring adequate nutrition. However, in some areas, progress has been slower, including on Tidung Island. According to previous studies, the factors contributing to stunting in children is not only to nutritional deficiencies, environmental conditions, housing quality, and poor sanitation also play a significant role in increasing the number of stunted children. As an initial study, this research aims to observe the living conditions of children experiencing stunting.

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1. INTRODUCTION

Housing is a fundamental human need, serving as a shelter and fulfilling essential requirements for safety, security, and well-being. Its recognition as a basic human necessity is embedded in both national and international frameworks, emphasizing its critical role in sustaining human life [1][2]. Houses and dwellings are designed to support their occupants by providing essential needs, security, aesthetics, a sense of pride, and even contributing to the occupants' health [3]. Housing is an element that is often challenging to access and address in detail [4]. In some area, the varying sizes of houses and their increasing proximity to one another due to limited land availability have resulted in many homes losing access to natural lighting and ventilation [5] that also happens in Tidung Island. Tidung Island is one of the islands in the Thousand Islands archipelago that, between 2012 and 2014, has developed significantly as a tourist destination, as well as a buffer for Jakarta Bay against coastal erosion [6]. Tidung Island tourism activities have clearly increased employment opportunities, residents' income, and other factors that support economic growth. However, they have also contributed to the shrinking of open spaces due to overcrowded residential housing and tourist

accommodations, coral reef degradation, a decline in environmental cleanliness [7] by growing reliance on motorcycles to save travel time, which corresponds with road and paving block damage on Tidung Island [8][9]. The fact that the local people activity affects the island's environment and residential areas can no longer be ignored, as over time it may affect the health conditions of Tidung Island residents. As one of the special cases in Tidung Island, we have a stunting Problem.

Stunting is a chronic condition caused by prolonged undernutrition, affects millions of children worldwide, with dire implications for their physical and cognitive development [10]. Globally, stunting prevalence has decreased over the last decade, but the World Health Organization (WHO) reported that 22% of children under five, or approximately 149.2 million, still suffered from stunting in 2020 [11]. The prevalence of stunting in Indonesia has shown a decreasing trend in recent years. According to the Indonesian National Nutrition Status Survey (SSGI) in 2022, the average annual stunting reduction achievement was 2.0% (2013 – 2021), with a stunting prevalence rate of 24.4% in 2021[12].

In Jakarta, capital city of Indonesia, the overall stunting prevalence has decreased in recent years due to improved healthcare services, better access to nutrition, and government initiatives aimed at addressing malnutrition. According to the Ministry of Health 2020, stunting rates in DKI Jakarta have seen a decline from around 27.5% in 2013 to 17.4% [13]. These reductions are largely attributed to urban infrastructure improvements, enhanced nutritional programs, and efforts to increase public awareness about child health and nutrition [14].

However, in remote and more isolated areas like Tidung Island, a part of the Thousand Islands district, progress has been slower. Geographic isolation, limited healthcare infrastructure, and poorer living conditions contribute to higher stunting rates compared to urban centers. Research shows that housing conditions, lack of access to clean water, and limited sanitation services are key factors contributing to persistent stunting issues on Tidung Island [15][16], while national interventions aim to address these issues, logistical challenges in reaching remote islands like Tidung continue to impede progress.

Housing conditions are one of the critical determinants of child health, particularly in terms of stunting : poor housing quality—characterized by overcrowding, insufficient ventilation, and inadequate sanitation—has a direct impact on the health outcomes of children [17][18]. Stunting is often linked to the environmental factors, as children living in substandard housing are more likely to suffer from infectious diseases that exacerbate malnutrition [19][20]. In Tidung Island, where many homes lack basic amenities such as clean water and proper sanitation, children are at a higher risk of malnutrition and stunting [21]. Environmental health plays a significant role in the occurrence of stunting [22], because there is a strong correlation between poor sanitation and childhood stunting in rural India [17]. On Tidung Island, inadequate access to clean water and sanitation facilities contributes to a higher incidence of waterborne diseases such as diarrhea, which significantly impairs a child's ability to absorb nutrients [23]. These conditions create a cycle of poor health outcomes, contributing to the persistence of stunting [24] [25] [26].

Urban sustainability, which emphasizes the importance of creating healthy living environments [27], is deeply intertwined with efforts to reduce stunting. Improving housing conditions, access to clean water, and sanitation are critical components of sustainable urban development, particularly in vulnerable communities [25]. In the context of Tidung Island, addressing housing-related issues is essential not only for improving health outcomes but also for ensuring the long-term sustainability of the island’s urban infrastructure [28]. The Indonesian government’s strategy to address stunting, known as Stranas Stunting, aligns with urban sustainability goals by focusing on improving housing, healthcare, and nutritional access [29].

In addition to physical infrastructure, socioeconomic factors play a critical role in stunting [30] found that poverty significantly increases the likelihood of children living in poor housing conditions, which in turn increases their vulnerability to malnutrition and stunting. In Tidung Island, many families depend on volatile income sources such as fishing and tourism [31], which affects their ability to afford nutritious food and access healthcare services. Economic instability, coupled with geographic isolation, exacerbates these challenges, leaving children vulnerable to long-term malnutrition and stunting [29][32]. The connection between poor housing and stunting is particularly evident on Tidung Island, where many homes lack proper sanitation and adequate living conditions [33][34]. Studies highlight the direct link between inadequate housing, environmental health risks, and the heightened incidence of stunting [14][20][35][21]. Initiatives aimed at improving living conditions, water, sanitation, environment, green open space, and infrastructure are related to

the stunting problem on the island [18][20][21][35][36]. This study aims to observe the housing conditions of children suffering from stunting in Tidung Island in specific year of 2024.

2. METHOD

As an initial stage of this study, to conduct observations of the homes of children experiencing stunting a structured research framework is required. In this research, all direct observations will serve as new findings regarding the relationship between stunted children and their homes or living environments. Stunting is a condition characterized by slower physical growth in children compared to the established standard. While nutrition is often the government's primary focus in combating stunting, this research team specifically delves into the living conditions of stunted children in Tidung Island. As preliminary research, the researchers will conduct interviews and simple observations to assess the general conditions and determine the feasibility of continuing this research to a more specific stage by evaluating the indicators of a healthy home in each household of stunted children in Tidung Island.

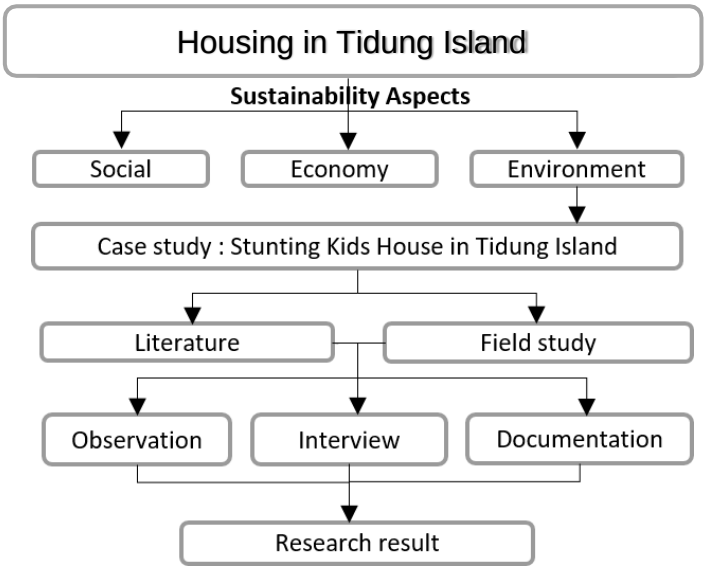

Figure 1. Research process diagram (source: author)

3. RESULTS AND DISCUSSION

This section will present data in the form of photographs of the existing conditions, accompanied by descriptive explanations of each home of a stunted child. The descriptions will be based on interviews with the parents or guardians of the stunted children residing in those homes. Based on local government data, there were 11 identified cases of stunting kids at Tidung Island in September 2024.

As a preliminary study, the research team conducted direct observations of 11 household with children diagnosed stunting that already informed by the local government. All the house will mention by Alphabet to hide personal information about the family. The observational data and visual documentation are presented below:

3.1. House 1

This House is occupied by the A. family with 5 family members. This house has 1 bedroom, kitchen connect with the sitting room, laundry area because the mother work as a home laundry, 1 toilet and 1 bath room. This house has 31 m² with many stuffs that makes the house wall mold in some area. The house has minimal openings and tends to rely on artificial lighting. The house also has a well that is directly connected to the living room and kitchen interior, making the house more humid. The roof frame of this house is left open without being covered by a ceiling. This condition will endanger the occupants due to direct and continuous exposure to asbestos. It is mentioned that this happens because the homeowner does not yet have the funds to close the ceiling of their house.

(a) (b) (c)

Figure 2. (a) well inside the house (b) outside area of the house (c) inside area of the house (source: author)

3.2. House 2

This house is occupied by the B. Family, consisting of 4 members, however the head of the family does not usually reside here due to his work as a fisherman. The head of the family usually returns home only after 3 months at sea and stays for 3 to 5 days before returning to his fishing duties. This Family has 2 children that one of them has diagnosed as a stunting.

Situated in a narrow alley accessible only by a single motorcycle, this house is completely overshadowed by an adjacent two-story building that blocking out the natural light. Its proximity to a dead end, less than a meter away, prevents a clear frontal view. Despite its compact size of 20.7 m2, comprising two bedrooms, a bathroom, and a kitchen, the house is remarkably dark due to the limited openings caused by its confined location. The interior features ceramic tile flooring and plastered walls. This house also has mold growth on the walls, particularly in the rooms that receive no natural light or ventilation at all.

(a) (b) (c)

Figure 3. (a) alley of the house (b) 1st bedroom that has a window open to the front of the house (c) 2nd Bedroom that has no ventilation and mold on the wall (source: author)

3.3. House 3

This house is occupied by the C. Family with the twin kids that one of them has diagnosed as a stunting kid. This house features a relatively spacious terrace and comprises two bedrooms. It also has a private well located at the rear of the property in a separate room, along with a separate kitchen and living room. Additionally, there is one bathroom situated at the back of the house. With a total floor area of 57 square meters, this house accommodates six family members. Due to the stunting condition of one of the children, the child's grandparents have moved in to assist with care.

The house has a roof frame and asbestos roofing without a ceiling, posing significant long-term health risks. It is mentioned that the house has been in this condition for a considerable period. Although the house has openings for ventilation and natural light, these are not fully utilized due to concerns about stray cats entering the premises. As a result, the occupants have opted to keep the windows and doors closed when they are inside, only opening the front door when they are on the terrace.

(a) (b) (c)

Figure 4. (a) alley of the house (b) 1st open to the front of the house (c) (source: author)

3.4. House 4

This house is occupied by the D. Family, consisting of 6 members. The head of the house work as a fisherman while the mother works laundry at home. This house placed near the ocean, so the house provides direct access to the fishing boat dock located on the seashore. Additionally, the house walls are constructed using lightweight concrete blocks that are left exposed without any plaster coating. The unique feature of this house is its columns, which are made of cast pipes.

This house features two bedrooms that face the living room, with no windows except for the bedroom doors. The bathroom is located at the rear of the house, combined with the kitchen and laundry area with a total floor area of 35 square meters. The house has only one window in the living room, relying primarily on the front and side doors that open directly onto the sea. The front part of this house is also used for cleaning and even drying fish caught by fishermen, resulting in a rather unpleasant odor.

(a) (b) (c)

Figure 5. (a) Front of the house (b) inside of the house (c) bedroom (source: author)

3.5. House 5

This house is occupied by the E. Family, consisting of 4 members with 23,3 square meters as total. This house has two openings at the front, one in the living room and the other in the bedroom facing the front. Both windows are never used and are always closed as the occupants are worried about stray cats and insects entering the house. The occupants also prefer to keep the doors closed due to the intense heat, but this causes the house to become damp and dark as it relies solely on artificial lighting.

This house features a separate terrace from the living room and a kitchen combined with the bathroom with no door. It also has two bedrooms, one of which is connected to a large storage area. Additionally, there is a small storage area at the back of the house, with no active openings except for the door. The roof frame of this house is left open without being covered by a ceiling. This condition will endanger the occupants due to direct and continuous exposure to asbestos.

(a) (b) (c)

Figure 6. (a) Kitchen and Bathroom area (b) front of the house (c) inside the house (source: author)

3.6. House 6

The Sixth house occupied by the F. Family with 6 Family Members and a total of 42 square meters. There are parents, one grandparent and three children under 5th years old. The house has a bamboo roof frame that is in quite a deplorable condition. The weight of the tiled roof has caused some of the bamboo to bend. Additionally, many of the tiles are broken, necessitating the use of buckets to collect rainwater during showers. The floor is not entirely tiled; some areas are still covered in cement.

(a) (b) (c)

Figure 7. (a) front of the house (b) family room (c) bedroom to the front view (source: author)

The only openings in the house are located at the front, with one in the living room and another in the front-facing bedroom. The family room, back bedroom, bathroom, and kitchen have no openings but receive some natural light through gaps in the roof. The house receives ample natural light from the gap of the wall and the roof bamboo construction; however, its construction is in a very poor condition. The living conditions in the house are unsafe for all, but particularly hazardous for children.

3.7. House 7

The 7th house is occupied by the G. Family. The stunting case in this family is the special case because the kids that has a special condition of the heart valve disease. The condition of the kids is quite concerning, based on the information provided by the local child health facilitator coordinator and the child stunting data team in Tidung Island. The house, with a total floor area of 60 square meters, consists of a living room, two bedrooms, a storage room, a kitchen, and a bathroom, all of which are separate. In addition to its other functions, the kitchen area of this house is also use as an indoor drying space for laundry, so it makes the back area of the back part of the house has become damp.

This house has ample openings, reducing its reliance on artificial lighting. However, the floor is still bare concrete, and the walls are made of lightweight bricks without plaster. Similar to many other houses, this one lacks a ceiling, exposing occupants to the potential health risks associated with direct contact with asbestos.

(a) (b) (c)

Figure 8. (a) Front of the house (b) family room (c) kitchen area (source: author)

3.8. House 8

The 8th house of this study is occupied by the H. Family This house, inhabited by a family of six, has a total floor area of approximately 74.2 square meters. The floor is tiled, and most of the walls are plastered. However, the ceiling is exposed to asbestos. The house features a spacious terrace, larger than those of the other 10 houses, used for teaching religious studies in the afternoons and evenings. Besides the terrace, there is a living room, three bedrooms, a kitchen, and two bathrooms. A rear exit is available, but windows are only found in the living room facing the terrace and a side section of the terrace facing the long hallway. The hallway, measuring 1.4 meters wide, serves as a rear exit and a storage area. Due to the lack of natural light sources within the house, it relies heavily on artificial lighting. Additionally, high humidity levels have resulted in mold growth on the interior walls.

(a) (b) (c)

Figure 9. (a) alley of the house (b) 1st open to the front of the house (c) (source: author)

3.9 House 9

This house is occupied by the I Family. This 38.5 square meter house, home to four people, has two bedrooms, a living room, a bathroom, and a kitchen. The kitchen has a direct door leading to a one-meter-wide alley. Despite having numerous openings, some of which face the alley and permanently covered with paper to maintain privacy, the house still relies heavily on artificial lighting due to the limited use of natural light. All the condition mention before make this house feel damp and dark conditions in this house are causing mold to grow on the interior walls.

As previously explained, this house has many openings; however, some of them face the alley and cannot be opened directly as this would disturb people passing by. Additionally, these openings covered with permanent paper covers to prevent neighbors or passersby from looking into the house through the windows. Overall, although this house has quite a few openings, it still relies heavily on artificial lighting for illumination.

(a) (b) (c)

Figure 10. (a) front of the house (b) center of the house (c) kitchen area (source: author)

3.10. House 10

This house is occupied by J Family. This house is the largest among the houses included in this study. With an area of 84 m², it has a sufficient number of openings to accommodate its residents. The house features a terrace at the front, and the living room has a window facing the terrace, providing adequate lighting in the front part of the house. It also has three bedrooms, one kitchen with a separate dining area, and two bathrooms. Seven people reside here, with the facilities mentioned earlier; however, due to the large number of items in the back area and the limited openings there, the back part of the house is damp, with mold forming on the interior walls. Additionally, the back area still relies on artificial lighting. The house has ceramic flooring, but the walls are made of lightweight bricks that not plastered.

(a) (b) (c)

Figure 11. (a) Front of the house (b) the family room (c) kitchen area (source: author)

3.10. House 11

The last house is the smallest house among all the houses in this study where the K family lived. Built as an additional structure attached to the main house where the grandparents of this family reside. This house has 10.8 m² area but is used by four people—two adults and two school-aged children.

(a) (b) (c)

Figure 12. (a) view from kitchen to the outside area (b) the house condition (c) bedroom area (source: author)

The cleanliness of this house is less than ideal. As the picture show that kitchen, storage room, and laundry area only separated by thin wooden walls. The cooking area opens directly to the back of the house, which helps with natural lighting but is not ideal, as the cooking area only covered by a banner. The walls are also made of wood, which poses safety risks for the residents. Parts of the interior wooden walls are also damp, leading to mold growth on some sections

4. CONCLUSION

Previous research has indicated that the living environment influences the condition of stunting in children. Through this study, it was found that 11 homes of stunted children in Tidung Island had at least one indoor space with damp and moldy walls, despite the island's average temperature of 27°C - 32°C. This occurred because the houses studied had minimal openings and the windows were rarely opened due to concerns about stray cats entering the house. Five out of ten houses have minimal openings, and almost all occupants reported not actively using these openings due to concerns about the entry of stray cats and insects such as cockroaches and flies. The interviews report also expressed reluctance to open windows and doors due to the extremely hot weather. House number 11 occupied by K. Family was found in extremely unsanitary conditions, with the kitchen only separated by a thin wooden partition wall and a kitchen area whose walls are only covered by a banner.

As a suggestion related to the findings, further research can be conducted to observe in more detail the homes of stunted children in Tidung Island in the context of government-established healthy home standards. This can then be used as research results to help local governments realize the importance of paying attention to the health conditions of stunted children from their environment, especially their homes.

