"Landmark-to-Landmark": Exploring Wayfinding Aspect Criteria for the Campus

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Abstract— *Wayfinding problems often occur in the public areas or public buildings with complex arrangements, including in the campus area. As a multi-building and multi-space area, the campus arrangement causes wayfinding problems for visitors due to many available pathways, low visual access, and temporary spatial changes. In addition, building in the campus area are designed in a predetermined style that makes the visual and spatial features of the campus area less distinctive. This study explores and formulates design criteria for a campus arrangement that emphasizes the ease of wayfinding using observation and in-depth interviews. This study found several criteria that must be applied in the campus arrangement to minimize wayfinding problems for campus visitors. Campus arrangement is not only focused on exploring the character of individual buildings but also on other aspects, such as visual access, plan configuration, and use of signs, according to the visitor's spatial cognition. To minimize wayfinding problems for campus visitors, the arrangement of the campus area must emphasize the integration of landmarks in each zone on the campus.*

Keywords— *Campus, design criteria, spatial cognition, wayfinding.*

I. INTRODUCTION

Wayfinding is the process of gathering information to make decisions in directing and moving from one place to another. Wayfinding is closely related to spatial legibility, a design principle that allows architects and planners to organize the area in a legible arrangement for everyone. The fundamental purpose of wayfinding is to find an efficient path to achieving the destination using environmental indicators (Lynch, 1960). Wayfinding problems occur almost in all public buildings, especially with complex arrangements such as the campus area (Azzali & Abdel Sabour, 2018). The campus arrangement is complex because it is dominated by a dense spatial layout and multi-story buildings. In addition, the entire outside of the campus area is usually walkable and accessible, making it confusing for visitors to wayfinding (Iftikhar, Shah, et al., 2020). The campus has many visitors who visit intensely and repeatedly for a long time. Therefore, the environmental indicator setting must provide legible spatial information to campus visitors. Knowing the visitor's spatial cognition in exploring and understanding the area can help arrange a campus masterplan that minimizes wayfinding problems. Wayfinding for new visitors relies on their ability to read and understand spatial information in their environment to form spatial cognition. This research will formulate the design criteria by emphasizing the wayfinding aspect of the campus arrangement as a multi-building and multi-space area.

II. THEORY

Passini (1992) explains that wayfinding is a cognitive process involving the human's ability to collect and process spatial information. Wayfinding also a process of compiling travel routes based on spatial information. The spatial information is perceived and converted into a series of travel strategies (Hashim & Said, 2013). Spatial cognition focuses on understanding how humans perceive, represent, and interact with the spatial information of the existing environment. This spatial information includes objects and elements such as size, shape, and relationships between objects such as orientation, location, and direction (Waller & Nadel, 2013). According to Weisman (1981), four aspects of identifying spatial information influence the ease of wayfinding: visual access, the degree of architectural differentiation, the use of signs and room numbers, and plan configuration.

Visual access measures the ability of building or location to be seen by visitors from a certain point. Visual access provides information to visitors about the circulation system, both horizontally and vertically, and its relationship to the surrounding space. The degree of architectural differentiation in buildings allows the visitor to orient themselves and remember the location easily. Arthur and Passini (1992) suggest that using different colours, materials, and textures in spatial features can improve the building's characteristic and can help the visitors to identify their locations. The signs and room numbers are a tool to help visitors to identify their destination. The more legible spatial information of the area, the easier for visitors to wayfinding. The last aspect is plan configuration, which affects the arrangement of the overall building layout. The plan configuration is usually related to the size of the area, the number of possible destinations and routes, and the route intersection (Li & Klippel, 2012).

From the table I about aspect, parameter, and indicator of environment, it can be concluded that the elements of an effective wayfinding system are as follows:

1. Users can see through space or outside the building to maintain a point of reference.
2. Every building is well-differentiated or visually distinct through material, color, or texture.
3. The building layout is easy to understand or remember.
4. The existence of attractive and impressive landmarks through the building, landscape, or furniture arrangement

Good planning and design of the campus always emphasize to the combination of spatial arrangement, functional area division, open space and landscapes

management, traffic systems, and the design of buildings and other supporting facilities.

