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Patterns of Shade Space Utilization Based on Spatial Distribution and User Activities

Nurdiyah Yusuf*
Architectural Engineering, Alauddin State Islamic University Makassar
*Correspondence Author: nurdiyah.yusuf@uin-alauddin.ac.id

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ABSTRACT

Abstract: *A shade space is an important element of the campus environment because it can create a comfortable campus environment and support students' academic and social activities. This study aims to describe the condition of shade spaces and analyze the pattern of their use by building users within the Faculty of Science and Technology UIN Alauddin Makassar. The research uses a descriptive qualitative approach. Data were collected through non-participant observation, Place-centered Mapping behavior mapping, visualization analysis, and documentation. Observations were carried out at several shade points for 16 days, which were divided into morning, noon, and evening periods. The aspects observed included shade source, physical condition, supporting facilities, type of user, type of activity, form of interaction, duration of use, and time of utilization. Data is analyzed through data reduction, activity grouping, shadowing analysis, and spatial pattern mapping. The results showed that shaded spaces with strategic locations, shady vegetation, supporting facilities, and good accessibility had a higher utilization rate than shaded spaces with minimal facilities. The transition area between Buildings E and F is the most used space. The highest intensity of use is found during the day and evening, especially for sit-down or resting activities. On the other hand, shaded spaces without supporting facilities tend to be underutilized. These findings show that the existence of shade is not yet the only determining factor in space utilization. The quality of facilities and the connection of the space with academic activities also affect the use of space. Research recommends the availability of facilities such as seating areas and vegetation diversity to improve the social, academic, and environmental functions of shade spaces in the faculty area. These findings are expected to be the basis for the development of a more comfortable, inclusive, and sustainable campus open space design*

Corresponding Author:
Nurdiyah Yusuf
Architectural Engineering, Alauddin State Islamic University Makassar
Email: nurdiyah.yusuf@uin-alauddin.ac.id

1. INTRODUCTION

The campus environment does not only consist of classrooms, laboratories, libraries, and administrative rooms. The outdoor space between the buildings is also part of the student experience during academic activities. The space is used to move from one building to another, wait for lecture schedules, rest, discuss, do assignments, eat, and build social interactions. Therefore, the quality of outdoor space is related to the comfort and sustainability of campus users' activities. In addition to classrooms and laboratories, open spaces have an important function as a forum for social interaction, discussion, informal learning, and recreation. Research on campus open space shows that physical comfort, accessibility, vegetation, and supporting facilities affect the intensity of space utilization by students. The physical character of an outdoor space can influence the behavior patterns of its users (Hasan et al., 2025). Hasan et

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al. (2025) show that students tend to choose campus spaces that provide good seating, shade, interaction opportunities, and visibility. When formal facilities are inadequate, students can also adjust their behavior by using stairs, garden dividers, floors, or other physical elements as informal seating.

One of the important elements in the outdoor space of the campus is shade. In this study, a shady space is understood as an outdoor space or transitional space that is protected from direct exposure to sunlight by vegetation, building shadows, hallways, canopies, gazebos, roofs, or a combination of several of these elements. Shady space is not only concerned with the presence of shadows, but also with the ability of space to provide conditions that allow users to carry out activities within a certain period of time. The need for shade is important in the campus environment in hot and humid climates. Shade conditions, sun exposure, air temperature, and wind movement affect the comfort of campus path users (Suwanmanee et al., 2024). Shade can also affect more than just momentary comfort. There is a large difference in thermal conditions between a space exposed to the sun and a sheltered space that affects students' experience and thermal adaptability and concentration while in a shaded space (Gündoğdu et al., 2023). Meanwhile, trees and building shadows can reduce radiation exposure and improve the microclimate conditions of outdoor campus spaces in hot climates.

In tropical climates such as Makassar, high exposure to solar radiation causes the existence of shade to be one of the main factors that determine the comfort of outdoor space users. Shady spaces formed by vegetation and building elements are able to improve microclimate conditions so that they are more comfortable to use for various activities (Ghaffarianhoseini et al., 2019; Makaremi et al., 2012; Middel et al., 2016). In the concept of microclimate and outdoor thermal comfort, trees and the shadow of buildings can serve as shade elements that reduce the amount of direct solar radiation that reaches the surface of the ground and the human body. In trees, the crown and leaves block some of the direct sun's radiation. In addition to providing shade, vegetation also helps control thermal conditions through evapotranspiration. Research in tropical campus environments shows that areas with denser vegetation tend to have more comfortable thermal conditions than areas dominated by built-up surfaces and minimal vegetation (Nuswantoro et al., 2026). The shadow of trees and buildings can significantly reduce the transmission of solar radiation because it can reduce exposure to direct solar radiation which is an important effect of thermal comfort because outdoor thermal comfort is not only affected by air temperature, but also by the amount of heat radiation that the body receives from the sun and the surrounding surface (Wu et al., 2025). Increasing shade area can also lower the value *Physiologically Equivalent Temperature* or PET is about 1 to 2°C, so that the thermal conditions felt by pedestrians become more comfortable.

UIN Alauddin Makassar has green open space of around 30-35% of the total campus area, including green open areas in the Faculty of Science and Technology area. The Faculty of Science and Technology has several building masses that are connected by an outdoor space which is an open space. The space is used by faculty users as a place to wait, discuss, do assignments, and rest. The existence of green open space is one of the important elements in supporting the quality of the campus environment, and a forum for faculty user activities. Vegetation in green open spaces plays a role in providing a shading effect, reducing the intensity of exposure to solar radiation, and creating areas with more comfortable microclimate conditions through controlling environmental temperature and humidity. However, the existence of shaded space in a campus area is not only determined by the availability of vegetation, but also by the spatial distribution pattern, physical characteristics of the space, and its relationship with user activities. The shady area spread across the Faculty of Science and Technology has the potential to become a supporting space for various activities, such as social interaction, informal academic activities, discussions, rests, and recreational activities for students and other academics. Therefore, understanding the pattern of the distribution of shaded spaces and how the space is used by users is an important aspect in evaluating the quality of outdoor space on campus.