ACKNOWLEDGEMENTS

The entire team would like to express our sincere gratitude to Mrs. Hafsah, SKM, the Head of Tidung Island Village, the Village Team, and all her staff for their invaluable assistance for their invaluable facilitation and support throughout the preparation and implementation of this research. We extend our sincere gratitude to all the parents of stunted children in Tidung Island as of September 2024, for their participation in, including interviews and home visits, and thanking our institution Universitas Kristen Indonesia for the funding and support to this research. It is our hope that this research will encourage more people to be concerned about the prevalence of stunting cases and to take action to improve the situation, especially in Tidung Island.

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RUSTIC: Jurnal Arsitektur
Vol. 5, issue No. 1, January-June 2025, pp. 13~18
e-ISSN: 2775-7528, DOI: doi.org/10.32546/rustic.v5i1.2565

Identification of Natural Lighting Intensity in the Architectural Studio Classroom

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Article Info

Article history:

Received June 24, 2024
Revised Nov 21, 2024
Accepted Dec 27, 2024

Keywords:

Architectural Studio;
Lighting;
Learning Space;
Natural Lighting.

ABSTRACT

Architectural works offer various benefits to support user activities, including creating spaces that facilitate learning. For architecture students, studio spaces play a crucial role in their academic activities as these spaces are specifically designed for collaborative and individual learning. Natural light is considered the best source of illumination, providing a comfortable and energy-efficient environment. However, ensuring optimal lighting conditions in all parts of the studio is a challenge that requires thorough analysis. This research aims to examine architecture studio rooms as learning spaces, focusing on the quality and distribution of natural lighting to enhance student comfort and productivity, even in scenarios where artificial lighting might be necessary. The study employs a descriptive method, combining direct observation with quantitative analysis to compare field data with findings from relevant literature. Results reveal that while some areas of the studio receive adequate natural light, others fall short, highlighting the need for improvements in lighting design. This imbalance can impact the overall functionality and comfort of the space, emphasizing the importance of considering natural lighting in architectural design. The research also involves field measurements using specialized instruments to provide accurate insights into the lighting conditions. By addressing these issues, the study contributes to the broader understanding of how natural light influences learning spaces and offers recommendations for optimizing lighting in architectural spaces.

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1. INTRODUCTION

An architectural work cannot be separated from a different benefit in each architectural work. The benefits of architectural work can be shown as a support for various kinds of lives of users of architectural buildings. One of the supports for the lives of users of architectural buildings is a learning activity. In an area, a building for learning is one of the public facilities that supports educational activities. As a public building, the costs incurred for school operations come from the community and also the government, therefore energy saving efforts can have a fairly good impact on many parties.[1]

The architectural studio space is a learning center for architecture students where architecture students learn and develop their creativity. The learning process in the classroom is one strategy to achieve the goals of the architecture students. To achieve these goals, it will be very disruptive if the lighting conditions do not meet the specified standards. The comparison of the level of natural lighting in the room and natural lighting on a flat plane in an open field is determined by: a) the geometric relationship between the measuring point

and the light hole, b) the size and position of the light hole, c) the distribution of sky light, d) the part of the sky that can be seen from the measuring point. [2]. Lighting greatly influences an activity in a room. The main function of lighting is as a room light to support the activities taking place in the room. In addition, lighting can also provide added value in a room, including building a room atmosphere, physical and psychological effects are a unity that influences each other in lighting. Light is an electromagnetic wave that can be seen with the eye. A light source emits energy, some of this energy is converted into visible light. The propagation of light in free space is carried out by electromagnetic waves. [3]. It is necessary to have sufficient natural light from sunlight into the room. Lighting that is too bright will make the user of the room feel awake and very active..[4]. Natural lighting is very important to support learning because of the need for sufficient natural light to obtain visual comfort for students. Natural lighting is lighting obtained from direct sunlight, where this light is obtained in the morning to the afternoon. According to SNI 03-2396-200, natural lighting during the day can be said to be good if: (a) During the day between 08.00 and 16.00 local time there is enough light entering the room, (b) The distribution of light in the room is quite even and/or does not cause disturbing glare. [5]. Natural lighting has certain provisions to achieve such comfort. Natural lighting during the day must meet the following provisions: a) natural light during the day must be utilized as well as possible; b) in utilizing natural light, direct solar radiation entering the building must be minimized. Sky light must be prioritized over direct sunlight; c) natural lighting during the day in a building must meet the provisions of SNI 03-2396-1991 concerning "Procedures for designing natural lighting during the day for houses and buildings".[6].Therefore, an observation or observation, measurement and analysis of the level of lighting in the morning, afternoon and evening in the room is carried out to provide a picture of the average natural lighting conditions of the studio classroom which will then be compared with the standards that have been determined. Natural lighting comes from sunlight that enters the building space through openings in the building and is greatly influenced by the position of the building in relation to the position of the sun.[7]

The architectural studio space of the Institut Teknologi Indonesia uses a tropical architectural concept, but there are still several corners of the room that experience a lack of natural lighting, such as the area near the partition between studio A and studio B, which on December 20, 2023 had a light intensity of 220.11 lux. The lighting level in a room is defined as the average lighting level on the work plane in lux units. What is meant by the work plane is an imaginary horizontal plane located 0.75 meters above the floor in the entire room.[8]. The architectural studio space of the Indonesian Institute of Technology is located on the 3rd floor of building F with the west side facing the F seminar room, the east side facing the BPUD lab, the north side facing the garden, and the south side facing building G. Because natural lighting is one of the things that is very necessary to support learning for architecture students, it is necessary to utilize natural light from the sun that enters every corner of the architectural studio room optimally so that students who study in the architectural studio room can get comfort in natural lighting. Basically, light is needed by humans to see objects visually. With the light reflected by these objects, we can see them clearly. So that it will create visual comfort if the lighting obtained is sufficient. Which will have an impact on health, especially on the sense of sight (eyes). The lighting required for each job is different. The work area requires an adequate level of comfort so that users in it can carry out activities smoothly and have good work productivity. Visual comfort in a room that comes from lighting is influenced by the number, size and placement of openings/windows. [9]. To obtain visual comfort, the light should not be too bright or too dim. The minimum average lighting level and the minimum recommended color rendering should not be less than the lighting level in the Table and the lamp power density should not exceed the value (excluding ballast losses) [6].

Table 1. Lighting levels and color rendering

Room Function	Average minimum illumination level (lux)	Minimum color rendering
Classroom	350	80
Library Reading Room	350	80
Laboratory	500	90
Computer Practice Room	500	80

Source: SNI 03-6197-2000

Light Intensity/Illumination is a unit of the amount of lighting. The level of lighting can be seen from the intensity of light in the room. Light Intensity/Illumination (E) is the flow of light falling on the surface of a plane per square meter, the unit is Lux or Lumen/m². With the equation:[10]

$$E = \frac{\Phi}{A}$$

This Φ = light current unit is Lumen (lm)
A = illuminated surface area unit $(m)^2$

There are factors that affect the intensity of light. The utilization factor is defined as the ratio of the luminous flux reaching the work area to the light output emitted by all lamps. The determination of the utilization coefficient based on the reflectance factor of the ceiling, walls, and floor is influenced by the reflection of each color. [11]. The reflectivity of the cat can be seen in Table 2.

Table 2. Paint Reflectivity Table

Paint color	Percentage of light reflection
White	85%
Yellow	75%
Light gray	75%
Bright blue	55%
Dark Blue	10%
Maple	7%
Mahogany	12%
Walnut	16%

Source: IES Hand Book, 1984

2. METHOD

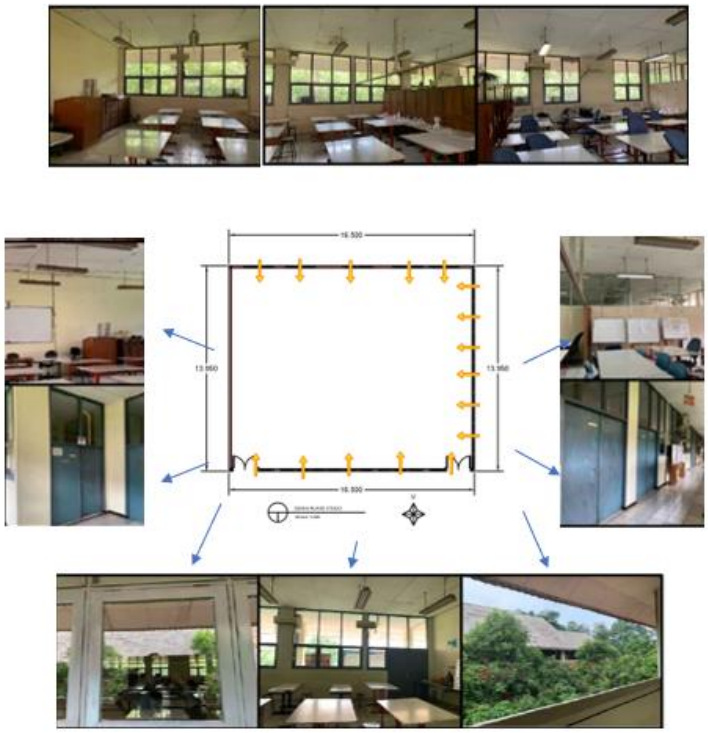
The method used in the problem of natural lighting in this architectural study room is a quantitative method using a direct observation method in the studio room of the Institut Teknologi Indonesia. This method is used to answer the formulation of the problem regarding the lack of natural lighting in the architectural space of the Institut Teknologi Indonesia by comparing the level of lighting in the classroom according to the Indonesian National Standard (SNI) with the lighting results measured directly in the architectural studio room which are then formulated hypotheses. The measuring instrument used in this study is to use a luxmeter found in the light maker application and is used directly to calculate the unit light flow which is then calculated using the light intensity formula.

3. RESULTS AND DISCUSSION

This study examines the natural lighting in the architectural studio space of the Indonesian Institute of Technology to meet the visual comfort for students carrying out learning activities in the architectural studio space. In this study, a study will be conducted from the results of measurements and calculations in the architectural studio space.

a) Building Orientation Towards the Sun.

In the architectural studio space of the Institut Teknologi Indonesia , the building orientation faces west so that the architectural studio space only gets sunlight through openings on the north and south sides of the building.



Picture 1: Classroom studio condition

b) Light Openings on the Walls.

The light openings on the walls in the architectural studio space of the Indonesian Institute of Technology are window openings located on the north and south sides of the architectural studio space, openings on dead windows located on the four sides of the architectural studio, and openings on doors located on the south side of the architectural studio. With a total of 28 openings in the form of living windows measuring 80 x 85 cm, 32 openings in the form of dead windows above living windows and doors measuring 80 x 200 cm, 9 openings in the form of dead windows on the east side measuring 84 x 85 cm, and 2 openings in the form of doors measuring 160 x 200 cm.

c) Natural Lighting Measurement.

Lighting measurements in the architectural studio space of the Institut Teknologi Indonesia were carried out with the lights turned off and only utilizing natural light from the sun so that the results of the light flow measurements were obtained as follows

Table 3. Measurement results

No	Measurement Time	Weather Conditions	Luminous Current Unit (lm)
1	08.00	Overcast and cloudy	23.017
2	09.00	Overcast and cloudy	40.279
3	10.00	Bright	47.415
4	11.00	Bright	80.559
5	12.00	Bright	80.559
6	13.00	Bright	80.559
7	14.00	Overcast and cloudy	40.280
8	15.00	Rain and cloudy	34.525
9	16.00	Rain and cloudy	28.771

Source: analysis, 2024

The table above is a table of the results of natural lighting measurements in the architectural studio space of the Indonesian Institute of Technology that have been carried out. The table contains

figures from the amount of natural light flow obtained during measurements from 08.00 WIB to 16.00 WIB in the architectural studio space. Institut Teknologi Indonesia.

d) Reflectivity of Paint in the Architecture Studio Room.

The architecture studio room of the Indonesian Institute of Technology has the same paint color on all four sides, both on the north side, south side, east side, and west side. The paint color of the architecture studio room is white. In the theory of the table of the percentage of light reflection against the reflectivity of paint color, the white paint color in the architecture studio room of the Indonesian Institute of Technology has a light reflection percentage of 85%. So that 85% of the light that enters the studio room of the Indonesian Institute of Technology will be reflected inside the room.

e) Calculation of Natural Light Intensity.

The light intensity in an architectural room is obtained from the calculation of the light intensity formula based on data obtained from the results of measuring the light flow measured in the architectural studio and the results of measuring the area of the architectural studio room. The light intensity in the architectural room is obtained from the calculation of the light intensity formula based on the data obtained from the results of measuring the light flow measured in the architectural studio and the results of measuring the area of the architectural studio room.

Table 4. Light Intensity Calculation

Measurement Time	***Time***	***E = Φ (lm) / A (m^2)***	***Light Intensity (E)***	***Compliance***
Morning	08.00	23.017 / 230,17	100 Lux	No
	09.00	40.279 / 230,17	175 Lux	No
	10.00	47.415 / 230,17	206 Lux	No
Afternoon	11.00	80.559 / 230,17	350 Lux	Yes
	12.00	80.559 / 230,17	350 Lux	Yes
	13.00	80.559 / 230,17	350 Lux	Yes
Evening	14.00	40.280 / 230,17	175 Lux	No
	15.00	34.525 / 230,17	150 Lux	No
	16.00	28.771 / 230,17	125 Lux	No

Source: analysis, 2024

The highest Lux value occurs during the day and starts at 11.00 am. This condition is the best point of light in the studio classroom and is in accordance with standards SNI 03-6197-2000 , when a Average minimum illumination level in 350 Lux with 80.559 Luminous Current Unit.

4. CONCLUSION

Based on the discussion that has been done above, it can be concluded that the natural lighting in the architectural studio space of the Institut Teknologi Indonesia still does not meet the SNI 03-6197-2000 standard on Room Lighting Levels. Based on the measurement results and calculation results that have been carried out, light intensity data is produced in the architectural studio space of the Institut Teknologi Indonesia. The light intensity does not meet the visual comfort standards of the reading room, which is 350 Lux. In the architectural

studio space, the light intensity figures obtained are relatively small, measurement data shows that the average light intensity carried out at 08.00 - 16.00 WIB is 220.11 lux. With the highest light intensity of 350 Lux at 11.00 WIB, 12.00 WIB, and 13.00 WIB and the lowest light intensity is 100 Lux at 08.00 WIB. To meet visual comfort in the studio space, artificial lighting is needed in the morning and evening so that visual comfort in the studio space is still met.

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RUSTIC: Jurnal Arsitektur
Vol. 5, issue No. 1, January-June 2025, pp. 19~25
e-ISSN: 2775-7528, DOI: doi.org/10.32546/rustic.v5i1.2880

Analysis on Vegetation for Landscape Arrangement of Agrotourism in Cikapek, Leuwidamar, Lebak District

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Article Info

Article history:

Received Dec 17, 2024
Revised Dec 20, 2024
Accepted Dec 28, 2024

Keywords:

Agrotourism;
Cikapek;
Environmental sustainability;
Sample plots;
Vegetation

ABSTRACT

Vegetation analysis is important for regulating the balance of carbon dioxide and oxygen in the air, improving the physical, chemical, and biological properties of the soil, and managing groundwater. The aim is to determine the composition and structure of the plants present and located in the Cikapek Agrotourism area, Lebakparahiang Village, Leuwidamar District, Lebak Regency. The method used is sample plots measuring 100 m x 100 m (1 Ha) with 3 (three) observation plots, along the trail line there are plots at equal intervals. The plot sizes are (a) 5 m × 5 m for the sapling phase, (b) 20 m × 20 m for the tree phase. The observed tree growth phases: a. Mature trees with a diameter ≥ 20 CM b. Saplings, young trees with a height ≥ 1.5 M. Results indicate the plant species Cocos nucifera or coconut tree has the highest IVI (Important Value Index) of 0.92651% and the lowest Importance Value Index is the sugar palm plant with an IVI of 0.583%, and the lowest Important Value Index is the Waru plant with an IVI of 0.112%. However, the research should address broader regional planning concerns, integrating other biophysical factors to ensure a comprehensive and harmonious development strategy. This will help create an agrotourism area that supports ecological balance, aligns with the needs of the local community, and promotes long-term environmental sustainability.

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1. INTRODUCTION

Indonesia's high biodiversity, known to be the second largest in the world that urge to be managed and utilized based on the principle of sustainability for its continuity. Its' natural biological resources and their ecosystems in the form of diverse flora, fauna and natural phenomena as well as the beauty of natural scenery might be developed and utilized as much as possible for the welfare of the people while still paying attention to efforts to conserve natural resources that can be utilized as nature conservation and at the same time as natural tourism objects (Alikodra, 2010).

The Vegetation analysis becomes significant because it can discover the presence of vegetation from each growth level. The presence of trees in general will have a positive impact on the balance of the ecosystem on a wider scale. In general, the role of vegetation in an ecosystem is related to the regulation of the balance of carbon dioxide and oxygen in the air, improving the physical, chemical and biological properties of the soil, regulating groundwater management, and others.

Agrotourism areas have three main functions, firstly is for public space facilities area, secondly, part for agriculture such as seedling or transplant, and third is for providers environmental service place. That is why vegetation analysis is needed because of its complexity conditions as a reference for the development and arrangement of plants 0n the area.

The aim of the research is to understand the composition types and structural forms of plants that suitable for the area designated as an agro-tourism zone in Cikapek, Leuwidamar District. This research is urge to acquired scientific information in term of vegetation on Agrowisata area that useful for basic planning and development area.

2. METHOD

Vegetation analysis was carried out in the area of the Cikapek Agrotourism Area Plan, Lebakparahiang Village, Leuwidamar District, Lebak Regency, for 1 month (February, 2024).

Figure 1. Sample zone analysis vegetation on Agrowisata Cikapek area
(Source: process by author from Google Maps)

Analyzing the Cikapek Agrotourism area requires essential tools for accurate data collection and planning. Writing tools document observations and measurements, while measuring tape, rulers, and meter tape ensure precise spatial assessments. Raffia strings mark boundaries, and a compass determines directions for mapping and planting alignment. A camera provides visual documentation, and a map of the area offers a comprehensive layout for informed decision-making and sustainable development.