TABLE I. Aspect, parameter, and indicator of environment

Environmental Aspects	Parameter	Indicator
Visual access	The location of the destination or building that is used as the orientation can be seen easily (Wang et al., 2014)	• The angle of visual to the building • The distance of building from the road • The existence of barrier
The degree of architectural differentiation	The character of the building design can be seen in contrast to the surrounding environment (Li & Klippel, 2012)	• Facade (color, material, texture) • The size of building • The shape of building shape • The function of building
The use of sign and room numbers	The existence of symbols or graphics can provide additional information regarding the position of the destination location (Calori & Vanden, 2015)	• Sign placement • Sign clarity (easy to read, easy to understand)
Plan Configuration	The placement of buildings and supporting elements is not confusing (Ahmed et al., 2020)	• The placement of the entrance • The settings of circulation system • The presence of landmarks • Zoning

III. METHODOLOGY

The paradigm in this research is post-positivist, which is used to reveal the existing reality (Groat & Wang, 2013). This research was conducted with a phenomenological approach because it emphasizes the depth of participants' interpretation of a phenomenon or form of the environment experienced (Groat & Wang, 2013). The research location is in Institut Teknologi Sepuluh Nopember (ITS) Surabaya, Sukolilo campus. This campus is classified as a complex arrangement area that includes residential, sports facilities, public spaces, educational buildings, etc.

The research begins with the researcher's observation of the environment of the Institut Teknologi Sepuluh Nopember (ITS) Sukolilo campus. This observation aims to understand the environment by observing environmental indicator that have the potential to facilitate wayfinding in the campus area. Next, an in-depth interview was conducted to explore participants' wayfinding experience in the ITS area asa student. The selection of participants used a purposive sampling technique. The researcher chose participants to ensure that the sample came from the same population group and was considered able to provide information according to the research objectives well (Creswell, 2007). From the information, researchers can conclude aspects of the environment visually and spatially by conducting in-depth interviews. The result of in-depth interview can provide information related to spatial information that support the formation of spatial cognition and facilitate the ease of wayfinding. Thus, the researcher can formulate the proper criteria for each environmental aspect.

IV. RESULT AND DISCUSSION

A. Visual Access

In the campus, an area with multi-building and multi-space, visual access is often blocked, making it difficult for visitors to wayfinding. Good visual access can provide information for users who come from all directions.
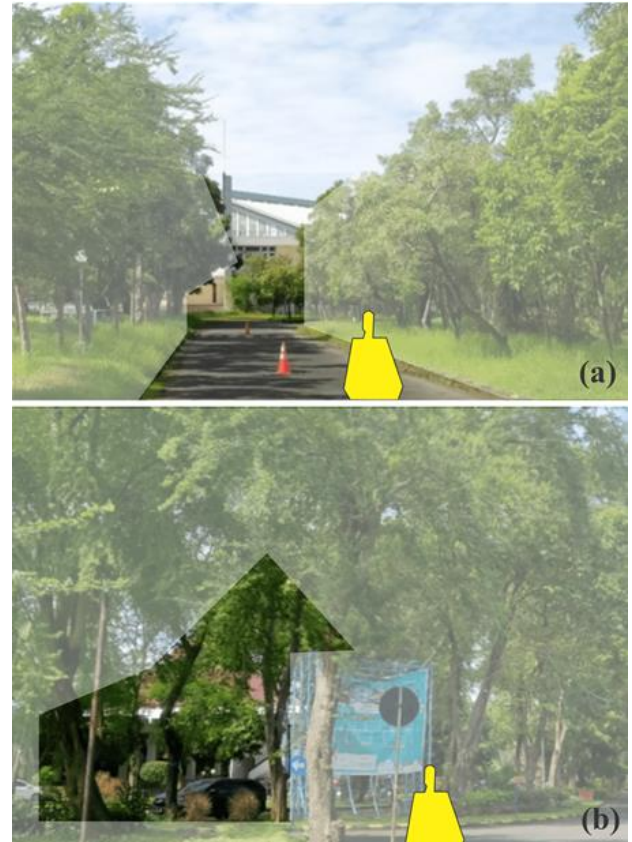

Fig. 1. (a) the physical characteristics of building are not explored well from the arrival angle, (b) trees cover all the physical characteristics of buildings that are potentially used as landmarks

In the context of the campus, visual access depends on the visibility between pedestrians and motorists with sources of spatial information either from buildings or signs. To the results of observations and interviews, difficulties in wayfinding are caused by low visual access (figure 1). The main factor causing low visual access is too many trees around the area covering the building's facade. The observation results also stated that the building's potential from the angle of arrival ways was not optimally utilized. So, buildings with physical characteristics that contrast the environment cannot help visitors recognize the area and help the visitor orient themselves. This condition contrasts with the parameters of good visual access, the location of the destination or building can be easily seen.