Based on these conditions, this study was conducted to analyze the spatial distribution of shade spaces in the area of the Faculty of Science and Technology of UIN Alauddin Makassar and identify the types of activities that take place in these shaded areas. This analysis is expected to provide an overview of the relationship between shade room characteristics, space utilization patterns, and user needs, so that it can be the basis for developing a more comfortable campus environment, adaptive to tropical climatic conditions, and supporting academic activities optimally.

2. RESEARCH METHODS

a. Research Approach

This study uses a descriptive qualitative approach. The approach was chosen to understand the pattern of space utilization in natural conditions and explain the relationship between user behavior and the physical character of the space. Aims to identify the form, time, location, and reason for the use of the shade area or space. The research strategy uses a case study in the Faculty of Science and Technology UIN Alauddin Makassar. Behavioral mapping is used as the primary technique to record user activity at a predetermined location and time point.

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b. Research Location and Time

The research was conducted within the Faculty of Science and Technology (SAINSTEK) UIN Alauddin Makassar. The Faculty of Science and Technology consists of several building masses that are divided into several functions, namely building D as the main building that functions as an academic building and practicum activities, and buildings C, E, and F as classrooms or lecture venues.

Image 1. Faculty of Science and Technology, UIN Alauddin Makassar

The shady space in this study is an outdoor or semi-open area within the Faculty of Science and Technology that is protected from direct exposure to sunlight by vegetation, buildings, hallways, canopies, gazebos, or a combination of several of these elements and allows users to carry out sedentary or temporary activities. Therefore, the spatial boundaries of the research are set as follows:

a. All outdoor and semi-open areas of the Faculty of Science and Technology
b. Courtyard between buildings
c. hallways and terraces
d. Faculty Garden
e. area under the tree
f. gazebo or canopy
g. jalur pedestrian

Image 2. Observation focus area

The determination of the observation focus area was carried out in stages through initial surveys and mapping of shady spaces within the Faculty of Science and Technology UIN Alauddin Makassar. The focus area was selected using the purposive sampling technique. The selection takes into account the representation of shade types, location distribution, level of use, availability of facilities, proximity to academic activity centers, and variations in user activity. Locations that have high, medium, and low usage intensity are still included to obtain a comparison between optimally

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utilized space and space that has not been optimally utilized. Based on the results of the initial survey, five shade spaces were selected. The point is spread across the area of the Faculty of Science and Technology and consists of two areas with vegetation shade, and three areas with combination shade. Each point was observed repeatedly in the morning, afternoon, and evening periods to identify changes in shade conditions and patterns of their utilization. Data collection was carried out on July 13 – August 3, 2026 for 16 days of observation. Observations were made on active lecture days until the end of the current semester period to identify the intensity of use of shaded space. Observation time is divided into:

Period	Time	Remarks
Morning	08.00 – 10.00	The start time of campus activities
Afternoon	12.00–14.00	Rest time and high sun exposure
Afternoon	15.00–17.00	Changing classes and the end of campus activities

c. Objects, Subjects and Units of Analysis

The object of the research is a shady space located within the Faculty of Science and Technology. Shaded spaces are defined as outdoor spaces or semi-open spaces that obtain protection from the sun through: vegetation or tree canopy, the mass shadows of buildings, hallways, terraces, cantilevers, canopies and gazebos, as well as combinations of vegetation and building elements. The research subjects were users of the Faculty of Science and Technology who were observed to be using a shady space, consisting of students, *cleaning services,* lecturers, staff, or staff. The analysis unit includes the physical condition of the shaded space, the activities that occur, the location where the activity takes place, the time of use, the intensity of use, and the pattern of user interaction.

d. Data Collection Techniques

The data collection technique used is non-participant observation where the researcher observes activities without being directly involved in them. A Place-centered mapping method to record the behavior that takes place at a predetermined shaded area point.

e. Data Analysis Techniques

The analysis was carried out simultaneously with the data collection process by conducting data reduction, activity coding, spatial analysis through simulation analysis of shadowing using Sketchup and 3D Atlas, temporal analysis, analysis of behavioral and spatial relationships, data presentation, and drawing conclusions.