The primary data collection is carried out in the research area using a sample plot method with a size of 100 m x 100 m (covering 1 Ha) as many as 3 (three) plots/observation plots. In one sample plot, the plot is divided into sub-plots to facilitate observations in the field, with a size of 20 m x 20 m. The number of observation subplots in the field is further divided within the observation radius based on the observed tree growth phase. The method used in this research is the grid line method, along the trail line there are plots at the same distance. The plot size is (a) 5 m × 5 m for the sapling phase, (b) 20 m × 20 m for the tree phase. (Adjusted for variables observation).

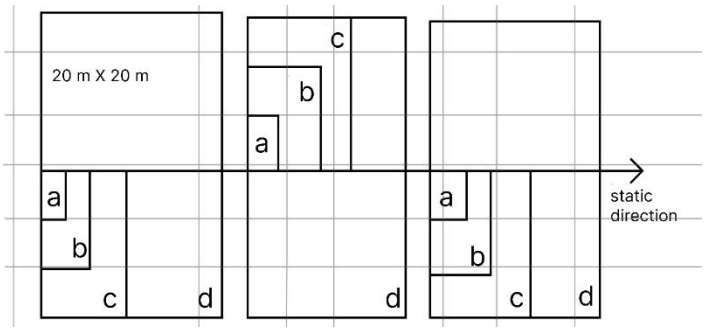

Figure 2. Sample Plot Design in the field (Source: Author)

The variables for the primary data collected in the field are the diameter of the tree trunk at a height of 150 cm from the ground surface, the name of the plant species, and the number of individuals per species. The growth phases of trees in this study are as follows:

1. Sapling with a height of ≥ 1.5 meters.
2. Adult tree with a diameter of ≥ 20 cm.

Data Analysis The collected data is analyzed to determine the species composition and vegetation structure. To obtain important values, density, dominance, and frequency are calculated based on the following equations:

$$Density\ (\mathrm{K}) = \frac{Number\ Of\ Individuals}{Plot\ Area}$$

$$Relative\ Density\ (\%) = \frac{Density\ Of\ a\ Species/kinds}{Density\ Of\ All\ Spesies/kinds}\ x\ 100\%$$

$$Frequency\ (F) = \frac{Number\ Of\ Plots\ Found\ Of\ a\ Kind/Species}{Total\ Number\ Of\ Plots}$$

$$Relative\ Frequency\ (FR) = \frac{Frequency\ Of\ a\ Kind/Species}{Frequency\ Of\ All\ Kinds/Species}\ x\ 100\%$$

$$Domination\ (D) = \frac{Base\ Area}{Plot\ Area}$$

$$Relative\ Domination\ (\%) = \frac{Domination\ Of\ a\ Kind/Species}{Domination\ Of\ All\ Kinds/Species}\ x\ 100\%$$

$$\text{Importance Value Index (INP)} = \mathrm{KR} + \mathrm{FR} + \mathrm{DR}$$

Figure 3. Important Value Equation (Source: Author)

3. RESULTS AND DISCUSSION

3.1. General description

The Cikapek Agritourism Area Plan is located in Lebakparahiyang Village, Leuwidamar District, Lebak Regency, which has a diversity of vegetation and natural resource potential that still has the character of local potential. The potential diversity of local vegetation is illustrated by the diversity of plants in the area which is still dominated by local species.The Cikapek Agrotourism area is located between the coordinates, 6°29'36.09"S - 106° 9'57.32"E and has an area of 50 hectares with a height of 200 meters above sea level. Currently in the planning stage as an agrotourism area from the Regional Government of Lebak Regency, Banten Province. The Cikapek Agrotourism area has a generally tropical climate with an average temperature of 240C – 270C. The climate conditions of the area include climate type C according to Schmidt and Ferguson's classification. The average rainfall is 2218.0 mm/year with the driest climate around December and the wettest in January.

3.2. Results of Vegetation Analysis in the Cikapek Agrotourism Area

The research results showed that there were 15 plant types and 11 families in the sample plot locations in the field. The existence of plant species allows them to increase outside the sample plot area in the field. Vegetation diversity has a relatively decreasing and increasing trend in plant types in the Cikapek agrotourism area, this is due to land use in the form of ex-HGU cultivated land by farmers on a temporary land use scale. Apart from that, there is disturbance to existing vegetation, especially forest encroachment to be used as agricultural land by local communities.

The results of the vegetation analysis show that plants with the highest Importance Value Index are not the primary community builders in the Cikapek Agrotourism Area. The composition of plant communities continues to change periodically according to the level of land use by the surrounding community. In the area, the Importance Value Index of plant species in a community is one of the parameters that indicate the important role of these plant species within their community

The results of the vegetation analysis show that the plant species Cocos nucifera has the highest IVI in the tree phase and the plant species Vernonia amygdalina in the pole phase. This indicates that the vegetation condition at the planned development site of Cikapek Agrotourism in Leuwidamar District is a secondary forest that has grown after disturbances, allowing pioneer species to thrive. This relates with the status of the former HGU land utilized by the community as mixed garden land, resulting in new plant species and predominantly young plants.

3.3. Composition of Plant Species in the Cikapek Agrotourism Area

The research results obtained at the sample map location for the Cikapek agrotourism area show that there are 15 plant species and 11 families from the tree community at the tree and sapling phases. Each has the following distribution: 4 plant species in the tree phase, 11 plant species in the sapling phase.

Table 1. Plant Species and Families at the Vegetation Research Location Tree Phase Vegetation

No	*Scientific Name*	*Local Name*	*Family*
1	*Arenga pinnata*	*Aren*	*Arecaceae*
2	*Cocos nucifera*	*Kelapa*	*Arecaceae*
3	*Vernonia amygdalina*	*Afrika*	*Asteraceae*
4	*Albizia falcataria*	*Albasia*	*Fabaceae*
5	*Durio zibethinus*	*Durian*	*Malvaceae*
6	Artocarpus heterophyllus *dan cempedak* Artocarpus integer	*Nangka /Campedak*	Moraceae
7	*Hibiscus tiliaceus*	*Waru*	*Malvaceae*
8	*Acacia dealbata*	*Akasia*	*Fabaceae*
9	*Bambusa vulgaris Schrad*	*Bambu*	*Poaceae*
10	*Hevea brasiliensis*	*Karet*	*Euphorbiaceae*
11	*Sandoricum Koetjape*	*Kacapi*	*Meliaceae*
12	*Alstonia scholaris*	*Lame/Pulai*	*Apocynaceae*
13	*Lagerstroemia*	*Bungur*	*Lythraceae*
14	*Garcinia sp*	*Manggis*	*Clusiaceae*
15	*Swietenia mahagoni*	*Mahoni*	*Meliaceae*

Source: Author (2024)

3.4. Tree Phase Vegetation

Based on the Important Value Index calculation results for the tree level, the plant species with the highest Important Value Index at the tree phase is the Coconut plant species with an IVI of 0.92651%, followed by the Sentul plant species with an IVI of 0.81969% and the Mahogany plant species with an IVI of 0.67121%. The plant species with the lowest Important Value Index is the Palm plant with an IVI of 0.58257% followed by Mahogany plant with an IVI of 0.671%

Table 2.Important Value Index at the Tree Phase

No	*Scientific Name*	*Local Name*	*K*	*KR (%)*	*FR (%)*	*DR (%)*	*IVI (%)*
1	*Arenga pinnata*	*Aren*	0.0025	0.125	0.16666	0.29090	0.58257
2	*Cocos nucifera*	*Kelapa*	0.0075	0.375	0.33333	0.21818	0.92651
3	*Sandoricum Koetjape*	*Kacapi*	0.005	0.25	0.33333	0.23636	0.81969
4	*Swietenia mahagoni*	*Mahoni*	0.005	0.25	0.16666	0.25454	0.67121
	Total Amount		**0.02**	*1*	*1*	*1*	*3*

Source: Author (2024)

From Table 2, it describe that the species Cocos nucifera has a high IVI value (0.813345), with 3 plants spread across 2 plots out of the 3 observation plots. The diameter range for Cocos nucifera is between 100 cm to 150 cm. This indicates that the condition of the land utilization in the form of mixed garden and shrubs at this research location has been damaged due to community activities in utilizing the land, as indicated by the small number of trees and small tree diameters.

3.5. Vegetation Phase of Sapling

Based on the calculation results of the Importance Value Index at the sapling level, it was found that the species with the highest Importance Value Index at the sapling phase is the African plant species with an IVI of 402.27738%, followed by the Acacia plant species with an IVI of 0.8202%, and the Albasia plant species with an IVI of 0.27834%. Meanwhile, the species with the lowest Importance Value Index is the Waru plant with an IVI of 0.11217% next lowest is the 2nd lowest Mangosteen plant with an IVI of 0.122%; the 3rd lowest is the Lame/ Pulai plant with an IVI of 0.128%; 4th lowest Durian plant with IVI 0.131%; The 5th lowest is the Bungur plant with an IVI of 0.152%

Table 3. Importance Value Index in the Sapling Phase

No	*Scientific Name*	*Local Name*	*K*	*KR (%)*	*FR (%)*	*DR (%)*	*IVI (%)*
1	*Vernonia amygdalina*	*Afrika*	2.48	402	0.10714	0.17024	402.27738
2	*Albizia falcataria*	*Albasia*	0.44	0.07096	0.10714	0.10023	0.27834
3	*Durio zibethinus*	*Durian*	0.16	0.02580	0.07142	0.03341	0.13064
4	Artocarpus heterophyllus *dan cempedak* Artocarpus integer	*Nangka /Campedak*	0.24	0.03870	0.10714	0.05887	0.20472
5	*Hibiscus tiliaceus*	*Waru*	0.08	0.01290	0.07142	0.02784	0.11217
6	*Acacia dealbata*	*Akasia*	1.92	0.30967	0.07142	0.43914	0.82024
7	*Bambusa vulgaris Schrad*	*Bambu*	0.36	0.05806	0.07142	0.02784	0.15733
8	*Hevea brasiliensis*	*Karet*	0.2	0.03225	0.10714	0.04136	0.18076
9	*Alstonia scholaris*	*Lame/Pulai*	0.12	0.01935	0.07142	0.03739	0.12817

10	*Lagerstroemia*	*Bungur*	0.08	0.01290	0.10714	0.03182	0.15186
11	*Garcinia sp*	*Manggis*	0.12	0.01935	0.07142	0.03182	0.12260
	Total Amount		**6.2**	**402.6**	**0.96428**	*1*	**404.56428**

Source: Author (2024)

From Table 3, it shown that Vernonia amygdalina has a high IVI (402.27738), with a total of 62 plants distributed in 3 plots from 3 observation plots. The diameter range for Vernonia amygdalina is between 30 cm to 70 cm. This shows that the condition of land use in the form of mixed gardens and shrubs in this research location is damaged due to community activities in land use, marked by the small number of trees and the small diameter of the trees.

4. CONCLUSION

Based on the results of this research, 15 types of plants and 11 families were obtained tree communities in the tree and sapling phases. Importance Value Index at the tree level: It was found that the plant species that had the highest Importance Value Index at the tree phase was the Coconut plant species with an IVI of 0.92651% and the lowest Importance Value Index is the sugar palm plant with an IVI of 0.583%. The highest Important Value Index in the sapling phase is the African plant species with an IVI of 402.27738% and the lowest Important Value Index of 1 is the Waru plant with an IVI of 0.112%; next lowest is the 2nd lowest Mangosteen plant with an IVI of 0.122%; the 3rd lowest is the Lame/ Pulai plant with an IVI of 0.128%; 4th lowest Durian plant with IVI 0.131%; The 5th lowest is the Bungur plant with an IVI of 0.152%.

To ensure the types of plants in the Cikapek Agrotourism area remain balanced and sustainable, it is essential to implement thoughtful and well-informed policies in its development. Special attention should be given to plant species with the lowest Importance Value Index (IVI) that continue to thrive, ensuring their preservation as a hallmark of the Cikapek area. This approach will not only maintain biodiversity but also highlight the unique characteristics of the region.

Further research is required at the proposed site of the Cikapek Agrotourism area, located in Leuwidamar District. Such studies should focus on the effective management of the agrotourism area, including the identification of specific plant species suitable for sustainable cultivation. Additionally, research should address broader regional planning concerns, integrating other biophysical factors to ensure a comprehensive and harmonious development strategy. This will help create an agrotourism area that supports ecological balance, aligns with the needs of the local community, and promotes long-term environmental sustainability.

ACKNOWLEDGEMENTS

We would like to extend our sincere gratitude to the dedicated staff of Leuwidamar Sub-district, Lebak Regency, for their invaluable support throughout our research. Their cooperation and assistance have been essential in ensuring the success of this project. Our heartfelt thanks also go to the surveyors whose expertise and precision played a crucial role in gathering accurate data. Additionally, we are deeply appreciative of all the respondents who generously shared their time, knowledge, and insights, contributing significantly to the depth and quality of our findings. Without the collective effort of all these individuals, this study would not have been possible.

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RUSTIC: Jurnal Arsitektur
Vol. 5, issue No. 1, January-June 2025, pp. 26~37
e-ISSN: 2775-7528, DOI: doi.org/10.32546/rustic.v5i1.2775

The Identification of Visitor Activities at Nostalgia Park, Kupang

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Article Info

Article history:

Received Oct 24, 2024
Revised Nov 18, 2024
Accepted Dec 27, 2024

Keywords:

Behavioral mapping;
Nostalgia Park;
Open space;
Park;
Public space.

ABSTRACT

Nostalgia Park, the first planned public open space in Kupang, was designed to serve as a representative recreational area for the city's residents. Since its inauguration in 2011, it has become a focal point for recreational activities within Kupang. Since the space has been open for 13 years, it is essential to define visitor activities before determining the necessary facilities. To develop a comprehensive understanding of the facility requirements necessary to improve the quality of Nostalgia Park as a public space, this research examined fundamental inquiries regarding existing visitor activities. The study used behavioural mapping with a place-centered approach, observing specific zones and periods to identify user activity locations and types. The findings of the survey were subjected to descriptive analysis to inform the formulation of facilities. The research, conducted over two weeks, yielded an overview of the condition of the Nostalgia Park. The highest density of activity was observed in zone B, while zone A exhibited the lowest activity. The majority of visitors are present on weekends and holidays, with the highest concentration of activity occurring in the afternoon, between 15:00-17:00 WITA. Based on these findings, the necessary facilities for each zone have been identified, with their distribution adjusted to accommodate the activity levels.

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1. INTRODUCTION

The existence of public space in a city is an indicator of the quality of life, which in turn affects the level of happiness and social sustainability of its citizens [1]. In addition to its role as a facilitator, a good quality of life in cities is also closely interconnected with the quality of urban design and the mental health and well-being of the surrounding community [2]. The configuration of this public space is largely influenced by the pattern and arrangement of the built environment [3]. In general, public open space in urban areas can be classified into two categories: green open space and non-green open space [4].

Nostalgia Park, the first planned park and principal public space in Kupang, was inaugurated on February 8, 2011, by President Soesilo Bambang Yudhoyono. Originally constructed as a site for the Gong Perdamaian Nusantara (GPN) Monument of Kupang City [5] [6]. The 13-year-old park has evolved into the preeminent public space in Kupang, offering a multitude of activities. The park is strategically situated close to El Tari Street, the city's primary thoroughfare, ensuring convenient accessibility from all parts of the city. Nostalgia Park is under the purview of the government and is accessible to the public at all times without restrictions on visiting hours. The park offers a multitude of facilities for the community, including socialization spaces, exercise areas, recreational facilities, play equipment for children, and commercial stalls.

The park offers a variety of activities, including opportunities for relaxation, soccer, jogging, recreation, and trading [7]. Moreover, Nostalgia Park serves as a venue for public events, such as national anniversaries, which are typically held with a series of competitions and other forms of entertainment.

As the primary public space in operation for 13 years, Nostalgia Park requires an evaluation of its functionality in both the physical aspects of design and management, as well as other factors, including user behaviour. This evaluation is necessary to identify the extent to which the public space is fulfilling its role as a space for all. The identification of visitor behaviour in Nostalgia Park was conducted through the use of behavioural mapping techniques, employing public space quality indicators [8]. Behaviour mapping is a technique used to map human or user behaviour in a specific space or location, thereby facilitating the visualization of activity distribution within the physical environment [9]. The application of behavioral mapping is also employed to ascertain the output of a given design by analyzing the pattern of human behavior or activity, that enables the creation of a design that can meet the needs of its users [10]. This distribution of activities can then be employed to identify the utilisation of space in the process of designing quality, effective, and efficient solutions [11].

Several studies have been conducted on Nostalgia Park, particularly concerning its architectural features. These include investigations into the quality of function, physical quality and the role of the park as a public space that has declined in significance [12], the significance and utilisation of Nostalgia Park [7], and studies into the comfort of vegetation about temperature and humidity [13]. Other studies have focused on the quality of facilities in supporting activities that occur in Nostalgia Park [14] Additionally, studies that examined park user profiles, with a particular emphasis on distance and mode of transportation used [15] and, research have been conducted on the sustainability of green open space development in Nostalgia Park, employing sustainable development indicators [16]. Behavioural mapping research has been conducted in Nostalgia Park, focusing on movement patterns (person-centred mapping) to analyze the use of space and enhance the mental health of its users [17].

A review of previous studies reveals that, despite similarities in the research method, namely behavioural mapping, there are notable differences in the objectives and results achieved. The research observed movement patterns to identify activity categories that could be utilized to improve the quality of life in urban areas. The objective of this research is to identify the activities of visitors to Kupang Nostalgia Park through the use of place-centred mapping, intending to formulate the requirements for the development of public space facilities within the park.

2. METHOD

The objective of this research was to address fundamental inquiries about the prevailing patterns of visitor conduct and to develop a comprehensive understanding of the facility requirements necessary to enhance the quality of Nostalgia Park in Kupang City as a public space. Accordingly, this research employs qualitative methods to gain insight into social phenomena from the perspective of the participants [18]. Behavioural mapping is a qualitative method that involves describing interactions and activities in a particular environment. This allows researchers to gain insight into behavioural patterns and contribute to a comprehensive understanding of user interactions with the built environment [19]. In the context of behavioural mapping, there are two principal approaches to mapping behaviour [20]. The first is place-centred mapping, which focuses on the mapping of behaviour based on the specific location in question. The second is person-centred mapping, which is concerned with mapping behaviour based on the movement of individuals within a given area over a defined period. Accordingly, this research employs the technique of place-centered mapping.