B. The Degree of Architectural Differentiation

The degree of architectural differentiation in wayfinding serves to make the visitors easy to remember the location and orientate themselves in campus area. The degree of architectural differentiation can be influenced by physical

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attributes seen from the material, size, shape, color, and contour or texture. The purpose of making physical attributes distinct and contrast from the environment is to make it easier for visitors to wayfinding. A building with distinctiveness has the potential to be used as a landmark by visitors because of the dominance of its form.

Fig. 2. (a) architectural differences in the building's form, (b) architectural differences by adding icons to buildings, (c) architectural differences by adding graphics and symbols to the building gate

To facilitate wayfinding on the campus area, each building must have a physical character to be seen in contrast to the surrounding environment. However, with most campus buildings designed by predetermined style, each building becomes less iconic and challenging to identify. In the ITS campus area, there have been efforts to provide the distinctiveness from each building (figure 2). These efforts are in the form of making the shape of the building stand out and with a significant height. In addition, giving symbols that reflect the department, such as colors, statues, and graphics on the gate. However, these efforts have not been implemented in every building.

C. The Use of Sign and Room Numbers

The sign includes a visual information system that uses graphics and letters to reduce the risk of disorientation and assist visitors in understanding the area. The basic principle of the sign is that it can be read, not easily erased, and easy to understand. However, in practice, the placement of signs also plays an essential role in the success of a sign in providing information to visitors.

The existence of symbols or graphics in the campus arrangement should be able to provide additional information related to the location of the destination. Using signs should be a significant information when the visitors cannot read and perceive architectural elements well. In the ITS campus area, the sign problem lies in the placement and visibility of the building sign (figure 3). Some buildings are also not equipped with name descriptions. The buildings with a similar shape

will be difficult to distinguish if visitors come to the ITS area for the first time. Improper placement of direction sign makes spatial information provided is not optimal. In addition, the existence of the building's name is often not accompanied by signs for the entrance. So that even though there are building names, visitors still find it challenging to access the existing buildings.
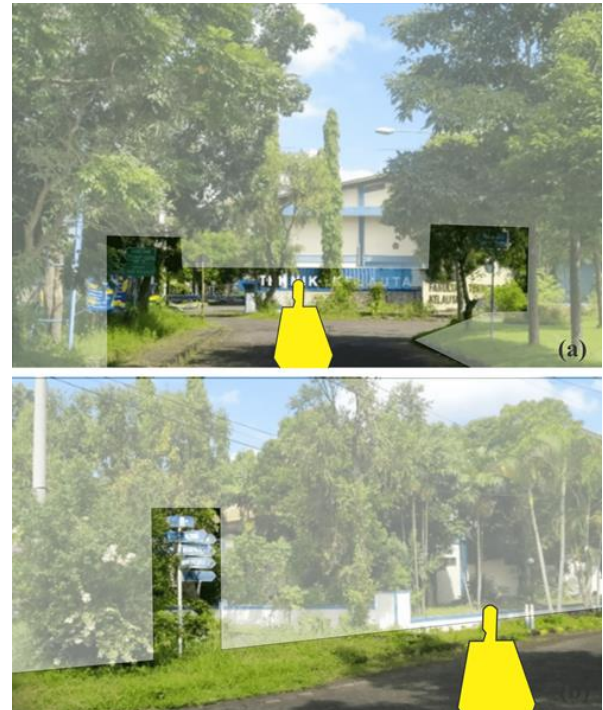