3. RESULTS AND DISCUSSION

a. Characteristics of Research Areas

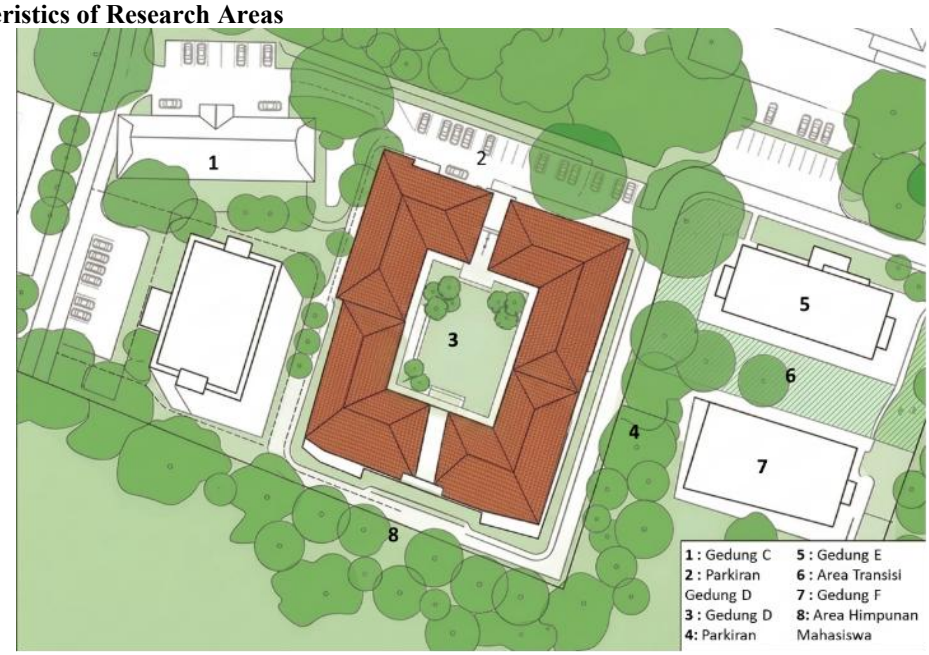

Image 3. Siteplan of the Faculty of Science and Technology

The area of the Faculty of Science and Technology consists of four building masses and an open area that connects between buildings. There is a transition area located between Building D and Building E. The transition area has seating facilities that are divided into two types, elongated seating parallel to Building E and concrete seating with a

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capacity of 2-3 people with a total of six seats. The mass division of the building is divided into several functions, namely Building D as an academic and practicum building, Building E as a lecture building and faculty library, Building C, and Building F as a lecture building. The focus of the research is the outdoor space area of the Faculty of Science and Technology which consists of green open space and pavement that functions as a parking area.

b. Shade Space Distribution Based on Digital Shadow Modeling

Shading Analysis simulation using 3D Atlas was carried out to determine the distribution pattern of the sun's shadow by building elements to the Faculty of Science and Technology area at a certain time. In addition to the shadowing of building elements, vegetation also plays an important role in forming shaded zones along the edges of the area and circulation corridors, while the mass of buildings produces permanent shade in areas adjacent to buildings.

Shadow Modeling of the Faculty of Science and Technology Area	Time	Remarks
	08.00 – 11.00	The image shows the Shade analysis condition, so the dark/shaded areas indicate the part of the surface that does not receive direct sunlight exposure **Shadow Character:** long shadow **Potential Shaded Spaces:** Temporary Shaded Areas
	13.00 – 14.00	During the day, the shaded space is dominated by the shadowing area of buildings and vegetation **Shadow Character:** shadow begins to lengthen, shade area increases **Shading Potential:** a wider but temporary shaded area
	15.00 – 16.00	**Shadow Character:** the shadows start to align with the building so that the shaded area is only on the shadowing of the side of the building **Shaded Space Potential:** Reduced shade area

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	17.00	The elevation of the sun decreases, so direct sunlight exposure is low. Increased shade area **Shadow Character:** the shadows start to align with the building so that the shaded area is only on the side of the building, but the direct sun exposure is low **Shaded Space Potential:** Wider shaded area

Table 1. Shadow Distribution

Based on the simulation of the shading distribution and the analysis of the vegetation distribution, five shaded area points were determined as the observation focus area.

KETERANGAN

RT 1 : Pintu Masuk Fakultas
RT 2 : Parkiran Utama
RT 3 : Area Transisi
RT 4 : Pelataran Gedung F
RT 5 : Area Himpunan Mahasiswa

Image 4. Focal Point of Observation of the Shady Space of the Faculty of Science and Technology

The Shady Space (RT) to be studied is divided into five points, namely:

- **RT 1** : a shady area which is the entrance area of the faculty of science which has a dome-shaped canopy, and a terrace/hallway as a drop off and waiting area.

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Image 5. RT Area 1

- **RT 2** : a shady area which is an open area that functions as the main parking lot of the Faculty of Science and Technology and there is vegetation with a wide title such as trembesi and ketapang.

Image 6. Area RT 2

- **RT 3** : the transition area between Buildings D, E, and F where there are concrete seating facilities and there is vegetation in the middle of the seating facilities.

Image 7. RT Area 3

- **RT 4** : The open space that functions as a parking lot for the users of Building F. there is tall vegetation and small headings that function as a barrier. In this area there is also a hallway and terrace which is part of the Building F building.

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Image 8. RT Area 4

- **RT 5** : The shady area referred to in RT 5 is the area at the back of the faculty which is a communal area for students, especially student associations. There is a wooden gazebo that is often used by students as a gathering space. There is vegetation, namely trembesi which is large and is located at several points in this area.

Image 9. Area RT 5

c. Pemetaan Perilaku Place-Centered Mapping

Behavior mapping is done to record and record the behavior that occurs at pre-defined shaded area points. The behavioral mapping method carried out is Place-centered mapping to identify the type of activity, users, and duration of use of shaded space.

