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MORPHOLOGICAL PATTERNS BASED ON SPACE SYNTAX THEORY IN SMALL TYPE HOUSING IN MALANG CITY

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Abstract.

This study examines the morphological pattern of small houses in Malang City using the space syntax method. The analysis was conducted to understand the impact of spatial structure on the social interactions and mobility of residents. Data was obtained through field observations and mapping, which were then analyzed to determine the relationship between the spatial configuration and daily activity patterns. The results show that the morphological pattern of housing designed according to the principles of space syntax can enhance social connectivity and accessibility between spaces, which has implications for the quality of life of residents. This finding is expected to serve as a reference for improved housing planning and development in urban areas. This study aims to analyze the morphological pattern of small houses based on the Space Syntax theory in Malang City. Primary data are collected through field surveys and direct measurements, while secondary data are obtained from relevant agencies. The results of the study show that there is a certain pattern in the structure of the housing space of small houses that have an impact on the connectivity and accessibility between the inside of the house and between houses in the surrounding environment, this shows that the morphological pattern of housing designed by considering the principle of space syntax can improve social connectivity and accessibility between spaces, which has implications for the quality of life of residents. This finding is expected to serve as a reference for improved housing planning and development in urban areas.

Keywords: Morphological, Small Type, Space Syntax

1. Introduction

The morphological pattern of small-type housing in Malang City can be analyzed through the lens of Spatial Syntax Theory, which emphasizes the relationship between spatial configuration and social dynamics. This approach reveals how urban design affects the overall accessibility, connectivity, and functionality of a residential area. Housing and settlements are one of the basic human needs, which also have a very strategic role as a center for family education, cultural seedbeds, and quality improvement for future generations, as well as an embodiment of identity. Housing and settlement problems cannot be viewed as purely functional and physical issues, but are more complex, encompassing the dimensions of community life, which include social, economic, cultural, technological, and ecological aspects, as well as political considerations. The differences in viewpoints that exist are not to be opposed, but rather as an effort to enrich the review, allowing us to examine housing and settlement issues more holistically. Awareness of diversity is important because it can lead to alternative implementation strategies in the housing and settlement sector, enabling the achievement of the desired Vision. (Iwan Suprijanto, 2004)



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Morphological Patterns in Malang

- Structural Aspects: The study in Klojen identifies urban morphology through image-land relationships, connecting spaces, and their visual characteristics, which make up urban landscapes (Tallo A et al., 2014).
- Accessibility and Integration: Research shows that road configurations significantly affect accessibility in settlements, with well-integrated roads promoting social activities and community engagement (Yudhanta & Prayitno, 2011)
- Informal settlements: In informal areas, low integration values correlate with limited accessibility, impacting the quality of life and safety of residents. (Kustianingsrum & Haerdy, 2023)

Space in a settlement can be identified as a forum for the activities of the people who live in it. In the theory of space syntax, (Brown, 1997) states that space can be formed due to human activities, and vice versa, human activities can form a space, so Hillier identifies the relationship between space and its users. In addition, this theory suggests that space is formed through the relationship between other spaces surrounding it. The development of space syntax theory is currently used for various spatial and environmental planning needs that are reviewed from several aspects, such as social patterns (Nurhalimah & Astuti, 2020; van Nes, 2021; Handayani, 2021; Ding et al., 2022; Science, n.d.), environmental health (Ramelan, Agus, Usup, Anggraeni, Novia, 2015; Alnusairat et al., 2022; Wang et al., 2022), building scale configuration and transformation (Putra, 2021), environmental safety (Çamur et al., 2017), and environmental safety (Tsai & Chang, 2023).

Space syntax theory is employed to analyze the social significance of spatial configurations. The configuration of the space in question is the relationship between space and spaces to form a system. In this case, space is likened to a street or open space, which is the emptiness of the house buildings that make up the residential environment. One approach that can interpret the configuration form of a space is the integration value approach, which shows the value of accessibility (Dettlaff, n.d.). This enables designers to estimate the movement of residents and predict the presence of humans in the settlement system. (Kustianingsrum & Haerdy, 2023)

2. Method

This study uses a quantitative method by conducting a survey on several small types of housing in the city of Malang with the intention of analyzing based on the characteristics of activities in the space that affect the physical factors of a city as a place to carry out activities, and the physical forms of the environment caused by non-physical factors from the formation of a city morphology. This analysis is conducted to produce a proposal for a morphological pattern of the city, as observed physically. To determine the output, several analyses are required, including the examination of the ground, linkage, and place figures. From these three analyses, it is possible to identify and recognize the morphological pattern of the city of Malang, as seen in the elements that form the city's morphology.

