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Wayfinding Concept in University of Brawijaya

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Abstract. Wayfinding is an activity related to the orientation and motion from first point to point of destination. Benefits of wayfinding in the area of education, namely as a means of helping direct a person to a destination so as to reduce the lostness and assist users in remembering the way through the role of space and objects wayfinding. Around 48% new students of University of Brawijaya (UB) 2015 that was ever lost when entering the campus. This shows the need for wayfinding concept to someone who was unfamiliar with the surrounding area as freshmen. This study uses mental map analysis to find the objects hierarchy wayfinding determination based on the respondents and the space syntax (visual graph analysis) as a hierarchy based on the determination of the configuration space. The overlay result say that hierarchy between both of analysis shows there are several objects which are potentially in wayfinding process on the campus of UB. The concept of wayfinding generate different treatment of the selected object based of wayfinding classification, both in maintaining the function of the object in space and develop the potential of the object wayfinding.

1. Introduction
Wayfinding is an activity related to the orientation and movement from one place to another [1]. In Brawijaya University (UB), the increasing number of new students affect campus’ activity movemement such as the addition of infrastructure, widening of road, and new buildings’ construction. This affects difficulty in identifying the space to wayfinding in UB, especially new students who are unfamiliar with their surroundings. Based on the survey, 48% of new students UB 2015 ever lost when entering the university. Difficulties and confusion for new students in finding a destination place in the campus became the main idea in this study. Orientation process and wayfinding related to several factors which are capacity of people, processes and cognitive maps awakened in the mind of the individual, and the role of environmental information, includes architectural wayfinding element, signage system, and other sensory information [2]. Architectural wayfinding elements identified by a) path and circulation; b) landmarks or markers; c) nodes; d) edges; and e) districts or zones [1]. In urban design elements, there is one sign or signage elements of architectural design as a form of information and orientation of the city [3]. Then role of wayfinding support in other sensory information, such as the shape of paving sidewalks, street lights, and vegetation can help users in the process of wayfinding [4].
2. Methodology
This study identifying the object condition as the main wayfinding elements in UB and identify wayfinding objects by the experts and respondents whose based on object from the variable architectural wayfinding elements (path, edge, zone, node, and landmark). Wayfinding also needs supportive wayfinding elements, such as signage and other sensory information. Retrieving the data using mental map analysis to determine the hierarchy of objects by the respondents as well as a questionnaire on the supporting wayfinding elements. The hierarchy of mental map is obtained by comparison scores from the result of questionnaire mental map that consist of criteria from each elements. The hierarchy of space syntax is obtained by comparison between averages of imaginary point score from each objects in wayfinding element. After find the hierarchy from both analysis, then do classification and comparison between the hierarchy of objects by mental map and the spatial configuration hierarchy by space syntax (VGA).

![Methodology Diagram](image)

Figure 1. Line of research methodology

The analysis of mental map and space syntax has a difference in the rank or hierarchy on the object wayfinding. Ranking mental map obtained from sequencing scores from high to low, while for space syntax of sorting the average value of an imaginary point of each object architectural wayfinding. The overlay is used on both analysis to determine the potential objects of the overall objects which are selected by the respondents.

In finding the objects that are potential to be the main wayfinding of Universitas Brawijaya, the priority of potential object selection is conducted first. Object selection priorities for space configuration is fixed and is not affected by external influence. Furthermore, the classification is conducted for sorting the eligible object to be included into the draft, thus the object can be classified as low or high. From the selection of the object, the concept of appropriate treatment toward the objects then can be determined, either by merely maintaining the function of the object or developing the potential objects that have the potential to develop yet still have some obstacles in wayfinding process.
Table 1. Priority of Potential Objects for Main Wayfinding