Behavioural mapping is a method of systematic observation of behaviour in a specific location over some time. The results of these observations are presented in the form of a map, which serves as a visual representation that facilitates analysis of the observed behaviours. The research location is the Nostalgia Park Public Space in Kupang City Center. To identify visitor behaviour in the Nostalgia Park, observations were conducted on weekdays and holidays (weekends) at specific times. The survey concentrated on visitor behaviour in terms of the type of activity, the number of activities, and the location of activities. Researchers observed and recorded data during the collection process of all visitors during the specified period. Intensive surveys and observations were conducted over two weeks, encompassing weekdays and weekends. The

research was conducted from Friday, June 14, to Wednesday, A review of data on visitor behavior in Nostalgia Park, revealed that the park still requires additional facilities to accommodate visitor behavior and activities on June 26, 2024, at locations divided into four time periods. Each morning period spanned from 06:00 to 08:00 WITA, while the afternoon periods were from 11:00 to 13:00 WITA, 15:00 to 17:00 WITA, and 19:00 to 21:00 WITA, respectively.

The methodology used is divided into two stages. Stage one comprises observations of place-based activities in Nostalgia Park Kupang, conducted to map the types and frequencies of behaviour observed in a given space. Stage two involves the analysis of the results of these observations following the objectives of qualitative research. This analysis aims to elucidate the social phenomena occurring in Nostalgia Park, with a particular focus on the activities observed. The number of visitors and their activities are recorded manually by surveyors in each zone. This understanding, in turn, will inform the decision-making process regarding the necessity for facilities in this public space.

3. RESULTS AND DISCUSSION

3.1. Existing Conditions of the Research Location

Nostalgia Park is located on El Tari Street, in the Kelapa Lima District of Kupang City, East Nusa Tenggara. The park holds historical significance as a key part of Kupang's urban heritage, covering an area of approximately 49,483 m² (4.9 hectares). It serves as the primary public open space within the city, facilitating community interaction and serving as a vital urban amenity. The park is situated in the city centre, close to some strategic facilities, including Lippo Mall, the Finance Building, and the area occupied by the Kupang Mayor's Office. Its location and accessibility have contributed to its status as a prominent public open space.

The park, which was established 13 years ago, has become the primary public space in Kupang, hosting a multitude of activities. The park is strategically situated near El Tari Street, the city's primary thoroughfare, ensuring convenient accessibility from all parts of the city. Nostalgia Park is under the purview of the government and is accessible to the public at all times without restrictions on visiting hours. This park offers a multitude of facilities for the community, including socialization spaces, exercise areas, recreational facilities, play areas for children, and commercial stalls. The park offers a variety of activities, including opportunities for relaxation, soccer, jogging, recreation, and commerce.

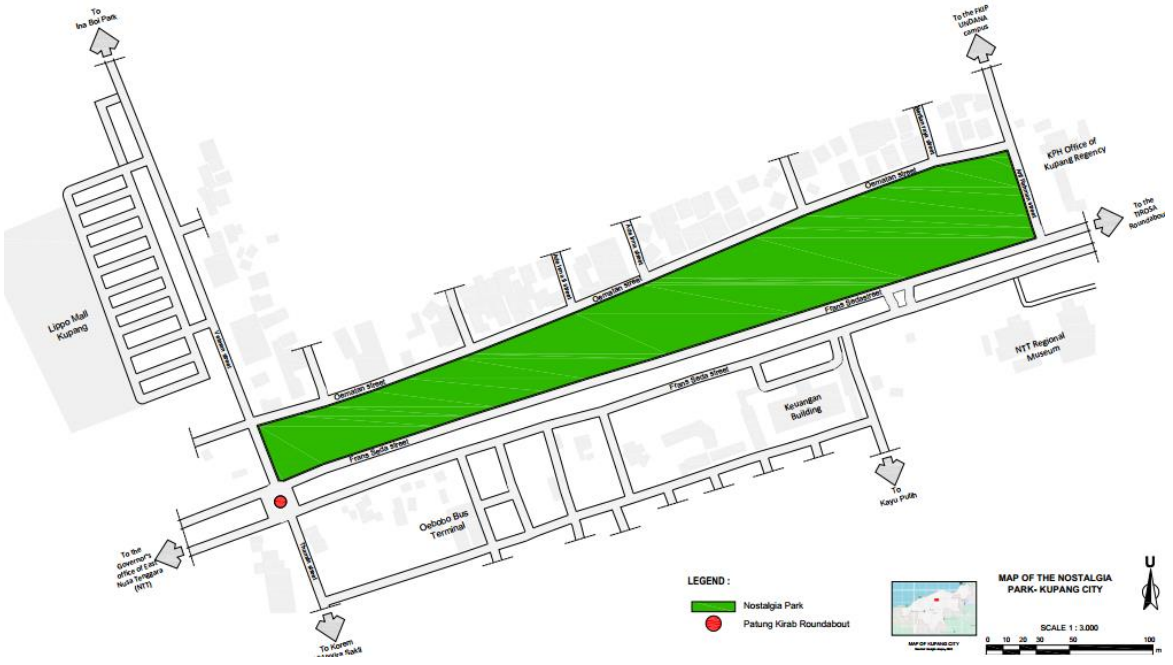

Figure 1. Research Location of Nostalgia Park in Kupang, East Nusa Tenggara (source: author)

Figure 2. Facilities at Nostalgia Park (source: author)

3.2. Identification of Visitor Behaviour in Nostalgia Park

The objective of visitor behavior identification is to ascertain the activities engaged in by visitors in public open spaces. The categorization of visitor activities is based on the theoretical framework proposed by Zhang and Lawson in 2008 [21], which classifies public space activity patterns into three main categories: process activities, physical activities, and transition activities. Process activities are defined as those carried out between two activities with a discernible purpose. Subsequently, physical activity is defined as any activity that occurs when two or more individuals interact in a public setting. In contrast, transitional activities are actions undertaken by visitors without a discernible objective, typically executed in isolation [22]. The initial surveys and observations were conducted over two weeks, spanning both weekdays and weekends. The research was conducted from Friday to Wednesday, June 14-26, 2024, at locations divided into four time periods each morning (06.00-08.00 WITA), afternoon (11.00-13.00 WITA), afternoon (15.00-17.00 WITA), and evening (19.00-21.00 WITA). Each public open space area is subdivided into distinct zones, each of which is characterized by a specific activity pattern. This section presents a discussion of the following topics: zone division, data on visitor behavior and visitor characteristics, and the relationship between behavior and public open space arrangement.

Figure 3. Division of Observation Zones in Nostalgia Park (source: author)

The data on the distribution of visitors who engaged in activities at Nostalgia Park during the survey period are presented in the following table and graph, based on the observation results.

Table 1. Data on Visits to Nostalgia Park Per Day (source: author)

Day	Survey Date	Data on visits/Zone			Data on visits/day
		Zone A	Zone B	Zone C	
1	Friday, 14 June 2024	251	917	518	1686
2	Saturday, 15 June 2024	200	852	507	1559
3	Sunday, 16 June 2024	151	713	476	1340
4	Monday, 17 June 2024*	196	655	457	1308
5	Tuesday, 18 June 2024*	206	688	447	1341
6	Thursday, 20 June 2024	154	524	451	1129
7	Friday, 21 June 2024	173	577	404	1154
8	Saturday, 22 June 2024	137	702	471	1310
9	Sunday, 23 June 2024	174	851	484	1509
10	Monday, 24 June 2024	148	612	450	1210
11	Tuesday, 25 June 2024	165	528	420	1113
12	Wednesday, 26 June 2024	185	487	428	1100
	Number of visitors	***2140***	***8106***	***5513***	***15759***
	Average visitors	***178***	***676***	***459***	***5253***

Remarks: *Holiday

The results of the survey indicate a marked increase in the number of visitors to Nostalgia Park on weekends (Friday through Sunday) and holidays. This increase is likely attributable to the availability of activities designed for families and communities during weekends and holidays, which may serve to occupy the time of those who are not at work. The mean visit data and visitor distribution graph are presented in Table 2 and Figure 4.

Table 2. Data on Average Visits to Nostalgia Park (source: author's data)

Zone	Visitors/day							Visitors/ Week	Average/ Day
	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday		
A	171	186	185	154	212	169	163	1239	177
B	634	608	487	524	747	777	782	4559	651
C	454	434	428	452	461	489	480	3197	457
Number of visitors	***1258***	***1227***	***1100***	***1130***	***1420***	1435	***1425***	***8994***	***1285***

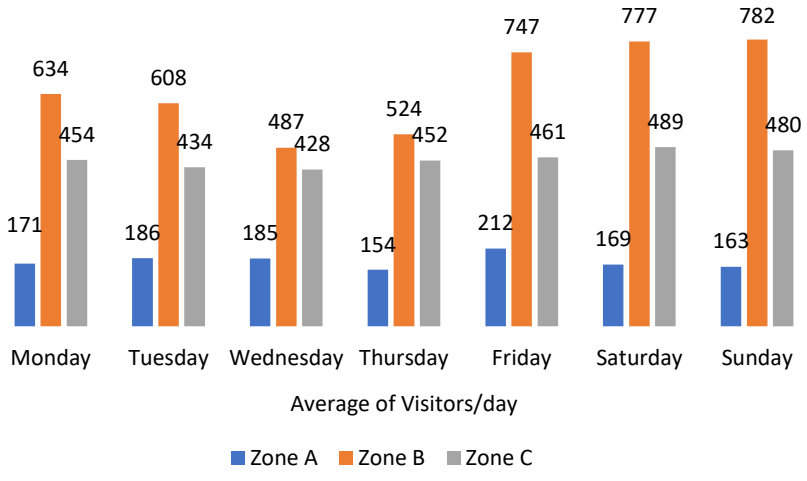

Figure 4. The Graph of Visitors Distribution Per Zone in Nostalgia Park (source: analyzed by author)

Regarding the distribution of activities across the park, the survey data indicated that the majority of visitor activities occurred in Zone B, which is characterized by a greater density of facilities and activity spaces. These spaces are adaptable to accommodate a diverse range of activities and groups, including those with varying age demographics. Zone A is typically characterized by a tranquil atmosphere, with visitors engaging in activities such as jogging or leisurely walking. This is a plausible assumption given that the zone in question lacks a plethora of supplementary facilities, except jogging tracks and parks. Zone C is home to a diverse range of visitors, given the expansive area and the variety of facilities available, including an Amphitheatre. The primary activities observed in the park are jogging and leisurely walking, as well as sitting. The distribution of activities in Nostalgia Park is illustrated in the following maps.

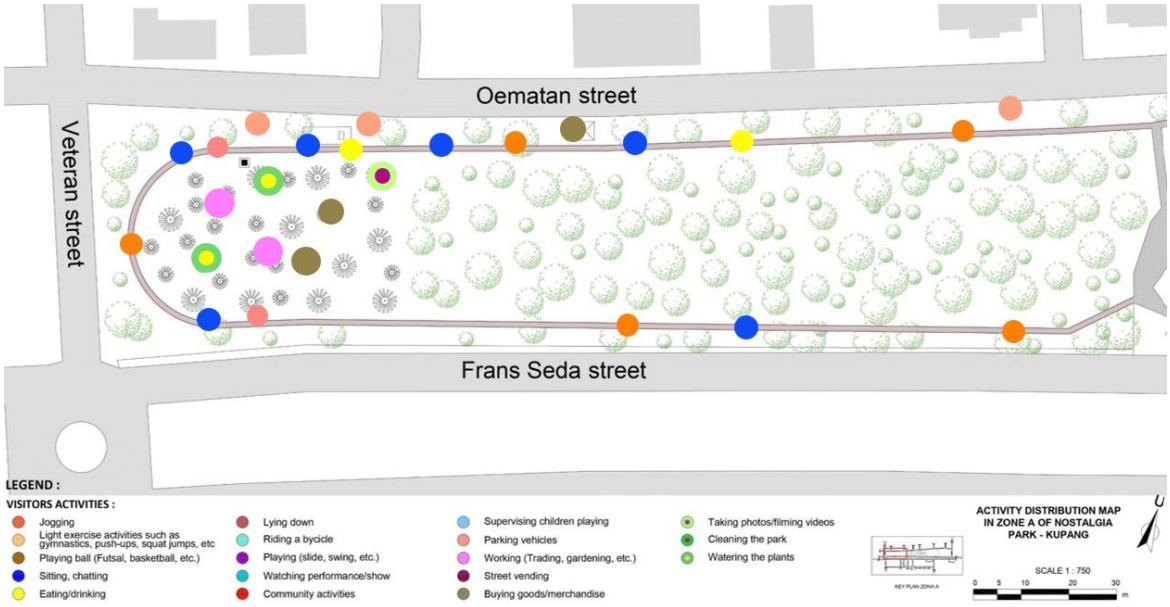

Figure 5. Distribution of Visitors Activities in Zone A (source: author)

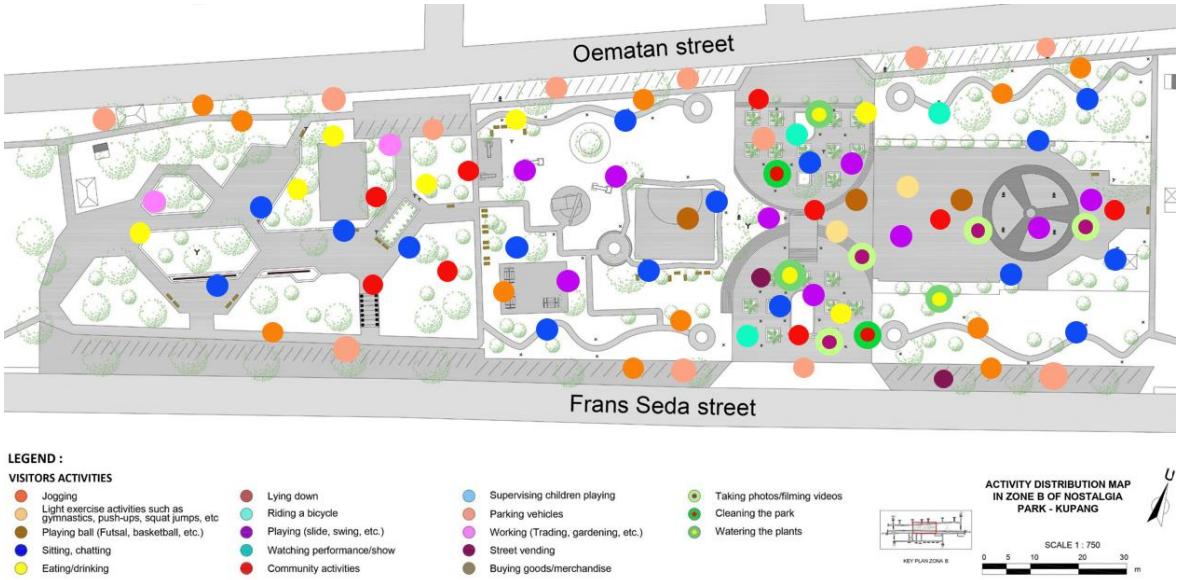

Figure 6. Distribution of Visitors Activities in Zone B (source: author)

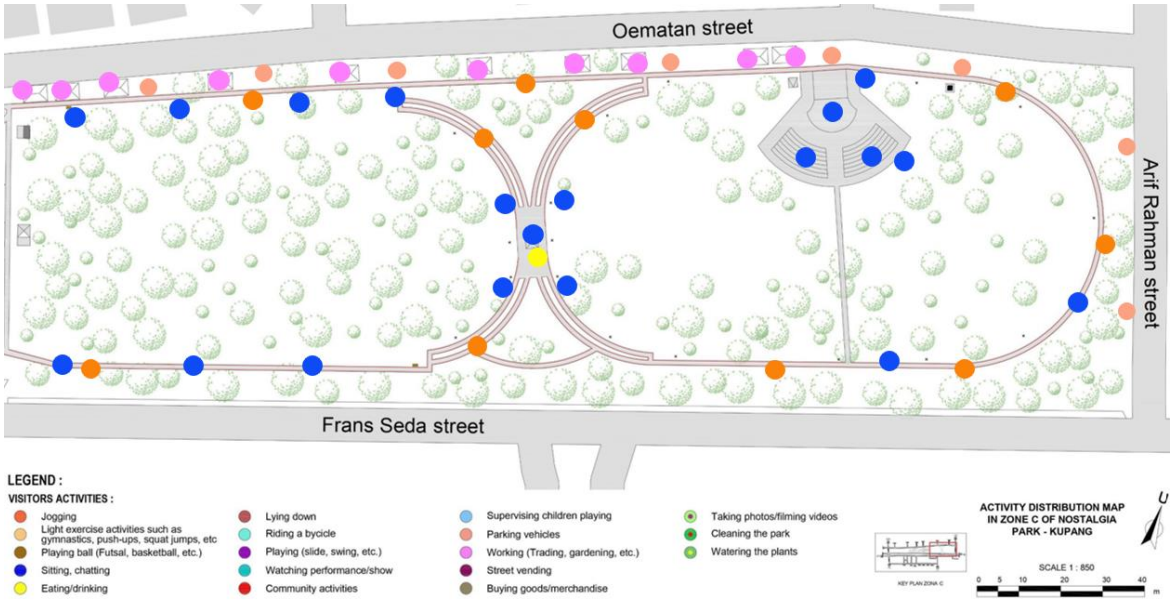

Figure 7. Distribution of Visitors Activities in Zone C (source: author)

The analysis of visitor behavior indicates that the distribution of activities is influenced by several factors. These include the presence of zones that are visited by a significant number of visitors, the availability of supporting facilities (such as benches, play areas, traders, and dining and drinking establishments), and the overall visual appeal of the area. Conversely, zones that appear tranquil are attributed to a dearth of facilities, including inadequate illumination and the absence of supplementary amenities. Besides this, zones that are less frequently visited are situated at a considerable distance from parking or drop-off areas. In general, the level of activity in the Nostalgia Park is observed to increase during the morning and evening periods. The Number of Visitors to Nostalgia Park During Each Period is in Table 3 and Figure 8.