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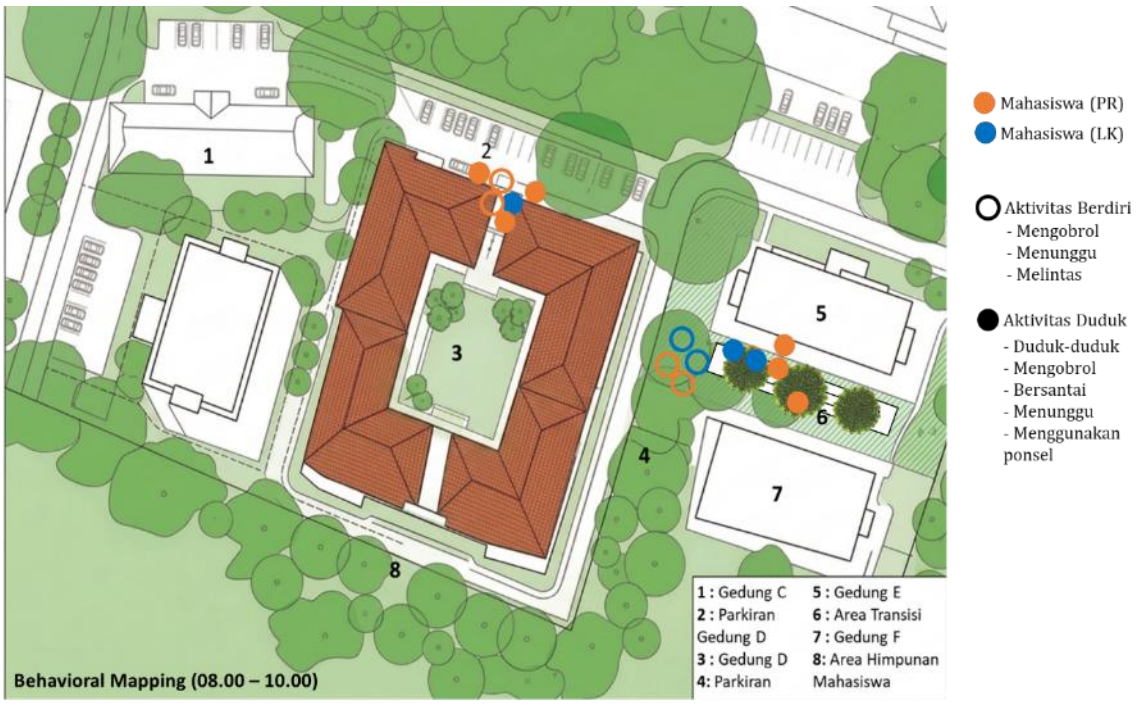

Image 10. Place-centered mapping in the morning (08.00 – 10.00)

In the morning (08.00 – 10.00) the activity was concentrated in the RT 3 area, where the area has an elongated seating facility and is used by students to wait for lecture time, use mobile phones, and pass through. In the RT 1 area at the front door of the faculty building, there are activities of waiting, sitting, chatting. The RT 2 area is dominated by passing and parking activities, while in the RT 4 and RT 5 areas there is no activity that occurs in this time range.

Image 11. Activities that occurred in the RT 1 area in the morning

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Image 12. Activities that occurred in the RT 3 area in the morning

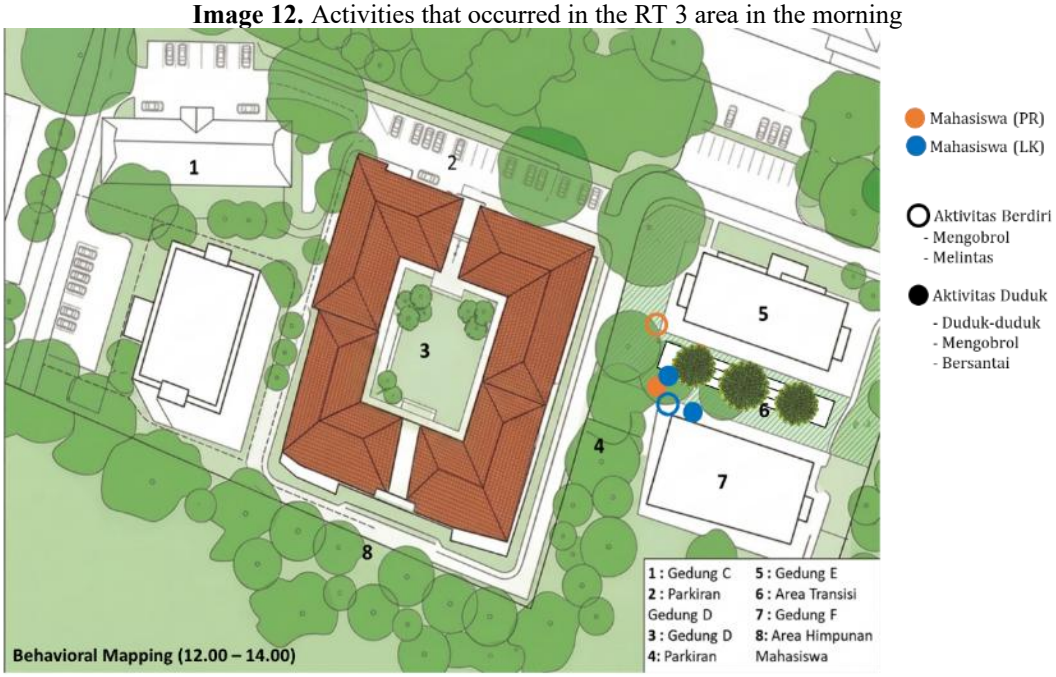

Image 13. Place-centered mapping during the day (12.00 – 14.00)

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Image 14. Shadowing in the RT 2 area during the day

Image 15. Activities that occur in the RT 3 area during the day

Figure 15 shows the difference in the choice of shade. Seating areas exposed to sunlight are avoided by students and choose to use a shadier seating area that is exposed to the shadows of the surrounding building elements. The dominant activity during the day is passing by, and waiting for lecture time.