<table>
<thead>
<tr>
<th>Mental Map</th>
<th>Space Syntax</th>
<th>Information</th>
<th>Priority Objects</th>
<th>Concept</th>
</tr>
</thead>
</table>
| High       | High         | If the opinions of the respondents as high as spatial configuration, then the object can be a potential cause of the object in terms of the spatial structure, which easily identified and supported by a selection of objects based on the opinions of respondents. | High   | • Maintaining the function of the selected object  
|            | Low          | If the configuration space is low, it means the space is less integrated, although there are respondents who chose the object | Medium | • Planning the development of space configuration to improve the visual integration with the object of wayfinding.  
| Low        | High         | If the opinion of the respondents is low, while the space configuration declare that the object has the potential and is easy to be identified, then there is a problem on that object, both in visual obstacles or caused by other factors. | High   | • Strengthen the function of the object as an element designated as the object of wayfinding by arrangement at other sensory information and signage system.  
| Low        | Low          | If the objects are equally low, it means that the object is not worthy of being the main wayfinding and only becomes the object complement. As know from the concept of a point of interest, that in a room does not require that all objects have a high value. | Low    | • No treatment for low priority objects |

The prioritized classification based on criteria are High (mental map) - High (space syntax) and Low (mental map) - High (space syntax) (Tabel 1). The classification object has a different classification in each element based on the average value taken from the analysis (Tabel 2).

Table 2. Classification Objects from Average of Final Score in Analysis

<table>
<thead>
<tr>
<th>Objects</th>
<th>Mental Map</th>
<th>Space Syntax</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Low</td>
<td>High</td>
</tr>
<tr>
<td>Path</td>
<td>0.18-0.99</td>
<td>0.99-2.43</td>
</tr>
<tr>
<td>Edge</td>
<td>0.09-0.78</td>
<td>0.78-1.45</td>
</tr>
<tr>
<td>Zone</td>
<td>1.14-0.37</td>
<td>0.37-1,14</td>
</tr>
<tr>
<td>Node</td>
<td>1.14-0.27</td>
<td>0.27-1.14</td>
</tr>
<tr>
<td>Landmark</td>
<td>0.03-0.22</td>
<td>0.22-0.98</td>
</tr>
</tbody>
</table>

The interval of classification consists of two things which are low and high. If the final score result is over the average value, thus the object is classified into high. This is also applied in low classification too.
3. Result
The result of this study is based on the analysis of space syntax, mental map, and other supporting elements, such as signage system and other sensory information. Result forms this study contains of potential wayfinding objects from each elements to support wayfinding activities for new students in Brawijaya University.

3.1. Space Syntax
Researchers use the application Depthmap 0.30, with a base map of UB in dxf format from AutoCAD in the study of wayfinding concept in UB. Results obtained from the analysis is the distribution of color resulting from an imaginary point that describes the visual gradation integration in UB. The red color means that the high value of visual integration, and lower value for blue in gradation.

![Figure 2. Space Syntax Output (Visual Integration in UB)](image)

3.2. Mental Map
The results of mental map in the form of hierarchy obtained from the questionnaire respondents. The hierarchy result is converted to the map to provide the better visualization based on the users' opinions. The explanation about mental map will be discussed in every elements of wayfinding in UB.

3.2.1. Path. Path is the lane which becomes a potential place to move. It usually takes form as roads, pedestrian pathways, and footpaths [1]. Path is chosen and rated by respondents giving score for each criteria. Overall, respondents give higher scores on each criteria, such as pavement (90%), scale (82%), complementary roads (72%), liaison function with other roads (85%), and historical value (77%).

![Figure 3. (a) Visualitation Paths of Mental Map ; (b) Overlay Path Mental Map and Space Syntax](image)
Before using the analysis, the element of path has 28 objects obtained from the experts and respondents. After the overlay, path has 15 objects that is potential to become wayfinding objects. The treatment for path elements has 5 objects that only need to be maintained or strengthened, such as Path 4, 10, 11, 12, and 13, and 10 other objects that have the potential to be developed into main wayfinding, such as the Path 1, 5, 6, 8, 9, 14, 15, 16, 17, and 24.

3.2.2. Edge. Edge is linear element that are not used as a movement path, but it has a function as a barrier between the two adjacent areas [1]. Edge that are selected and rated by the respondents are given levels to determine the ranking of the most chosen and influential objects in wayfinding process. The results shows that respondents give a high score on each criteria such as scale (86%), ease viewed edge (87%), barrier function (85%), the type of construction used (86%), and historical value (73%) of total score per criteria.