Fig. 3. (a) the building name is not accompanied by a description of the entrance direction, (b) the placement of direction sign covered by trees
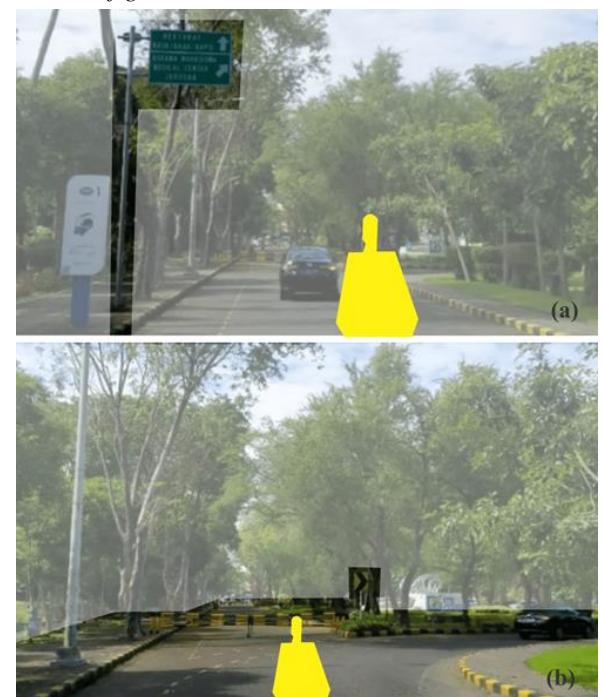
D. Plan Configuration

Fig. 4. The placement of the sign, description of the sign, and circulation settings are out of sync

This research reveals that the plan configuration is the main factor that causes difficulties in wayfinding. According to users, many intersections and roundabouts make route identification more complicated. Moreover, some intersections are not equipped with direction sign and location sign. The criteria of a good plan configuration are the placement of buildings and other supporting elements that must minimize the disorientation of visitors. In addition, each element's arrangement and the circulation rules must be arranged holistically. As in (figure 4), the presence of the sign and the portal does not provide the appropriate information. The study results follow the theory of Weisman (1981), which states that the plan configuration significantly affects the ease of wayfinding. The path's simplicity and the objects' layout make it easier for students to identify routes.

E. Design Criteria

The formulation of design criteria for campuses with the aspect of ease of wayfinding is the result of triangulation of analysis results on observations, in-depth interviews, and the parameters needed to establish the ease of wayfinding in the campus area. The design criteria are reviewed according to each aspect of the research to produce a description of the minimum criteria needed in a campus environment (table II).

TABLE IIIII. Design criteria

Environmental Aspects	Parameter	Design Criteria
Visual access	The location of the destination or building that is used as the orientation can be seen easily (Wang et al., 2014)	Environmental conditions must prioritize the visibility of the building: • Selection of the suitable vegetation • Controlling the scale of the building with vegetation so that it does not cover the façade • Processing of physical characters is focused on the angle of the visitor's direction of arrival
The degree of architectural differentiation	The character of the building design can be seen in contrast to the surrounding environment (Li & Klippel, 2012)	Buildings should contain easily recognizable and memorable elements: • Individual buildings must be attractive in form • Provide certain symbols or landmarks on the existing condition of the existing building
The use of sign and room numbers	The existence of symbols or graphics can provide additional information regarding the position of the destination location (Calori & Vanden, 2015)	The use of sign features should be able to provide additional information: • Setting uniformity of signs in all parts of the area • Symbols and graphics can be read from a viewing distance that meets standards for motorists and pedestrians • Complete each crossroads with signs with the proper placement
Plan Configuration	The placement of buildings and supporting elements is not confusing (Ahmed et al., 2020)	Each arrangement must consider all aspects holistically: • Zoning according to function and user • Each zone has a main gate so that access enters through the same gate • Provide landmarks that can be used as orientation points within each zone • Integrating paths with applied rules

V. CONCLUSION

Based on the results of an in-depth qualitative and quantitative analysis of the design criteria with the ease of wayfinding on campus, it can be concluded that every aspect of the environment is interrelated. On campus, wayfinding is the process of moving from one point of orientation to another. Design criteria in multi-building and multi-space areas, such as campuses, should emphasize integration between landmarks. Visitors always use buildings or landscapes with certain settings that are perceived as landmarks of an area to be able to move and orientate. The arrangement of buildings or landscapes must have a characteristic or contrast with the surrounding environment. In addition, the position of the building or landscape must be strategic and easy to find. It can be concluded that to become an orientation point or landmark of an area, a building or landscape must have a different character from its surroundings and have high visibility, especially from the point of view of the arrival of visitors. The criteria that have been described can later be used to assist architects and planners in exploring concepts in future campus arrangements.

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