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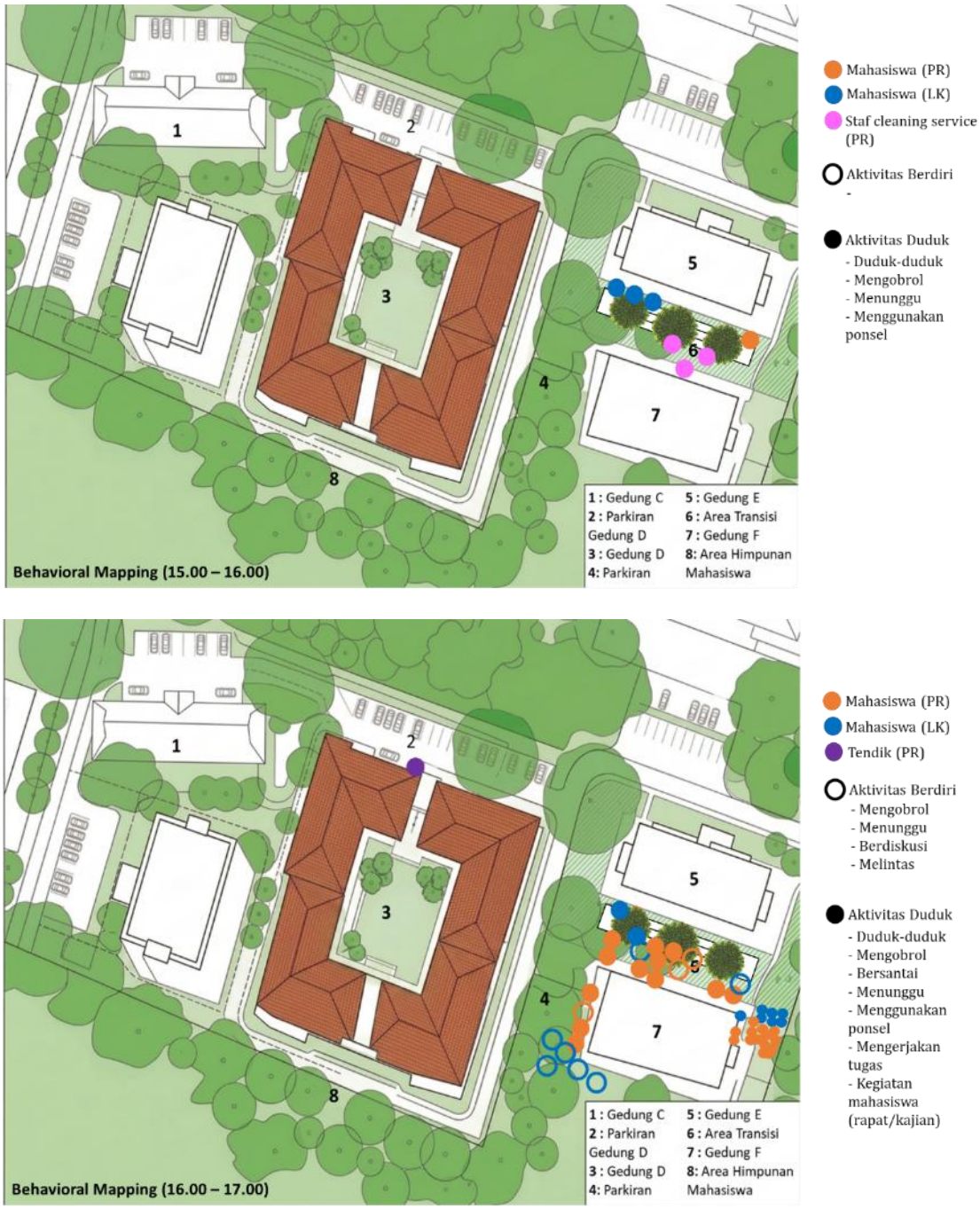

Image 16. Place-centered mapping in the afternoon (15.00 – 17.00)

The most dominant activity in the afternoon is the type of group activity such as chatting and discussing. Academic activities are more often found in RT 3 because it has seating, a shade area and vegetation with a wide title, and is close to the lecture building. More eating and drinking activities take place in RT 3 because it is adjacent to the hawker vendors in Building F. The space dominated by group activities has a sitting pattern in rows, following the shape of a bench. Instead, individual users tend to choose a seatside position, facing the building, or away from the crowd. The variation shows that the shaded space functions as a multifunctional space. In addition to providing protection from the sun, the space is an extension of academic and social spaces outside the classroom. RT 3 is also used by *cleaning service* staff to rest.

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Image 17. Activities that occurred in the RT 3 area in the afternoon

In the RT 1 area, it is used as a waiting area for students and staff, RT 2 is dominated by passing activities, RT 4 and RT 5 are used by students for meetings or joint studies. In addition, the use of informal spaces such as a grassy area next to building F used by students for association meetings.

Image 18. Student meeting activities

The mapping results showed that the use of shade space was not evenly distributed. The largest concentration is found in RT 3 which is a transition area that faculty users often pass through to move between buildings. In RT 3, students tend to occupy a part that is close to the pedestrian path or entrance to Building E, and F. other parts that remain shaded but do not have facilities like RT 2, and RT 5 is only used for standing, waiting, or crossing. The pattern shows the difference between a shaded space for settling in and a shaded space for transit. Spaces for settling in such as RT 3 are used for a longer duration, and accommodate various types of social and academic activities. The RT 1 area and the RT 2 area, which are entrances and open parking, are used as transit spaces that are more widely used for passing, parking, walking, standing, or waiting for a short time. Students were also found using informal spaces and elements that were not designed as seating, such as grassy areas, planters, hallway floors, or plant pots. This behavior shows that there is a need for seats that have not been fully met. A similar finding was found by Hasan et al. (2025), namely that users adapt to using informal elements when formal facilities are limited.