Table 3. Number of Visitors to Nostalgia Park During Each Period (source: author)

Zone		Daily Visitors/Zone			Numbers of Visitors/day
		Zone A	Zone B	Zone C	
Morning	06: 00 – 08:00	68	165	135	368
Afternoon	11:00 – 13:00	16	112	110	238
Evening	15:00 – 17:00	68	250	146	464
Night	19:00 – 21:00	25	124	65	215
Number of visitors		177	651	457	1285

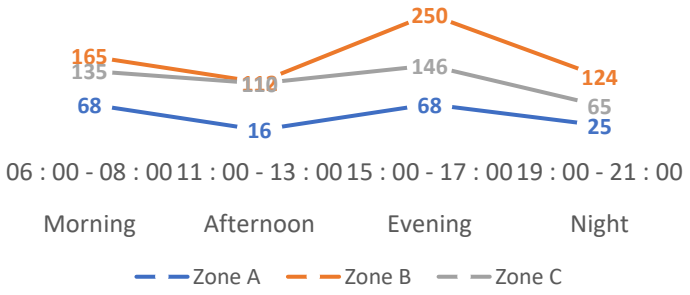

Figure 8. Graph of Visitors to Nostalgia Park During Each Period (source: analyzed by author)

The morning period (06:00-08:00 WITA) is predominantly marked by the presence of joggers and individuals participating in leisure walking. The highest levels of activity are observed during the afternoon

hours (17:00-19:00 WITA). Visitor numbers tend to decline during daylight hours, primarily due to the high temperatures in the area. Additionally, the number of visitors decreases at night, which can be attributed to the absence of adequate lighting at the location. The following findings emerge from an analysis of visitor behavior in the three zones of Nostalgia Park:

3.2.1. Zone A

The zone is equipped with a variety of facilities, including a jogging track, parking lot, flower garden, and dining area. The flower garden, situated at the center of the zone, is not active in the conventional sense. Rather, it is a plot of land utilized by the private sector for the storage of a collection of plants intended for sale. Consequently, this area is not intended to be accessed by visitors. The primary activities engaged in by visitors are jogging and leisurely walking along the periphery of the zone. A privately owned restaurant is situated on the northern side of the park, yet it is seldom frequented by visitors. This zone is observed to be active during the morning and afternoon hours. Due to the absence of illumination, the area is devoid of activity during nocturnal hours. The zone lacks the requisite park benches and other amenities, thereby rendering it less conducive to visitor comfort. Additionally, this zone is in a state of disrepair, as evidenced by the dilapidated jogging track and the presence of accumulated waste in various parts of the park.

3.2.2. Zone B

This zone is distinguished by the greatest number of facilities and serves as the epicenter of activity. The existing facilities include Gong Perdamaian and the surrounding functional spaces, a park, a sports field (for basketball), a children's playground, a jogging track, a gazebo, seating, and parking. Additionally, the zone contains a multitude of shade-producing plants, thereby ensuring a comfortable environment for visitor activities during daylight hours. In addition to the aforementioned facilities, the zone also encompasses a Salome food stall, which is a popular destination for visitors. Consequently, the northern side of the zone also serves as a location for visitors to repose. A variety of activities are conducted within this zone throughout the day, by a diverse range of visitors, including children and the elderly. The activities observed included recreation, sitting, eating, playing, sports (futsal, basketball, jogging, and leisurely walking), and the implementation of community activities. Community activities are concentrated in the Gong Perdamaian open space and the shady area on the west side of the zone. The zone in question is a locus of considerable activity, not only due to its status as the primary entrance and exit point but also because of the diversity of facilities available. Furthermore, the zone's accessibility and the presence of adequate parking areas on either side contribute to its high level of activity. The availability of lighting in the zone allows for visitor activity to extend into the evening hours. However, the lighting is uneven some of it is in poor condition and certain sections of the zone appear to be lacking in adequate illumination during nocturnal hours. Besides the issue of limited lighting, the zone faces a significant challenge around facility maintenance. A considerable number of facilities, including playground equipment, sports facilities, and park benches, have been subjected to damage and have not been duly repaired. The zone still lacks adequate activity support facilities, including benches that are both comfortable and accessible to all groups. Additionally, there is a dearth of lighting, coupled with concerns regarding maintenance and cleanliness, as well as parking management.

3.2.3. Zona C

This zone is the largest in terms of area and offers a variety of amenities, including a jogging track, Amphitheatre, gazebo, and park benches. The primary activities observed in this area are the exercise of jogging and leisurely walking by visitors during the morning and evening hours. There are locations where individuals engage in passive recreation, such as sitting and leisurely activities. The distribution of shade trees in this zone provides comfort for daytime activities but results in darkness at night due to the absence of lighting, which in turn limits nighttime activity. This condition also presents the potential for negative activities to occur at night, which may lead to significant concerns regarding security and comfort for visitors. This area also has a space in the centre and tends to be poorly maintained. The lack of supporting facilities, such as trash bins, causes the area to become dirty as visitors discard their trash indiscriminately. This area could be optimized for other public facilities if properly arranged.

3.3. Relationship between Behaviour and Public Space Arrangement in Nostalgia Park

Visitor behaviour data revealed the need for additional facilities in Nostalgia Park. Table 4 shows references data on the facility needs per zone.

Table 4. Facility Needs Based on Activities Per Zone in Nostalgia Park (source: analysis by the author)

Zone	Initial Function	Existing Activity	Facility Needs
Zone A	Parking Area	Parking the Vehicle	- The creation of parking lots with clearly defined parking patterns and boundaries is essential. - The installation of lighting at night around the parking lot is recommended. - Ornamental vegetation: The incorporation of plants with aesthetic appeal is advised
	Jogging Track	Jogging, walking and sitting	- The necessity for the repair of the damaged jogging track has been identified. The recommended solution is the installation of paving blocks. - The park area would benefit from the addition of seating - The installation of lighting at night along the jogging track and park area - Plants that serve an aesthetic purpose
	Places to Eat	Preparing food, buying and eating food	Plants that serve an aesthetic purpose
	Flower Garden	Planting flowers, caring for flowers, selling flowers and buying flowers	- It is recommended that parking lots be created with clearly defined parking patterns and boundaries. - The installation of lighting at night around the perimeter of the parking lot is recommended. - Plants that serve an aesthetic purpose
Zone B	Visitors parking	Visitors parking, sports, recreation, relaxing	- The parking lot surfaces should be improved and more durable asphalt or paving layers should be added. - Parking markers and clear road markings should be installed to regulate vehicle parking. - Transparent demarcation between distinct parking zones and other areas is recommended.
	Pedestrian/Jogging track	Exercise, relaxation	- The jogging track will undergo a comprehensive renovation, during which it will be repaved with more durable materials. - Additionally, lighting will be installed along the track to enhance user safety and convenience.
	Sports field	Sports, recreation, leisure	Installing additional lighting on the sports field will improve user comfort.
	Pond and Passive Garden	Sports, recreation, leisure, community activities, park care and maintenance	- The incorporation of ornamental flora and fauna can enhance the aesthetic appeal and comfort of the landscape. - The repair and reuse of the pond can contribute to water conservation in the garden. - The installation of lighting
	Open space and area around Gong Perdamaian	Sports, recreation, leisure, community activities, park care and maintenance	Addition of seating facilities and lighting
	Gong Perdamaian Basement Sculpture	Recreation, leisure, garden care and maintenance	The renovation of the basement is intended to transform it into a functional space.

Zone	Initial Function	Existing Activity	Facility Needs
	Gazebo	Recreation, leisure, community activities	Additional lighting for visitor safety and comfort
	Seating	Recreation, leisure	- The seating design was altered and additional seating was installed in locations deemed optimal for the intended use. - The seating was crafted from durable and comfortable materials.
	Children's play area	Children's play area, relax, sit.	- The addition of a neat and interactive setting has the potential to influence children's cognitive development during play. The space can be reorganized in terms of zones, colours, and the placement of facilities, which can be varied and comfortable. - The incorporation of play facilities and the utilisation of durable materials
	Location Marker / Landmark	Relaxation, eat, drink, light exercise.	The installation of additional seating and the provision of lighting are intended to enhance the safety and comfort of visitors.
	Plaza	Plaza, Coffee stalls, Coconut ice stalls	- The implementation of additional and strategically positioned waste receptacles is recommended. - The provision of illumination is advised for the safety and comfort of visitors.
	Green Area	Green Area	- The arrangement of vegetation plays an important role in the aesthetic value and functionality of an area. - The addition of vegetation can enhance the visual appeal of an environment, while also providing practical benefits such as delineating boundaries, creating shade, and providing directional cues.
Zone C	Jogging Track	Jogging, Walking, Sitting	- Garbage bins - Lighting facilities to enhance user safety and convenience
	Road Buffer	Parking, *angkringan*	- Garbage bins - Lighting facilities to enhance user safety and convenience - Parking area - Adjustment of food stall area
	Gazebo	Sitting, eating, drinking, lying down	- Garbage bins - Lighting facilities to enhance user safety and convenience
	Amphitheater	Sitting, eating and drinking, lying down, exercise	- Garbage bins - Lighting facilities to enhance user safety and convenience
	Sitting bench	Sitting	- Garbage bins - Lighting facilities to enhance user safety and convenience

4. CONCLUSION

The survey and analysis of visitor behavior revealed that activities in Nostalgia Park are distributed unevenly, correlating with the availability of facilities. Zone B exhibited the highest levels of activity due to its vibrant appearance and numerous amenities, while Zone A showed the lowest, attributed to insufficient facilities such as lighting and seating. Safety and security concerns, particularly at night due to limited lighting, require significant attention, especially in Zone A and Zone C, to ensure visitor comfort and well-being.

Activity levels were highest during the morning (06:00–08:00 WITA) and evening (17:00–19:00 WITA), with jogging and leisure walking most common in the morning. Afternoon activity decreased due to high temperatures.

These findings highlight the need to tailor facilities to each zone-specific activity pattern. Additional research is necessary to understand visitor characteristics and the overall quality of Nostalgia Park to develop facilities that meet user needs and enhance its functionality as an inclusive public space.

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RUSTIC: Jurnal Arsitektur
Vol. 5, issue No. 1, January-June 2025, pp. 38~51
e-ISSN: 2775-7528, DOI: doi.org/10.32546/rustic.v5i1.2718

Micro, Small, and Medium Enterprises (MSMEs) Center in East Kolaka with Emphasis on Neo-Vernacular Architecture

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Article Info

Article history:

Received Oct 10, 2024
Revised Dec 6, 2024
Accepted Dec 27, 2024

Keywords:

Community;
East Kolaka;
Local identity;
MSMEs Center;
Neo-Vernacular.

ABSTRACT

Micro, Small, and Medium Enterprises (MSMEs) play a crucial role in enhancing community resources and advancing the economy in Indonesia. The purpose of this research is to analyze and describe the Micro, Small, and Medium Enterprises Development Center (MSMEC) in East Kolaka using a Neo-Vernacular emphasis. A qualitative descriptive method is applied in this study, with data obtained through observation, interviews, and documentation review related to the development and characteristics of the MSMEC in the area. The results of the study show that the MSMEC in East Kolaka not only functions as a place for economic activities but also as a center of social interaction that strengthens local identity. The application of Neo-Vernacular architecture in the design of the MSMEC building demonstrates a combination of tradition and modernity, creating a space that supports the sustainability of MSMEs and enhances the attraction for tourists. This research offers new perspectives in the development of policies and strategies to strengthen MSMEs in East Kolaka.

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1. INTRODUCTION

Micro, Small, and Medium Enterprises (MSMEs) are the result of the productive efforts of the community, contributing significantly to the assets and economic circulation in Indonesia. The economic growth rate in developing SMEs can be observed from the available facilities and services, as well as from the enhancement of business skills and interests. The current economic conditions in Indonesia demonstrate resilience in the face of the monetary crises that have affected the country's capital [1].

Article 1, paragraph 7 of Law No. 25 of 2009 of the Republic of Indonesia states that service standards are the benchmarks used as guidelines for service delivery and as references to assess service quality, which are the obligations and commitments of service providers to deliver quality, fast, easy, affordable, and measurable services to the community [2]

Southeast Sulawesi Province, which encompasses 14 regencies/cities, has a land area of approximately 38,140 km², while its marine area covers about 140,000 km². The development of SMEs in Southeast Sulawesi, particularly in East Kolaka Regency, plays a significant role in boosting the economy, especially through the industrial sector. As a result of the splitting from Kolaka Regency, East Kolaka was officially established in the plenary session of the Regional Representative Council (DPD RI) on December 14, 2012, regarding the draft law for new autonomous regions [3].

Geographically, East Kolaka has the potential for agricultural and plantation commodities, with the majority of the population working as farmers and traders. In East Kolaka, industries based on agricultural and plantation products, such as cocoa and rice, have become essential suppliers for both the region and its surrounding areas. East Kolaka is the largest cocoa producer in Indonesia and is also known as a major rice producer in Southeast Sulawesi. In addition to being a producer of cocoa and rice, East Kolaka is also one of the centers for the development of sorghum in Indonesia. This region also has mineral resources, though they are relatively limited, including marble, quartz sand, black granite, asbestos, magnesite, and onyx [4].

Lalingato Village in Tirawuta Subdistrict, East Kolaka Regency, is one of the areas with an industrial development strategy playing a vital role in economic development because it is located in an office, tourism, and community activity center area. The area of Lalingato Village is 21.02 km².

One key role in strengthening the economy in Indonesia is to provide facilities for SMEs, such as training areas, to improve the knowledge and skills of SME actors, allowing them to produce productive businesses. By providing a platform for SME actors, they can capitalize on local potential by showcasing and marketing products created by the community [5].

In the context of this research, which focuses on Neo-Vernacular architecture for the design of the Micro, Small, and Medium Enterprises (MSMEs) Center in East Kolaka, the term "Neo-Vernacular" refers to an architectural approach that combines traditional local elements with modern innovations. The definition of vernacular architecture itself is rooted in the concept of architecture that evolves naturally within a specific region or culture, utilizing local materials and construction techniques passed down through generations. Vernacular architecture is not merely a style; it encompasses the relationship between the community and its environment, including social, cultural, and economic aspects. Vernacular architecture tends to be highly responsive to the local environment, such as weather, the availability of natural resources, and local traditions [6]. Therefore, the definition of vernacular is broader than just physical design; it is a representation of the way of life and the needs of the community within a specific context.

When discussing Neo-Vernacular, we refer to the effort of updating or adapting traditional elements to meet the needs and developments of modern times, without compromising the existing local values. Neo-Vernacular architecture does not merely add local elements to the building design; it creates harmony between tradition and innovation. This approach acknowledges the importance of preserving local cultural heritage while also demanding adaptation to contemporary technology and aesthetics, which can enhance the quality of the building and the comfort of its occupants [7]. Thus, the choice of Neo-Vernacular architecture in this study is highly relevant because it provides a design solution that considers the functional needs of MSMEs while still respecting the local wisdom possessed by the community of East Kolaka.

In this case, Neo-Vernacular is not just about applying local forms or materials; it is more about integrating the existing philosophy, spatial planning, and architectural concepts with modern design principles. This approach can be seen as an effort to maintain local cultural identity while promoting progress in the economic and development sectors. For example, the application of natural building materials such as bamboo or locally sourced wood, which have been traditionally used in East Kolaka, can be adapted in modern building designs for MSMEs. On the other hand, the use of modern construction technologies and more efficient, environmentally friendly spatial designs can be innovations that enhance the appeal of the design.

The need to design SME facilities that not only meet functional standards but also reflect local identity makes Neo-Vernacular architecture an excellent choice. This approach allows for the creation of spaces that not only support the local economic productivity but also foster a sense of ownership and pride in their cultural heritage. Therefore, by combining existing local elements and making modern updates, Neo-Vernacular offers a holistic architectural solution that respects tradition while encouraging sustainability and future development [8] [9].

2. METHODOLOGY

The approach used to collect and analyze data focuses on a deep understanding of the social phenomena or human behaviors being studied. Qualitative research aims to explore the perspectives of individuals or groups within a broader and deeper context. One of the key characteristics of this method is its descriptive and exploratory nature, where the researcher collects data in the form of narratives or descriptions rather than numbers or statistics [10], [11]. In the context of research focused on Neo-Vernacular architecture in East Kolaka, data was obtained through surveys and direct observations of the conditions of MSMEs in the area. Qualitative survey methods, such as open interviews, enable researchers to explore the opinions, expectations, and experiences of respondents more comprehensively. Meanwhile, observations allow researchers to directly examine the physical conditions and social interactions at the relevant locations.

This research method allows the researcher to analyze data in depth and develop richer descriptions of the phenomena under study. Additionally, qualitative research is often flexible, enabling researchers to adjust data collection instruments and techniques according to field developments [12]. In this case, descriptive analysis is used to identify patterns and themes emerging from the data, which are then used to build theories or concepts relevant to the design of the MSMEs center in East Kolaka. The literature used in this study also strengthens the theoretical foundation and relevance to local policies and the socio-economic conditions of the local community [13].

3. RESULTS AND DISCUSSION

3.1 Research Location

The Micro, Small, and Medium Enterprises (MSMEs) Center is planned to be developed in East Kolaka Regency, specifically in Tirawuta Subdistrict, Southeast Sulawesi Province. The site spans an area of 30,000 m², strategically located with the following subdistrict boundaries: Tinondo Subdistrict to the north, Loea Subdistrict to the south, Konawe Regency to the east, and Lalolae Subdistrict to the west.

The specific site boundaries for the MSMEs Center are as follows: the East Kolaka Administrative Offices lie to the north, the Lalingato Tribune to the west, the Official Residence of the Regional Secretariat to the south, and Ostar Peak to the east. This strategic location positions the MSMEs Center within a significant administrative and community hub, ensuring accessibility and relevance to the region's economic development.