2.1 Data Collection

Research data was collected through literature reviews from a variety of academic sources, including reputable scientific journals, architecture textbooks, and relevant documents on traditional and sustainable architecture. These sources are obtained through academic databases,



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including Scopus, Google Scholar, and Scispace. Data collection was conducted by requesting information on housing locations in the Housing Sector at the Public Works, Spatial Planning, Housing, and Residential Areas Office of Malang City.

2.1.1 Data Analysis

To support the Space syntax analysis process, several data collection methods are required to create a base map and supporting data for the map. For this reason, data collection is carried out, which includes interviews, documentation, and observations, to meet the need for data on the structure and identification of regional morphology, in order to create a basic map. In the field identification process, the morphology of the city was redrafted, comprising road network layers, pot patterns, buildings, and open spaces. The identification process is carried out by field observation, taking photos, and recording. The Google Earth Pro and Google Street View apps help validate the map's accuracy in real-time. The final data of the identification process is in the form of a map.

2.1.2 Data Processing

The analysis uses the Space syntax connectivity method, which is a dimension that measures local properties by calculating the number of spaces that are directly connected to each other in a space configuration (Brown, 1997). It is called a local property because information regarding spatial relationships can be directly observed from the observation space, while the non-observable spaces of the observation space will not be taken into account. The number of connected spaces is calculated using the concept of depth, a measure of distance. Thus, it is said to be directly connected if it has a distance of only 1 step or a depth of 1 step. Connectivity measurements are conducted to determine the level of interaction between each space and its surrounding spaces. The primary use of the connectivity value is to measure the level of intelligibility by correlating it with the integration value. The calculation of the connectivity value for each space involves adding up all the spaces that are directly connected to the observation space.

2.1.3 Presentation of Results

In analyzing residential morphological patterns, spatial syntax analysis, incorporating connectivity and integration measurements, will be particularly helpful in urban spaces. In the process, DepthmapX software, an open-source application developed by University College London, is used. This application works with a vertex system that includes dots, lines, and 2-dimensional images.

3. Results and Discussion

By using Space syntax analysis, data containing a basic map of the existing space configuration will be obtained. This map should include all important elements, such as roads, buildings, and open spaces, and identify the connectivity and integration of each space in the map. Connectivity measures how well spaces connect to each other, while integration indicates how easily different parts of a dwelling can be accessed.

3.1.1 Space syntax analysis



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This analysis was carried out using the main parameters of Space Syntax:

- Connectivity: Count the number of roads connected to each point on the map
- Integration: Measure how integrated a space is with other spatial networks
- Intelligibility: Evaluate the extent to which occupants can understand the configuration of the space

This analysis will help identify areas that may be isolated or less connected, which can affect social interactions.

3.1.2 Identify Problems and Opportunities

Based on the analysis results, identify the configuration issues in the space that may hinder social interaction. For example, areas that are less connected or difficult to access are targeted, and it is hoped that this study will identify opportunities to improve connectivity and integration, such as adding walkways or public open spaces.

Based on the analysis's findings, redesign the space configuration to enhance the quality of life for residents. Consider elements such as:

- Addition of a pedestrian path connecting important areas
- Provision of open spaces that can be used for social activities
- Building design that supports interaction between residents

4. Conclusion

The application of Space Syntax theory in the morphological analysis of small-type housing in Malang City provides important insights into how space design can affect the social life of residents. This study recommends the development of urban planning policies that consider connectivity and spatial integration to enhance the quality of life for residents and strengthen social interaction within residential environments. With this approach, housing can be designed to better support social interaction and improve the quality of life of its residents. Therefore, it is essential for urban planners and housing developers to incorporate Space Syntax principles into the design of housing in the near future.

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