The shade room of RT 3 is the shade room with the highest intensity of use. The shade comes from the shadowing of the surrounding buildings and vegetation, and takes place predominantly during the day and evening. The space is equipped with an elongated seating area, and other additional seating areas, there are buildings and trees surrounding the RT 3 area so that the shade/shading area is wider, Meanwhile, RT 4 gets enough shade, but is not equipped with facilities for sedentary activities. So that its use is only in the afternoon. In the RT 1, RT 2, and RT 5 areas, the shade area is limited because it depends on the time of shading of the building and the surrounding vegetation. The findings show that the shaded space in the SAINSTEK faculty environment does not have uniform quality. Differences in shade sources, shade time and area, facilities, accessibility, and position of the building result in differences in potential use.

d. Shade Space Utilization Analysis

The activities found can be grouped into passive, social, academic, consumptive, and movement/mobility activities. The use of shaded space and the activities that occur are as follows:

RT 1 : Main Entrance of the Faculty of Science and Technology

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Time	Shadow Condition	Supporting Facilities	Dominant Activity
Morning (08.00-10.00)	Wide shade area	Patio, hallway, and planter	Faculty user drop-off, building in and out
Lunch (12.00-14.00)	The canopy shade area is quite large		Sitting, waiting, going in and out of the building, student celebration activities
Afternoon (15.00-17.00)	The shaded area is dominated by shadows from buildings, and vegetation. The shaded area is wider but concentrated at one point		Sitting, waiting, exiting the building, using a mobile phone

Table 2. RT Area Utilization Analysis 1

RT 2 : Main Parking of the Faculty of Science and Technology			
Time	Shadow Condition	Supporting Facilities	Dominant Activity
Morning (08.00-10.00)	Wide shade area	Jalur pedestrian	Activities of coming and parking, waiting, passing
Lunch (12.00-14.00)	The shade area of vegetation and canopy is quite large, shades only part of the parking area		Drop off, waiting, chatting, parking, passing, eating and drinking, rest
Afternoon (15.00-17.00)	The parking area is filled with shadows from the building so that the shade space is wide		Chatting, chatting, eating and drinking, resting, using your phone, passing by, sitting around, parking, and going home

Table 3. RT 2 Area Utilization Analysis

RT 3 : Transition Area			
Time	Shadow Condition	Supporting Facilities	Dominant Activity
Morning (08.00-10.00)	Wide shade area	Spacious and elongated seating, hawker stalls, pedestrian paths	Sitting, waiting for lecture time, using mobile phones, chatting, passing by
Lunch (12.00-14.00)	The shade area of vegetation and canopy is quite large, shades a certain area		Sitting, relaxing, eating and drinking, resting, chatting, using mobile phones, doing homework, waiting for lecture time, passing by
Afternoon (15.00-17.00)	The shaded area is dominated by shadows from buildings, and vegetation. The shaded area is wider but concentrated at one point		Sitting, relaxing, resting, discussing, doing tasks, chatting, using mobile phones, waiting, passing by, eating and drinking

Table 4. RT 3 Area Utilization Analysis

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RT 4 : Building F Courtyard			
Time	Shadow Condition	Supporting Facilities	Dominant Activity
Morning (08.00-10.00)	Sufficient shade area	Canopy, terrace, hallway	Parking, waiting, passing
Lunch (12.00-14.00)	The shade area of vegetation is only at certain points. There is a terrace and canopy as a shaded area		Chatting, sitting, waiting, student discussions, passing by
Afternoon (15.00-17.00)	The shaded area is dominated by the shadows of the building. The shaded area is wider but concentrated at one point		Waiting, sitting, chatting, using mobile phones, student activities (meetings)

Table 5. Analysis of the Utilization of the RT 4 area

RT 5 : Student Association Area			
Time	Shadow Condition	Supporting Facilities	Dominant Activity
Morning (08.00-10.00)	Minimal shade area	Communal buildings, benches, gazebos	Sit around, wait for lecture time, use mobile phones
Lunch (12.00-14.00)	Vegetation shade areas are only from buildings and vegetation that is headed wide at a certain point		Sitting, relaxing, eating and drinking, resting, chatting, using your phone, waiting for lecture time
Afternoon (15.00-17.00)	The shaded area is concentrated at a single point that comes from the shadowing of the building.		Sitting, relaxing, chatting, using mobile phones, waiting, playing music, discussing, eating and drinking, group meetings

Table 6. Analysis of RT 5 Area Utilization

Based on the table of user activities, user activities in the shaded space can be classified into passive, social, academic, consumptive activities, mobility/movement, and organizational activities. The classification shows that the shaded space not only serves as a physical element that provides protection against exposure to the sun's heat, but also serves as a space that supports various forms of interaction and activities of faculty users. Passive activities indicate the use of shaded space as a place of rest and relaxation, while social activities reflect the function of space as a place of interaction and communication between users. Academic activities show that shady spaces also support informal learning activities, discussions, and assignment completion outside the classroom. In addition, consumptive activities, mobility/movement, and organization show that shaded spaces are related to user movement patterns and the dynamics of daily campus activities. The diversity of activities that occur in the shaded space shows that the area has an important functional value in supporting the quality of the outdoor space of the Faculty of Science and Technology. Therefore, the existence of shaded spaces needs to be maintained and improved in quality through the management of physical elements, vegetation arrangement, provision of supporting facilities, and the development of spaces that are able to respond to user needs. These efforts are needed so that the shaded space can function optimally as a comfortable off-campus space, adaptive to tropical climatic conditions, and support various academic activities.