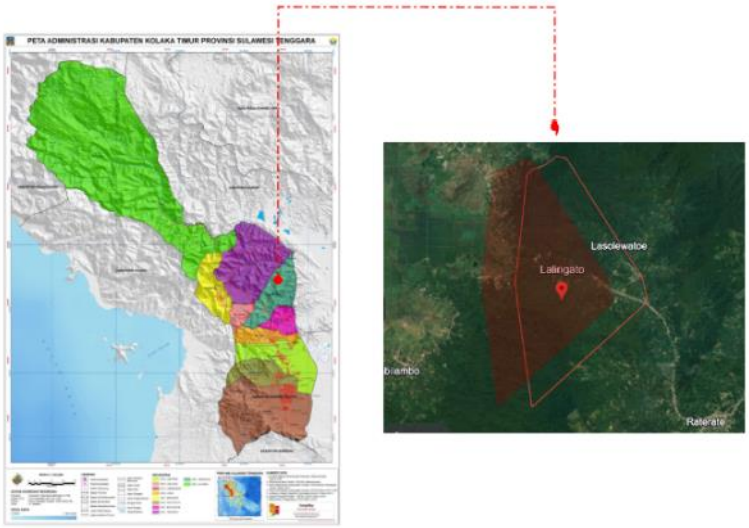

Figure 1. General overview of the location (source: Petatematikindo & Google Earth, 2024)

Figure 2. Existing Site (source: Google Earth, 2024)

The site area for this design project is currently an empty plot with dense vegetation, which helps reduce noise from the main road. Additionally, the site offers an attractive view as it is surrounded by several tourist destinations, including Sorombipi Peak and Ostar Peak.

3.2 Sun Orientation

Figure 3. Sun orientation (Source: Author)

Sun orientation will influence the shape and position of the building in order to optimize the use of natural lighting, with the possibility of the building facing east.

Response to the sun orientation on the site:

Figure 4. Response to Sun Orientation (Source: Author)

3.3 Wind Direction

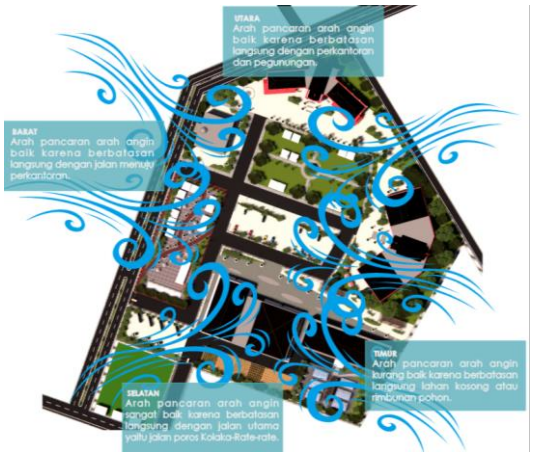

Figure 5. Wind Direction (Source: Author)

The wind flow originates from the mountain areas, specifically from the east and north. The site is located between office buildings, surrounded by pristine natural scenery, with dense trees and mountains that provide a cool atmosphere to the area. The utilization of wind flow as a source of natural ventilation for the building involves controlling the wind to ensure a steady supply of fresh air without compromising comfort.

Figure 6. Response to Wind Direction (Source: Author)

3.4 Rainfall

Figure 7. Rainfall (Source: Author's Analysis, 2024)

The northern region of East Kolaka, which includes Mowewe, Uluiwoi, Ueesi, and Tinondo, receives more than 2,000 mm of rainfall annually. Meanwhile, the southern and eastern regions, including Ladongi, Dangia, Lambandia, Poli-polia, Aere, Loea, and Tirawuta, receive less than 2,000 mm of rainfall annually.

Response to rainfall on the site:

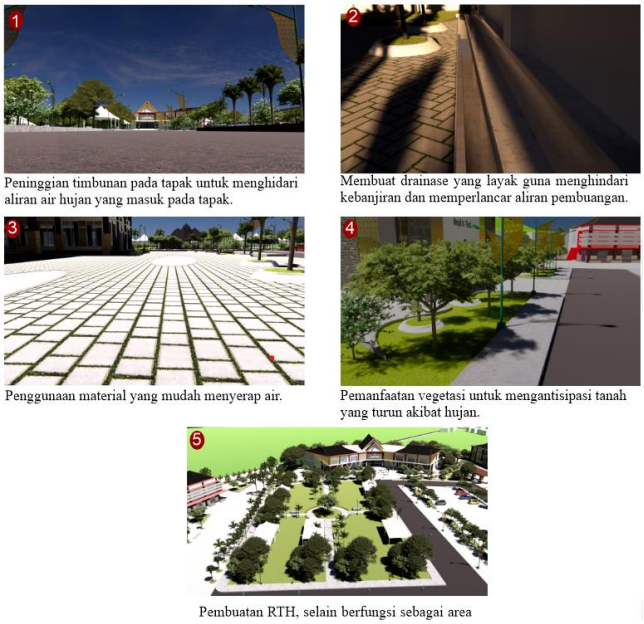

Figure 8. Response to Rainfall (Source: Author)

3.5 View

View refers to the perspective from both inside and outside the site, which is crucial in planning the MSMEs Center in East Kolaka to attract visitors.

3.5.1 View from the Site

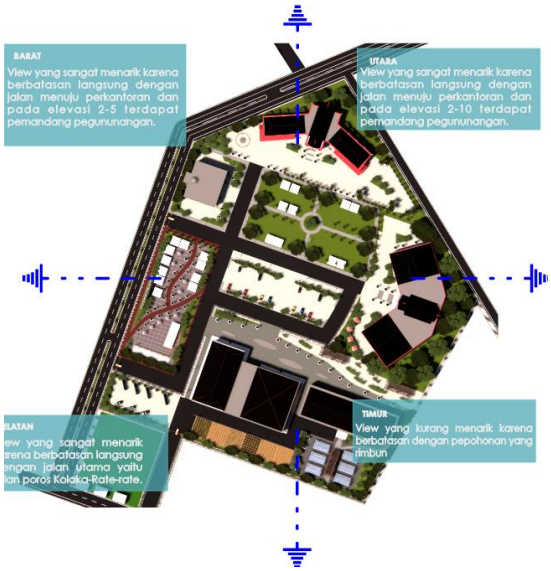

Figure 9. View from the site (Source: Author)

The view from the site is directed from the north and east towards the mountains, tropical forests, and office buildings, while the view from the south and west faces the main road and residential areas.

Figure 10. Site Area Orientation (Source: Author)

3.5.2 View into the Site

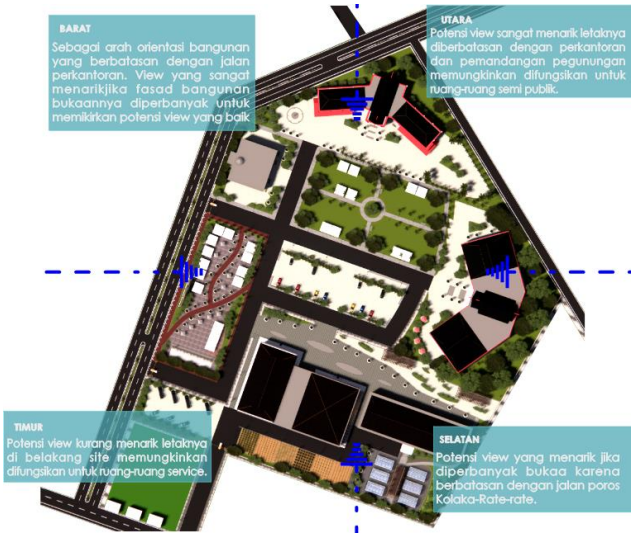

Figure 11. View into the site (Source: Author)

The view into the site comes from the direction of the main road and office roads leading to the site. Determining the direction of view from outside the site is essential to attract visitors to the planning location by designing focal points in the building.

3.6 Noise

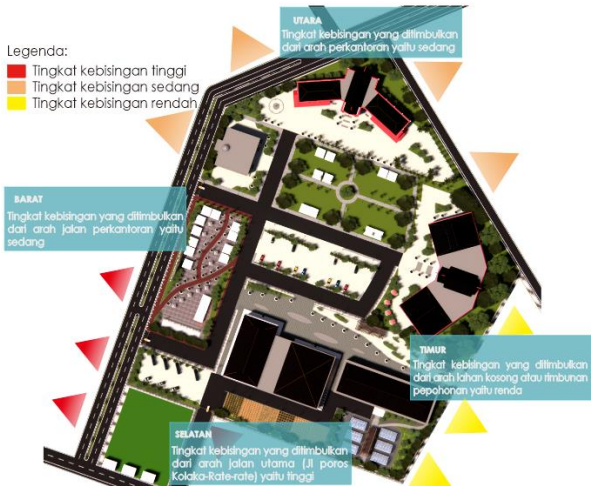

Figure 12. Noise (Source: Author)

Noise, resulting from sound vibrations originating in busy areas such as traffic and other activities, is a key consideration in site planning. At this location, noise primarily emanates from the main road to the south and the residential area to the west.

To address this, semi-public zones will be strategically placed in areas most affected by noise, effectively buffering quieter zones from these disturbances. Additionally, sound-absorbing materials will be incorporated into the design to serve as noise dampers, reducing the impact of external noise on the site. These measures aim to create a more comfortable and functional environment for all users.

3.7 Zoning

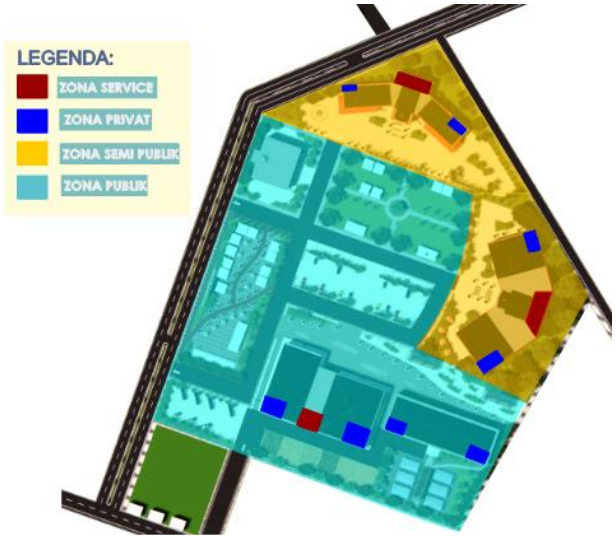

Figure 13. Zoning (Source: Author)

Zoning is the process of organizing the site to create public, semi-public, service, and private areas while considering the existing conditions of the site. In planning the zoning on the site, several considerations are required, including access to the site, noise levels on the site, and the views from inside and outside the site.

Response to zoning on the site:

a) *Public Zone:* Based on the analysis of sun orientation, wind direction, views, and noise, the public zones are oriented towards the east and south, as well as along the connecting road that is also located in these directions. This makes it feasible to place public zoning in these areas.
b) *Semi-Public Zone:* This zone is influenced by all results of site analysis from all directions but has certain boundaries.
c) *Service Zone:* The analysis of sun orientation, wind direction, and noise shows that this zone is not directly exposed to any of these factors.
d) *Private Zone:* Based on the analysis, this zone is placed behind the site and is not directly affected by sun orientation, wind direction, or noise.

3.8 Circulation and Parking

During planning circulation within the Micro, Small, and Medium Enterprises (MSMEs) Center in East Kolaka, it is essential to analyze the circulation as follows:

3.8.1 Circulation to the Site

To reach the MSMEs Center in East Kolaka, private vehicles or public transportation, such as motorcycles, cars, or similar vehicles, can be used.

Figure 14. Circulation to the site (Source: Author's)

The pedestrian circulation system is planned with several key considerations to ensure functionality, comfort, and accessibility within the site. Firstly, the circulation system is designed to define and connect various areas within the site, creating a cohesive layout that enhances user comfort. Additionally, pathways are planned to allow pedestrians to fully enjoy the surrounding views, integrating natural and architectural elements into their experience. Sufficient space will be allocated for pedestrian movement, ensuring that the circulation is evenly distributed to prevent overcrowding and facilitate smooth flow. Lastly, the design prioritizes avoiding conflicts with other types of circulation, such as vehicular or bicycle traffic, to maintain safety and convenience for all users.

3.8.2 Vehicle Circulation

Figure 15. Entrance-exit site (Source: Author)

The vehicle circulation system is planned with careful considerations to prioritize safety, efficiency, and harmony with pedestrian pathways. Direct access to the parking area is avoided to streamline traffic flow and reduce congestion at entry points. Additionally, vehicle routes are designed to prevent crossings with pedestrian circulation, minimizing the risk of accidents and ensuring a clear separation of movement. The circulation area is designed to meet established vehicle circulation standards, providing adequate space for smooth and efficient vehicle movement. Furthermore, measures are taken to avoid disruptions to pedestrian pathways, ensuring that both circulation systems operate independently and without conflict.

3.8.3 Parking

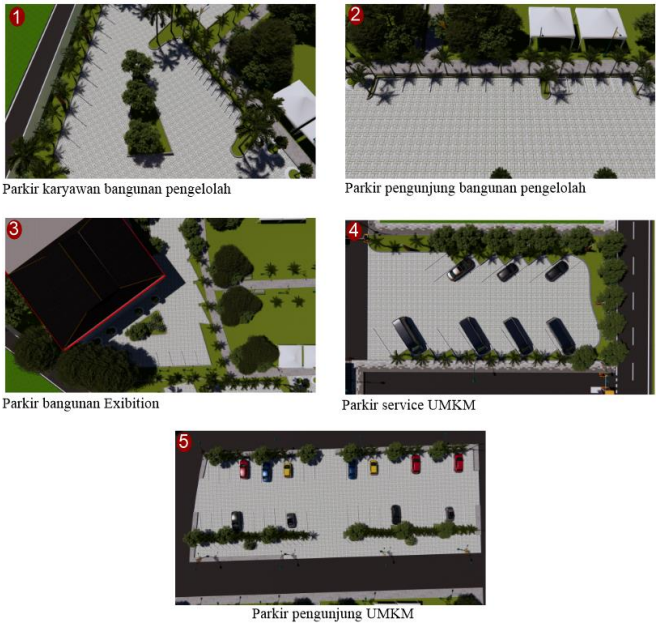

Figure 16. Parking Response (Source: Author)

Parking design considerations are carefully planned to ensure functionality, convenience, and integration with the surrounding environment. Materials used for the parking area will be selected to effectively support the weight and movement of vehicles, ensuring durability and safety. The layout will be adjusted to align seamlessly with both vehicle and pedestrian circulation, promoting ease of access and reducing potential conflicts. To enhance comfort and environmental aesthetics, vegetation will be planted around the parking area, providing shade to protect vehicles from prolonged sun exposure. Additionally, the parking arrangement will include a combination of straight and angled configurations, tailored to suit the existing circulation patterns and optimize space utilization.

3.9 Accessibility

Figure 17. Accessibility (Source: Author)

Accessibility to the planning site is defined by its ease of connection to the main road and connecting roads, ensuring smooth access for visitors and management. In response to this, the site design incorporates an entrance route that aligns seamlessly with the existing road flow, promoting intuitive and efficient entry to the area. Additionally, the exit route is carefully planned to facilitate vehicle circulation, preventing congestion and ensuring smooth transitions for both visitors and management. This design prioritizes free movement within and around the site, enhancing overall accessibility and user experience.

3.10 Building Form and Appearance

3.10.1 Basic Building Form

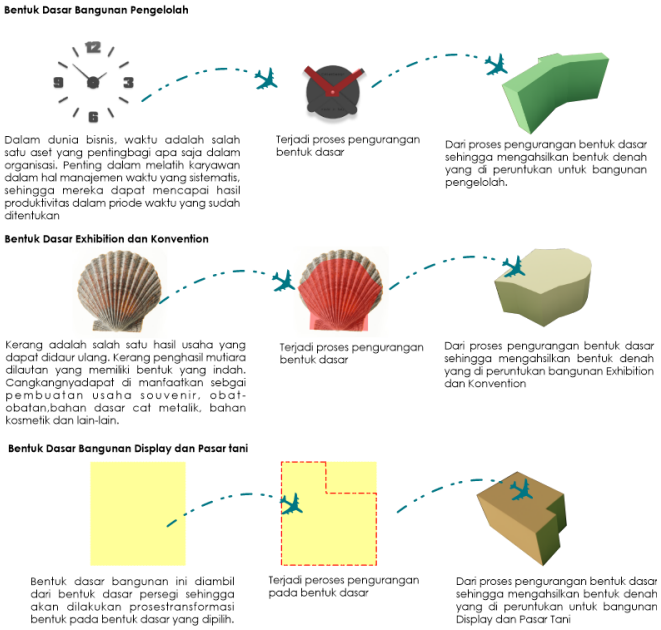

Figure 18. Basic Building Form (Source: Author)

The concept of the basic building form aims to create functional, efficient, and rational spaces, following the analogical architecture style for the MSMEs Center in East Kolaka. The basic form of management building is derived from the concept of time in the business world as a crucial asset for various organizational activities. This idea is represented by the shape of a clock, featuring long and short hands. The form then undergoes a process of simplification and reduction, ultimately inspiring the design of the management building. The basic form of the exhibition and convention area is inspired by a shell, a natural material that is recyclable and possesses high aesthetic value. Meanwhile, the basic form of the display and farmers' market buildings is derived from a square shape that has undergone a process of reduction.

3.10.2 Building Appearance

The appearance of the building will feature a modern façade combined with traditional architecture from East Kolaka Regency (*Bumi Sorume*) as a historical value, based on the design emphasis on Neo-Vernacular Architecture. The roof design from traditional Tolaki architecture will be applied to the building's roof.

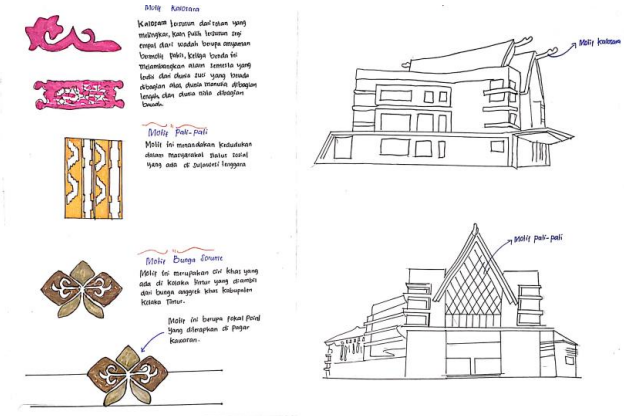

Figure 19. Building Appearance (Source: Author)

The meaning of the image above is the *Kalosara* symbol, which represents the customary law and culture of the Tolaki people in Southeast Sulawesi. *Kalosara* is made from rattan, forming a circle, with a square piece of white cloth and a woven container with fern motifs. These three elements symbolize the universe, consisting of the sacred world at the top, the human world in the middle, and the earthly world at the bottom.

3.10.3 Application of Neo-Vernacular Architecture on the Building

a. Application on the Building Facade

The *pati-pati* motif will be applied to the exterior of the building. The purpose of this motif is to signify the social status within the community in Southeast Sulawesi.