![Image](image-url)

**Figure 4.** (a) Visualitation Edge of Mental Map; (b) Overlay Edge Mental Map and Space Syntax

The survey shows that there are 7 objects that can be considered as the wayfinding elements. After the overlay process, there are only 2 edges that become the potential object and considered as main wayfinding. The treatment for that edges need to be maintained or strengthened as wayfinding objects in UB space, such as Edge 1 and Edge 2.

3.2.3. Zone. Zone or district is part of a region that is characterized by a specific character and functions so that people can identify and classify different area to another, from the characters and their use, as well as the shapes and materials used [1]. Zone has five criteria used to measure the impact of an object against wayfinding respondents. The percentage of high ratings on those criteria, such as easy to be seen zone (98%), shape (93%), scale (93%), the historical value (84%), and has a special function (93%).
Zone element has 14 objects obtained from the experts and respondents. After the overlay, zone has 7 objects that is potential to become wayfinding objects. The treatment for zone elements has 4 objects that need to be maintained or strengthened, such as Zone 4, 5, 6, and 7, and 3 other objects that have the potential to be developed into main wayfinding, the Zone 10, 11, and 14.

3.2.4. **Node.** Node represents strategic points that can be entered by the observer at the center of activity, such as parks, squares, courts, and others. Node also a meeting point of path, such as intersection or transportation center [1]. The high percentage given by respondents on each criteria are unique shape (93%), worth a look (89%), scale (87%), has a special function (90%), and historical value (83%).

Node element has 20 objects obtained from the experts and respondents. After the overlay, node has 12 objects that is potential to become wayfinding objects. The treatment for node elements has 3 objects that need to be maintained or strengthened, such as Node 6, 10, and 13, and 9 other objects that have the potential to be developed into main wayfinding, the Node 1, 2, 5, 7, 8, 14, 15, 18 and 19.

3.2.5. **Landmark.** Landmark can be mentioned as a physical marker that can be easily seen from several angles and distances, such as buildings, direction, gate, field, and others [1]. The high percentage given by respondents on each criteria are unique shape (95%), scale (94%), ease of visits (94%), as a liaison with surrounding objects (92%), and historical value (84%).
Figure 7. (a) Visualitation Landmark of Mental Map; (b) Overlay Landmark Mental Map and Space Syntax

The survey shows that there are 23 landmark objects that can be considered as the wayfinding objects. After the overlay process, there are 12 objects that become the potential object and considered as the wayfinding. The treatment for landmark elements has 6 objects that need to be maintained or strengthened, such as Landmark 4, 5, 6, 7, 8, and 9, and 6 other objects that have the potential to be developed into main wayfinding, the Landmark 2, 17, 18, 19, 20 and 23.

3.3. Other Sensory Information

Other sensory information is used as a supporting element of wayfinding campus, including paving of sidewalks, street lights, and vegetation. Other sensory objects located near the wayfinding objects and support new student in wayfinding process.

3.3.1. Paving (Sidewalk). Based on a primary survey results, paving on the sidewalk in UB has eight different types of surfaces. It can affect pedestrian’s memory about the uniqueness of pavement furniture’s visualization. The results of the questionnaire shows that 48 respondents said that the paving is affects someone’s wayfinding while 153 respondents said not affected.

Figure 8. Diagram Percentage Type of Paving Based On Respondents Choices

3.3.2. Street Lights. The street lights in UB majority are classified into two types which are type A and type B. Street lights is one of street furniture that can be the object that affect the process of wayfinding, especially in the dark situation. In addition to the aesthetic, street lights which follows the contours of the road, can direct people in the night so it can minimize the level of getting lost in campus. Based on the results of the questionnaire, 32 out of 201 respondents said that the street lights affect someone’s wayfinding in campus.
3.3.3. Vegetation. Vegetation has several functions as aesthetics, land cover (ground cover), shade, steering, and the barrier (physical barrier). These function strengthen the objects’ mental image into the influential object in wayfinding system. Based on the result of the questionnaire, 60 respondents stated that vegetation influences the wayfinding system while 141 stated it is not influenced.

3.4. Signage System
Signage referred in this study is the signage used as a direction and delivers information about the objects in UB. Based on the survey result, there are 10 spots of signage that scattered in the various intersections.

References