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e. Temporal Patterns of Utilization

The temporal pattern of shaded space utilization describes changes in the intensity and character of user activity based on observation time. Temporal pattern analysis was carried out to determine the tendency of shade use over a certain period of time and its relationship with environmental conditions, especially changes in thermal conditions due to sun exposure. The results of observations show that the use of shade space does not take place constantly, but varies based on the time, type of activity, and user needs in carrying out academic and social activities within the Faculty of Science and Technology UIN Alauddin Makassar.

Based on the results of the behavior mapping, the intensity of use changes over time. In the morning, the shaded space is more used for waiting for classes, chatting, and passing by. During the day, there is an increase in use, especially in spaces that have full shade, and seating. In the afternoon, activities are dominated by group activities such as discussions, chats, and student organization activities such as association meetings.

There are different uses in each area. In RT 1, the peak of use occurs in the lecture time span with the dominant activities of waiting, passing (going in and out), student celebrations, and drop offs. The lowest usage is in the afternoon when the lecture ends.

Image 19. RT 1 area at 9:00 a.m. (left) and at 5:00 p.m. (right)

Image 20. RT 2 area at 11:00 (left) and at 17:00 (right)

The use of the RT 2 area is dominated during break time (11.00 – 13.00) by students and staff. Most use the shaded area of RT 2 for snacking, resting, eating, and drinking. Meanwhile, the lowest intensity of use is in the afternoon at 17.00 which is only dominated by passing activities (going home).

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Image 21. RT 3 area at 11:00 (left) and at 17:00 (right)

In contrast to the RT 1 and RT 2 areas, on the other hand, the RT 3, RT 4, and RT 5 areas increased the intensity of use in the afternoon which was dominated by student activities, such as doing assignments, discussions, and association meetings. The use of informal space by students shows the need for space to accommodate wider organizational activities. The position of the user changes according to the shadowing area. In RT 3, students use the seating area, but during the day there is no use of the facility. This behavior is a form of adaptation to microclimate changes.

Image 22. Building Area F – RT 4 at 11.00 (left) and at 17.00 (right)

Image 23. RT 5 area in the afternoon (16.00)

In the RT 5 area, activities occurred starting in the afternoon, at 15.30 WITA to 17.00 WITA with the dominant activity of association meetings and discussions.

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4. CONCLUSIONS AND SUGGESTIONS

This study shows that the shaded space in the Faculty of Science and Technology UIN Alauddin Makassar is used for more diverse activities than just sheltering from the sun. The space is not only used for waiting and discussion, but also for social, academic, circular, and organizational functions. Of the five points observed, RT 3 is the room with the highest intensity of use, while RT 4 has the lowest level of use. The most intensive use occurred at 16.00 – 17.00 WITA and was dominated by group activities such as discussions, chats, and student organization activities. These patterns are related to lecture schedules, break times, and changes in shadow positions. The use of shade space is influenced by a combination of several factors, namely shade quality, seating availability, proximity to the building, ease of access, and supporting facilities. Thus, the existence of shadows is not enough to make a space effectively used.

Behaviors such as sitting on stairs, using grassy areas, and moving in the shadows indicate that some of the user's needs have not been accommodated by the physical conditions of the space. The use of informal space also shows that the existing shady space within the Faculty of Science and Technology does not provide adequate supporting facilities. The next arrangement needs to prioritize spaces that have shown high intensity of use and optimize potential spaces that still lack facilities.

Research recommends the addition of shade trees, the provision of seating, the addition of hygiene facilities and increased maintenance, especially the maintenance of the plant's crown. These recommendations are expected to support the creation of a more comfortable, adaptive, and responsive faculty environment to the needs of user activities.

REFERENCES

Chan, S. Y., Chau, C. K., & Leung, T. M. (2017). On the study of thermal comfort and perceptions of environmental features in urban parks: A structural equation modeling approach. *Building and Environment, 122*, 171–183. https://doi.org/10.1016/j.buildenv.2017.06.014

Chen, L., & Ng, E. (2012). Outdoor thermal comfort and outdoor activities: A review of research in the past decade. *Cities, 29*(2), 118–125. https://doi.org/10.1016/j.cities.2011.08.006

Eslamirad, N., Sepúlveda, A., De Luca, F., & Lylykangas, K. S. (2022). Evaluating outdoor thermal comfort using a mixed-method to improve the environmental quality of a university campus. *Energies, 15*(4), 1577. https://doi.org/10.3390/en15041577

Ghaffarianhoseini, A., Berardi, U., Ghaffarianhoseini, A., & Al-Obaidi, K. (2019). Analyzing the thermal comfort conditions of outdoor spaces in a university campus in Kuala Lumpur, Malaysia. *Science of the Total Environment, 666*, 1327–1345. https://doi.org/10.1016/j.scitotenv.2019.01.284

Gündoğdu, B., Nouri, A. S., Afacan, Y., & Matzarakis, A. (2023). Investigating the impacts of shaded outdoor spaces on thermal adaptation and cognitive performance of university students in classroom environments. *International Journal of Biometeorology, 67*(12), 1941–1955. https://doi.org/10.1007/s00484-023-02552-x

Hasan, N., Hijazi, I., Enab, D., Qanazi, S., Shahrour, I., Al-Qadi, H., & Qamhieh, K. (2025). Influence of campus outdoor spaces on students behavior: Enhancing social interaction and learning at An-Najah University. *An-Najah University Journal for Research - A (Natural Sciences), 39*(2), 125–136. https://doi.org/10.35552/anujr.a.39.2.2335

Hildegardis, C., Saraswati, A. A. A. O., Diasana, I. D. G. A., & Dewi, N. K. A. (2019). Student perception of thermal comfort of outdoor space in Nusa Nipa University, Maumere, East Nusa Tenggara. *International Journal of Engineering and Emerging Technology, 4*(2).