Figure 20. Application of *pati-pati* motif on the building (Source: Author)

b. Application on the Roof

The *Kalosara* motif will be applied to the roof of the building. This motif serves as a symbol of local customs in Southeast Sulawesi, particularly in East Kolaka.

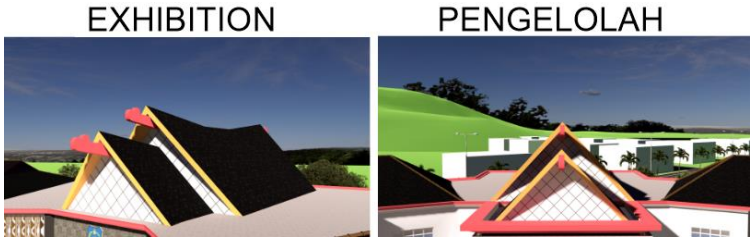

Figure 21. Application of *Kalosara* shape on the building (exhibition building on the left, management building on the right) (Source: Author)

c. Application on Hard Landscape Materials

The Sorume motif will be applied to the hard landscape materials, such as the amphitheater. This motif is a distinctive feature of East Kolaka, inspired by the orchid flower that is native to the region.

Figure 22. Focal point of the building design (Source: Author)

4. CONCLUSION

The conclusion can be drawn regarding the application of Neo-Vernacular architecture in the design of the Micro, Small, and Medium Enterprises (MSMEs) Center in East Kolaka. This study emphasizes the importance of integrating local elements into modern architectural design to create buildings that are not only functional but also reflect the cultural identity of the local community. The Neo-Vernacular approach used in this research combines traditional elements with modern innovations that enhance the comfort and efficiency of space, while supporting sustainability in the development of MSMEs in the region. The novelty of this research lies in the application of architecture that blends local materials and construction techniques with the latest design innovations to create adaptive, environmentally friendly spaces that are relevant to the local economic needs. This study also contributes to the architectural literature by offering an approach that respects cultural values while still considering the advancement of technology and contemporary aesthetics. With this approach, the MSMEs Center in East Kolaka serves not only as an economic hub but also as a symbol of local pride and cultural sustainability. The qualitative research method used allows the researcher to delve deeper into understanding the needs and expectations of the local community, as well as to gain richer insights into designing spaces that can foster economic growth. Overall, this research reaffirms that Neo-Vernacular architecture provides a relevant and sustainable solution to addressing the socio-economic and cultural challenges in East Kolaka.

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RUSTIC: Jurnal Arsitektur
Vol. 5, issue No. 1, January-June 2025, pp. 52~62
e-ISSN: 2775-7528, DOI: doi.org/10.32546/rustic.v5i1.2862

Spatial Re-Utilization in Traditional Markets: Optimizing Trading Spaces for Pasar Jambe, Tangerang

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Article Info

Article history:

Received Nov 14, 2024
Revised Dec 10, 2024
Accepted Dec 28, 2024

Keywords:

Pasar Jambe;
Spatial utilization;
Trading Spaces;
Traditional market;
User comfort

ABSTRACT

Traditional markets are often considered less optimal compared to modern markets, particularly in terms of comfort, circulation, and waste management. Although it was supposed to be operational since 2022, Pasar Jambe has yet to function and is crucial for meeting the basic needs of 52,521 residents of Jambe District in 2023. This study aims to design an alternative layout that not only fulfills the buying and selling functions but also enhances user comfort and supports trading activities and utilities such as ventilation, lighting, and waste management for sustainability and local economic growth. A descriptive method with a qualitative approach is used to identify the spatial needs of the market. The results indicate that the trading area should have a minimum area of 2 m² with a minimum circulation aisle of 1.5 m² and a radial design that facilitates access to each kiosk. The kiosks are designed with two opposing faces for efficiency and can be divided into two types to maximize display functionality. A waste container capacity of 2,000L is necessary to manage a total waste of 6,756 L/day, along with waste bins at each kiosk. This design also incorporates high ceilings and an optimal ventilation system to maintain the quality of fresh products, as well as optimized lighting through wide openings and a transparent twin wall alderon roof, achieving 100 lux of illumination with a minimum ventilation of 20%.

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1. INTRODUCTION

The transformation of retail spaces in Tangerang, Indonesia, reflects a dynamic interplay between modern supermarkets and traditional markets, similar to trends in Latin America. While supermarkets offer convenience and standardized products, traditional markets remain vital for underserved communities, providing affordable goods and preserving cultural practices [1]. Daily interactions among traders, customers, and neighbors similarly play a crucial role in sustaining market vitality and shaping local economies. These interactions occur within dynamic spaces, reflecting a balance between traditional practices and the pressures of modernization [2]. Several issues related to the market layout, such as the comfort of trading spaces, circulation, waste management, air circulation, and lighting [3], become the focus of the design response proposed in the design plan for Pasar Jambe, based on the revitalization plan for approximately 28 traditional markets in Tangerang Regency into modern traditional markets. According to data from one of the service personnel of the state-owned enterprise Pasar Niaga Kerta Raharja, Pasar Jambe was supposed to have been operational in 2022; however, it has yet to commence operations. The condition of Pasar Jambe is currently unrepresentative of its intended function. It has become a dumping ground for community waste, with its

physical structure abandoned and in a state of disrepair. The Jambe District has formally requested the Tangerang Regency Department of Industry and Trade (Disperindag) to "reactivate" Pasar Jambe. The presence of an adequate traditional market is essential for meeting the basic living needs of the residents of Jambe District, which has experienced rapid growth, with a population of 52,521 (people across nine residential neighborhoods in 2023) [4][5].

Visitors of traditional markets generally are lower to middle-income communities. For sellers, the market serves as a venue for marketing their products, while for consumers, the market is a place to obtain daily necessities. The market also plays a positive role in enhancing the regional economy. As time has progressed, the market economic system has undergone changes, leading to what is now referred to as the dual market economic system, which combines traditional and modern markets [6].

The spatial patterns of merchants in a modernized traditional market, emphasizing that market economic activities are integral to urban space rather than merely confined to the physical structure [7]. Modern traditional markets are expected not only to fulfill the essential functions of buying and selling but also to enhance user comfort during these activities. When a market has good trading spaces and utilities, it can operate optimally, which is anticipated to help improve the local economy. The scope of this research is limited to two market activities: primary activities and supporting activities. The primary activities include trading activities, which encompass visitor movement, while the supporting activities involve service functions such as the utilization of ventilation, lighting, and waste management tailored to the planned building area.

Figure 1. Site location (source: author)

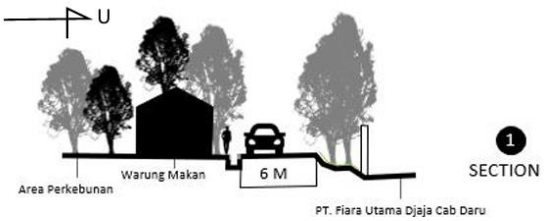


Figure 2. Section 1 (source: author)

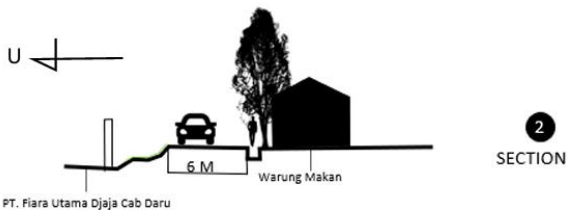
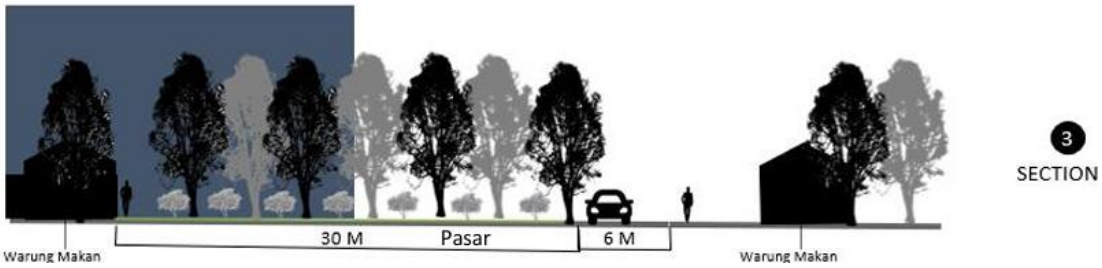


Figure 3. Section 2 (source: author)



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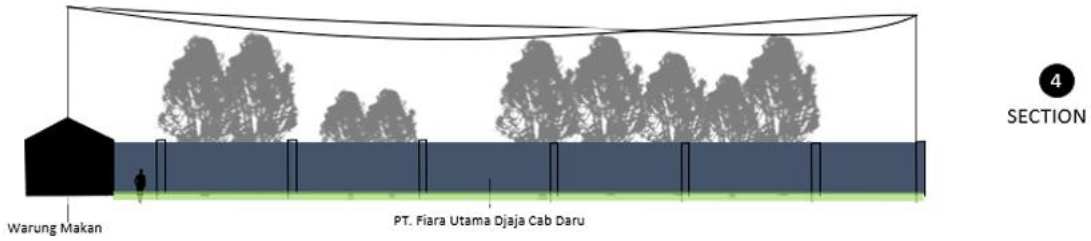

Figure 5. Section 4 (source: author)

The objective of this study is to provide an alternative design for Pasar Jambe, to restore its representativeness as a functional marketplace, specifically regarding the trading spaces and utilities that can have a sustainable impact, thereby meeting the basic needs of the Jambe District community and fostering economic growth within the region. A descriptive method with a qualitative approach is employed to identify the spatial needs of the traditional market, using the trading spaces and utility systems of Pasar Jambe as a case study. The discussion results indicate that, according to the classification of traditional markets as class 1 and type III [8] the trading area must have a minimum size of 2 m², and each stall must have an aisle for horizontal circulation of at least 1.5 m², as well as being divided based on the type and nature of goods.

Meanwhile, the waste container capacity should be 2,000L/container, with a waste output of 6,756 L/day (0.3 – 0.5 L/m²) based on the market building area of 11,260 m². Waste management must provide bins at each kiosk or along the aisle or stall, and the location of temporary waste collection points (TPS) should not be more than 10 m from the building. By dividing the zoning of dry and wet areas, ventilation will feel more comfortable. The access entrance to the building and corridors should be 3 m wide, with openings of 1 m and 2 m applied on several radial sides of the building to optimize ventilation and lighting. The implementation of materials such as twin wall for the roof covering allows more sunlight to enter without absorbing heat into the building.

2. METHOD

Data collection was conducted openly through observation and examining the phenomena of traditional markets in Indonesia, which are still inadequate in accommodating both primary and supporting market activities. This research formulates a spatial plan for the trading spaces in the market as well as user comfort, assessed from the functionality of utilities. The author attempts to identify the factors that contribute to the suboptimal nature of traditional markets in Indonesia and the need for markets as facilities for community trading, particularly in Jambe, Tangerang Regency. All identified factors will be analyzed in order to inform the design of the trading spaces and utilities of Pasar Jambe.

3. RESULTS AND DISCUSSION

Transactions between sellers and buyers take place in the trading spaces of traditional markets, which consist of kiosks and stalls. The layout arrangement of the market in relation to space requirements, circulation, and lighting is in accordance with the Minister of Home Affairs Regulation concerning trading facilities.

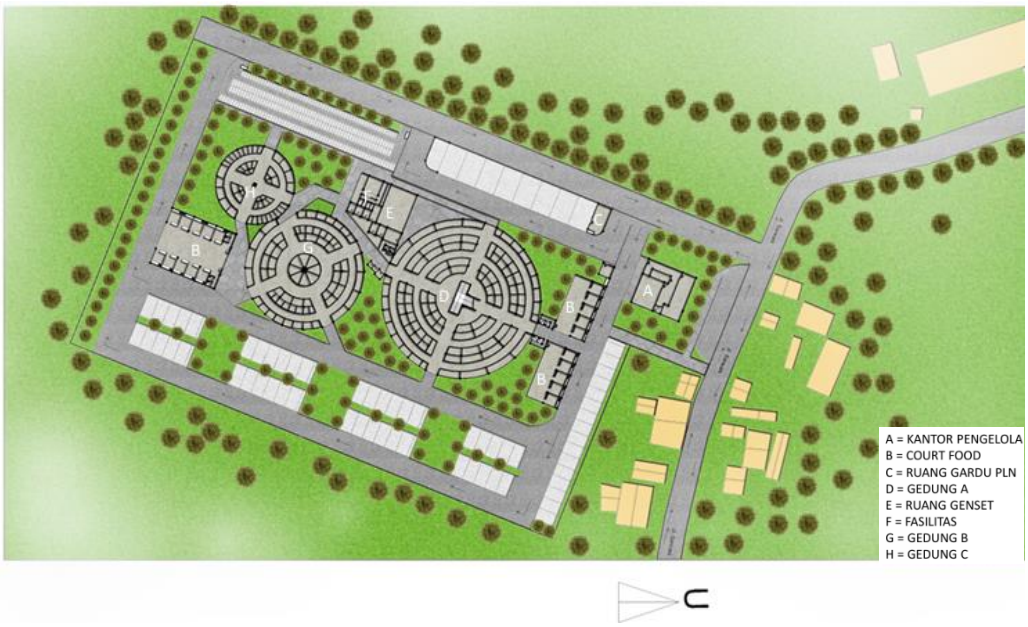

Figure 6. Pasar Jambe Masterplan, Trade Zone (A, B, C) (source: author)

Matters related to the standards for trading spaces, circulation, and lighting follow the procedures outlined below:

3.1. Activity Flow

There are five actors involved in the activities within the market building, namely sellers, visitors, buyers, managers, and operators. This research focuses on sellers and buyers, while managers, cleaning staff, security personnel, and visitors are considered supporting actors. The following is the flow of activities that occur in the market:

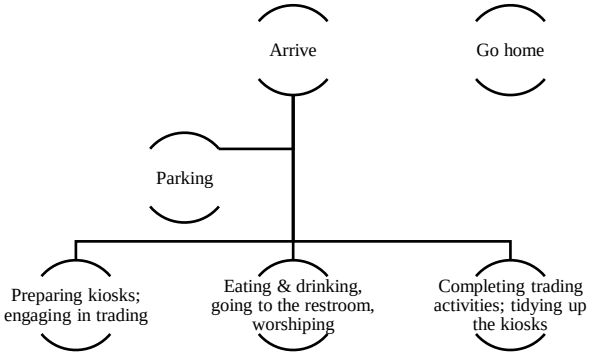

Figure 7. Activity of Actors (Sellers) (source: author)

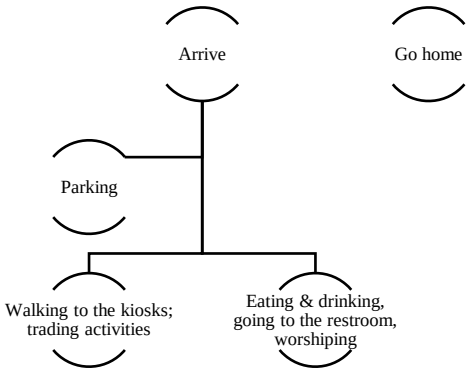

Figure 8. Activity of Actors (Buyer) (source: author)

3.2. Space Requirements and Dimensions

The purpose of the analysis is to determine the areas where groups of organized activities can function and operate properly [9].

Table 1. Space Requirements Based on Zones (source: author)

Zone	Spaces
A Zone	- Clothing/fabric, shoes/bags - Bamboo crafts - Groceries/cosmetics, toys, books - Electronics, cassettes - Pottery - Jewellery
B Zone	- Food/bread, tofu/tempeh - Vegetables - Spices - Fruits - Rice
C Zone	- Meat, fishes, chicken
Loading-Unloading Zone	(Close to the service area)
Manager's Zone	(Outside the main building)
Service Zone	(The parking zone is spread around the market, the prayer room is placed separately from the market building, and restrooms are located on the right and left sides of the building)
Visitors	(Food court, ATM center, open space)

Table 2. Proposed Room Dimensions [10]

No.	Name	Capacity	Unit	Standard (m)	Total (m^2)
Trade Zone (A, B, C)					
1	Kiosks	121	Unit	3 x 2 (proposed)	726
2	Stalls	189	Unit	2 x 2 (proposed)	756
Food Court					
3	Food court kiosks	20	Unit	4 x 3	240
4	Sink	6	Unit	1.5 x 1.5	13.5
5	Dining area	200	Unit	Chair 0.6 x 0.6 Table 1 x 1	122
Loading Area					
6	Loading dock	8	Unit	5 x 8	320
Mushalla					
7	Prayer Room	20	Peoples	0.8 x 1	16
8	Ablution	6	Peoples	1 x 1	6
9	Toilet	4	Unit	2 x 1	8
Market Management Office					
10	Staff room	18	Peoples	2 x 1	36
11	Lounge	5	Peoples	1 x 1	5
12	Head office	1	Peoples	5 x 3	15
13	Meeting room	1	Unit	6 x 8	48
14	Toilet	2	Unit	2 x 1	4
Public Restroom					
15	Toilet	14	Unit	1.5 x 1.5	31.5
Services					
16	Motorcycle	251	Unit	2 x 0.75	376.5

17	Car	60	Unit	3 x 5	900
18	Health room	1	Unit	3 x 2	6
19	Common room	1	Unit	2.5 x 2	9
20	Nursing room	1	Unit	3 x 2	6
21	Security post	1	Unit	2 x 2.5	5
22	CCTV room	1	Unit	4 x 2	5
23	Smoking area	1	Unit	2.5 x 2	4
24	ATM	1	Unit	1.5 x 1.5	6.25
25	PLN substation	1	Unit	4 x 7	28
26	Generator room	1	Unit	7 x 10	70
27	Pump room	1	Unit	4 x 4	16
28	MCB room (panels)	1	Unit	3 x 3	9
29	Temporary waste disposal (TPS)	1	Unit	4 x 7	28
	Total				3818.75
	Circulation (40%)				1527.5
	Total area				5346.25

3.3. Design of Radial Trading Space

Based on the classification of traditional markets, Pasar Jambe, which has an area of 11,260 m² and approximately 310 traders, falls under Class 1 and Type III. The analysis of space requirements and dimensions shows that each trading space must have a minimum area of 2 m², and each stall should have an aisle with a minimum width of 1.5 m² for horizontal circulation. Zones A, B, and C are designated for buying and selling activities, thus requiring kiosks and stalls to accommodate traders in placing their good.