Jing, W., Qin, Z., Mu, T., Ge, Z., & Dong, Y. (2024). Evaluating thermal comfort indices for outdoor spaces on a university campus. *Scientific Reports, 14*, 21253. https://doi.org/10.1038/s41598-024-71805-5

Li, Y., Guo, J., Zhao, Y., & Xia, B. (2026). Winter outdoor thermal comfort in university campus open spaces in the cold region of China. *Results in Engineering, 29*, 108964. https://doi.org/10.1016/j.rineng.2026.108964

Makaremi, N., Salleh, E., Jaafar, M. Z., & GhaffarianHoseini, A. H. (2012). Thermal comfort conditions of shaded outdoor spaces in hot and humid climate of Malaysia. *Building and Environment, 48*, 7–14. https://doi.org/10.1016/j.buildenv.2011.07.024

Manavvi, S., & Rajasekar, E. (2022). Evaluating outdoor thermal comfort in urban open spaces in a humid subtropical climate: Chandigarh, India. *Building and Environment, 209*, 108659. https://doi.org/10.1016/j.buildenv.2021.108659

Meili, N., Acero, J. A., Peleg, N., Manoli, G., Burlando, P., & Fatichi, S. (2021). Vegetation cover and plant-trait effects on outdoor thermal comfort in a tropical city. *Building and Environment, 195*, 107733. https://doi.org/10.1016/j.buildenv.2021.107733

Middel, A., Selover, N., Hagen, B., & Chhetri, N. (2016). Impact of shade on outdoor thermal comfort—A seasonal field study in Tempe, Arizona. *International Journal of Biometeorology, 60*(12), 1849–1861. https://doi.org/10.1007/s00484-016-1172-5

Mutani, G., Todeschi, V., & Beltramino, S. (2022). Improving outdoor thermal comfort in built environment assessing the impact of urban form and vegetation. *International Journal of Heat and Technology, 40*(1), 23–31. https://doi.org/10.18280/ijht.400104

Ning, S., Jing, W., & Ge, Z. (2023). Sunlight perception and outdoor thermal comfort in college campuses: A new perspective. *Scientific Reports, 13*, 16112. https://doi.org/10.1038/s41598-023-43077-y

Nuswantoro, W., Ludang, Y., Sutrisno, H., & Uda, S. A. K. A. (2026). Vegetation density of green open spaces as a key determinant of outdoor thermal comfort on the University of Palangka Raya campus. *Media Ilmiah Teknik Lingkungan, 11*(1), 47–56. https://doi.org/10.33084/mitl.v11i1.11886

Shashua-Bar, L., Pearlmutter, D., & Erell, E. (2011). The influence of trees and grass on outdoor thermal comfort in a hot-arid environment. *International Journal of Climatology, 31*(10), 1498–1506. https://doi.org/10.1002/joc.2177

Song, J., & Wang, Z. (2015). Impacts of mesic and xeric urban vegetation on outdoor thermal comfort and microclimate in Phoenix, AZ. *Building and Environment, 94*, 558–568. https://doi.org/10.1016/j.buildenv.2015.10.016

Suwanmanee, N., Kronprasert, N., Sutheerakul, C., Arunotayanun, K., & Rinchumphu, D. (2024). Investigation of outdoor thermal comfort for campus pedestrian walkways in Thailand. *Sustainability, 16*(2), 657. https://doi.org/10.3390/su16020657

Taleghani, M., Kleerekoper, L., Tenpierik, M. J., & van den Dobbelsteen, A. A. J. F. (2015). Outdoor thermal comfort within five different urban forms in the Netherlands. *Building and Environment, 83*, 65–78. https://doi.org/10.1016/j.buildenv.2014.03.014

Talebsafa, S., Taheri Shahraeini, M., Yang, X., & Rabiei, M. (2023). Impact of providing shade on outdoor thermal comfort during hot season: A case study of a university campus in cold semi-arid climate. *Renewable Energy Research and Applications, 4*(2), 209–224. https://doi.org/10.22044/rera.2022.12254.1169

Wu, Y., Liu, H., & Chen, L. (2019). Outdoor thermal comfort and adaptive behaviors in a university campus in China's hot summer-cold winter climate region. *Building and Environment, 165*, 106414. https://doi.org/10.1016/j.buildenv.2019.106414

Wu, Y. C., Lu, C. L., & Lin, T. P. (2025). Evaluating the effectiveness of tree canopy and building shade in urban heat mitigation using solar radiation transmittance. *Urban Climate, 62*, 102522. https://doi.org/10.1016/j.uclim.2025.102522

Xue, J., Hu, X., Sani, S. N., Wu, Y., Li, X., Chai, L., & Lai, D. (2020). Outdoor thermal comfort at a university campus: Studies from personal and long-term thermal history perspectives. *Sustainability, 12*(21), 9284. https://doi.org/10.3390/su12219284

Zhao, Y., Li, R., Niu, J., Shi, X., & Gao, N. (2025). Impact of vegetated facades on microclimate and outdoor thermal comfort across different building morphologies. *Building and Environment, 285*, 113614. https://doi.org/10.1016/j.buildenv.2025.113614

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