Kiosks and Stalls

The radial layout of kiosks provides space efficiency by allowing easy access from various directions to each kiosk [11][12], making the trading space more efficient without the need for long aisles that could obstruct airflow. The radial design facilitates the circulation of people and goods, making the buying and selling activities feel more spacious, even with a relatively high number of kiosks. This design also helps minimize contact between wet and dry areas, maintains cleanliness, and prevents the risk of contamination in the market environment [13].

To prevent kiosks from obstructing airflow, the kiosks can be designed with two faces facing away from each other. The kiosks and stalls with two faces face outward for non-food items, while stalls in the center are designated for vegetables, meat, chicken, and fish, and are equipped with clean water. The kiosk block is divided into two types: two rows with two faces to maximize the function of the display space in the middle of the building, and four rows with one or two faces to allow traders to have more than one adjacent kiosk.

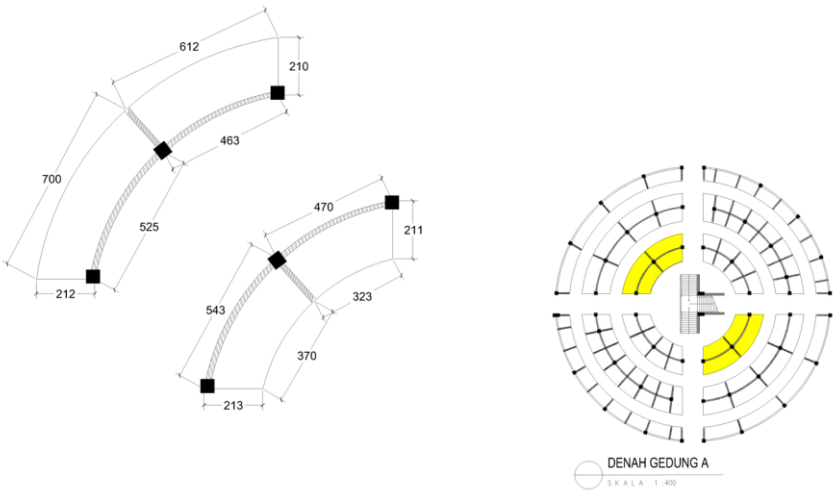

Figure 9. Two-Faced Two-Row Kiosk Layout Block 1 (Building A) (source: author)

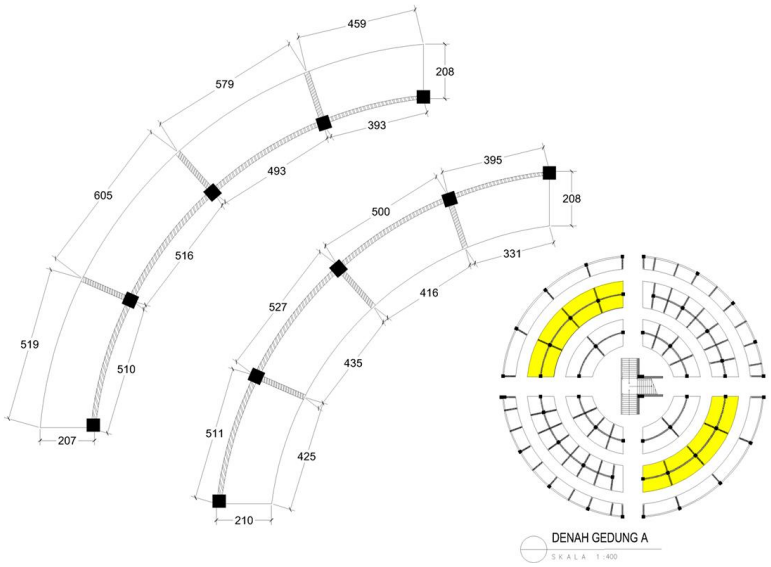

Figure 10. Two-Faced Four-Row Kiosk Layout Block 2 (Building A) (source: author)

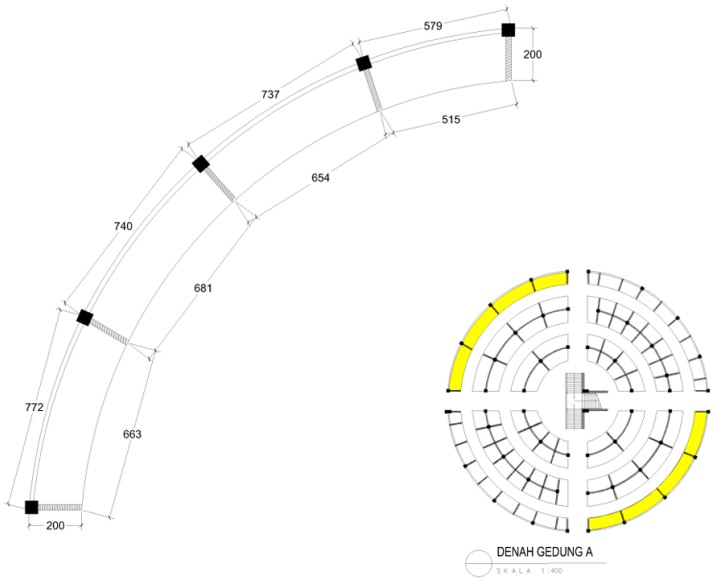

Figure 11. One-Faced Four-Row Kiosk Layout Block 3 (Building A) (source: author)

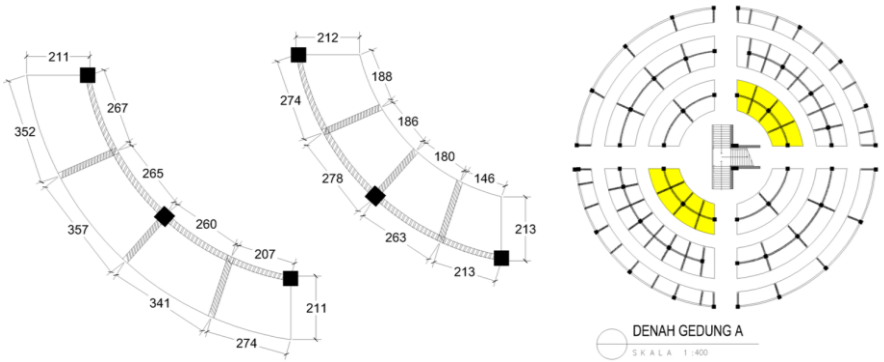

Figure 12. Two-Faced Four-Row Stall Layout Block 1 (Building A) (source: author)

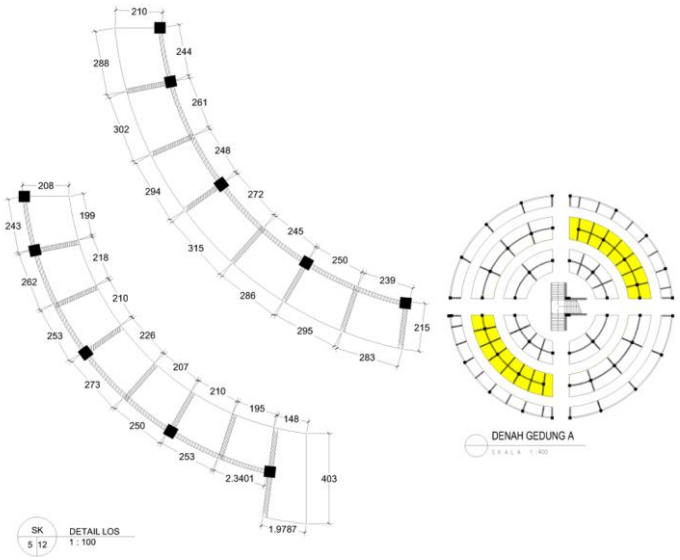

Figure 13. Two-Faced Eight-Row Stall Layout Block 2 (Building A) (source: author)

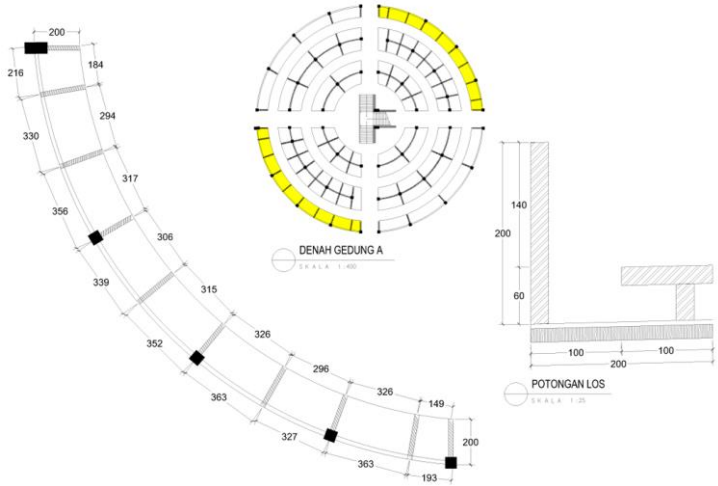

Figure 14. One-Faced Nine-Row Kiosk Layout Block 3 (Building A) (source: author)

3.4. Air Circulation and Waste Management

For air circulation, the ventilation is designed with ceiling height restrictions of 4.2 meters for the ground floor and 3.8 meters for the first floor. This is intended to ensure that the air in the trading spaces continues to circulate and helps lower the temperature, making the temperature inside the kiosks and stalls cooler, even in hot weather.

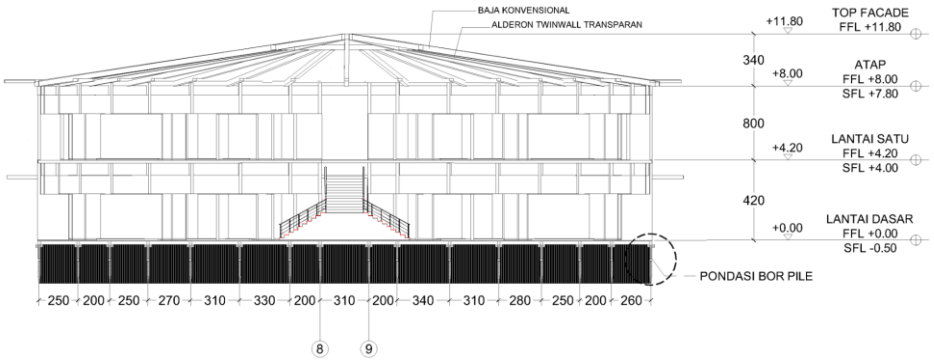

Figure 15. B-B Section (Building A) (source: author)

Optimal air circulation can reduce excess humidity, allowing fresh products to last longer and reducing the risk of product damage. The application of sufficiently high ceilings and a radial trading space design helps prevent unpleasant odors from being trapped in one area of the building. This ensures that airflow can continuously move, evenly refreshing the air around the kiosks/stalls, thus supporting comfort and the health of the market environment [14].

In waste management, Pasar Jambe provides temporary waste collection points (TPS) at each group of kiosks, with waste bins located at various points along the corridors. The provision of temporary waste collection points in the market offers many benefits in maintaining cleanliness and environmental sustainability [15]. One of its main functions is to control the spread of waste around the market, helping create a cleaner and healthier environment. TPS facilitates traders and visitors in disposing of waste in proper places, reducing the risk of waste accumulation that could lead to unpleasant odors and become breeding grounds for disease-carrying insects such as flies and rats. This is crucial to prevent disease transmission due to inadequate sanitation, especially in markets with high activity.

The existence of the TPS enables more efficient waste management, such as the separation of organic and non-organic waste. Organic waste can be processed into compost, thus reducing waste volume while providing material for greening. The TPS also encourages traders to maintain cleanliness around their stalls, which can enhance the market's image as a clean and comfortable place for visitors.

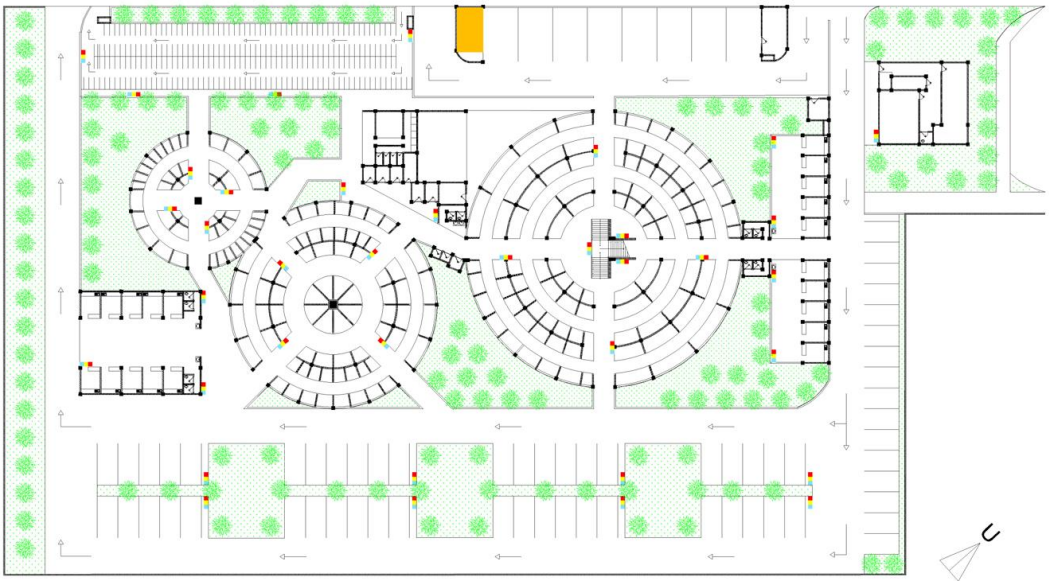

Figure 16. Distribution of TPS (Temporary Waste Collection Points) in Pasar Jambe (source: author)

After being collected at the Temporary Waste Collection Points (TPS), the waste will be transported to the intermediate waste storage (TPM) at Pasar Jambe, which consists of waste containers with a capacity of 2,000 liters per container. The total waste generated amounts to 6,756 liters per day (equivalent to 0.3–0.5 liters per square meter) based on the market's area of 11,260 m². For waste management, trash bins should be provided at each kiosk, along the corridors, or stalls, and the TPM should be located no more than 10 meters from the market building.

3.5. Natural Lighting

Lighting in the building is sourced from each side of the structure, which is equipped with sufficiently wide openings, namely 1 meter, while at some points there are additional openings with a width of 2 meters. Additionally, the roof uses transparent twin wall alderon material, which has many advantages, particularly in utilizing sunlight without allowing heat to enter the room. The total minimum ventilation area is 20% of the total floor area and is arranged to face each other (cross ventilation) with lighting of 100 lux.

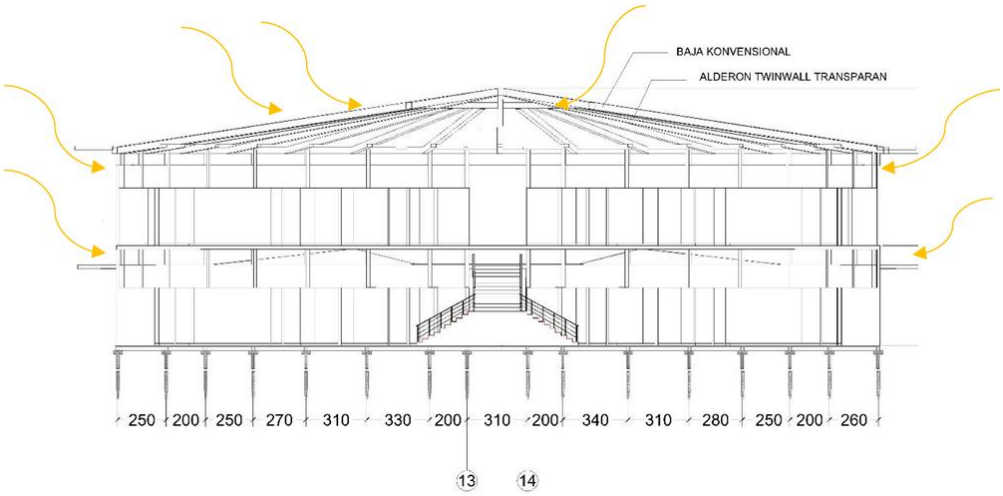

Figure 17. The circulation of natural light in Pasar Jambe (source: author)

4. CONCLUSION

Traditional markets are often perceived as inferior compared to modern markets. Various design-related issues, such as comfort, circulation, waste management, air circulation, and lighting, are key concerns in the revitalization plan for Pasar Jambe in Tangerang Regency.

The radial arrangement of the kiosks in Pasar Jambe provides space efficiency by facilitating access from multiple directions, thus optimizing the marketplace without obstructing airflow. To ensure that the kiosks do not block airflow, they can be designed with two facades facing away from each other. There are two types of kiosk blocks: two rows with two facades to maximize display functions, and four rows with two facades to allow vendors to have adjacent kiosks. Overall, this design aims to create a more comfortable and efficient environment for Pasar Jambe.

Optimal air circulation helps reduce excess humidity, preserving the quality of fresh products and minimizing the risk of damage. The use of high ceilings and a radial design in the marketplace space helps prevent unpleasant odors from accumulating, ensuring good airflow around the kiosks. Additionally, temporary waste collection points (TPS) are provided at each kiosk cluster and along corridors, serving to control waste spread and maintain cleanliness. TPS facilities facilitate the separation of organic and non-organic waste before being transported to medium waste disposal containers (TPM). Lighting within the building is optimized through wide openings on each side, measuring 1 meter, with some areas featuring openings of 2 meters. The roof is made from transparent twin wall Alderon material, effectively utilizing sunlight without letting in excessive heat. The minimum ventilation area reaches 20% of the total floor area, arranged for cross ventilation, with lighting achieving 100 lux.

ACKNOWLEDGEMENTS

I would like to express my sincere gratitude to Perumda Pasar Niaga Kerta Raharja (NKR) for their invaluable support and cooperation in providing essential data and insights for this research. To my colleagues in Architecture Study Program ITB Ahmad Dahlan, and fellow researchers Tamami Madaniyah, whose collaboration, feedback, and insight were instrumental in shaping the outcomes of this study.

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