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Proposing a Land Suitability Analysis Method for Green Open Space in Nusantara Capital City

Tinjauan Metode Analisis Kesesuaian Lahan Terhadap Ruang Terbuka Hijau di Ibu Kota Nusantara

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Abstract

Green open spaces are regarded as infrastructures that have a major positive impact on urban residents' quality of life and the sustainability of urban growth. Green open spaces play an important role in Nusantara Capital City with the theme of forest city. Examining any techniques employed in earlier research is crucial to determining the accurate location. Understanding the different approaches should enable one to suggest ways for further research in land suitability for green open spaces. The literature review of international papers relevant from 2016 to 2023 as the method. In line with previous research, the study's findings show that the analytical hierarchy process is the most popular method employed for land suitability analysis for green open space in Nusantara Capital City. The evaluation criteria that suit Nusantara Capital City are elevation, slope, land use land cover, accessibility, water bodies, and population. The analytical hierarchy process can help further research in land suitability analysis for green open space in Nusantara Capital City.

Keywords: land suitability, green open space, analytical hierarchy process, Nusantara Capital City.

***SDGs*:**

Abstrak

Ruang terbuka hijau dianggap sebagai infrastruktur yang memberikan dampak positif besar terhadap kualitas hidup penduduk perkotaan dan keberlanjutan pertumbuhan perkotaan. Ruang terbuka hijau memegang peranan penting di Ibu Kota Nusantara yang bertemakan kota hutan. Mempelajari metode yang digunakan dalam penelitian sebelumnya sangat penting untuk menentukan lokasi yang akurat. Memahami berbagai jenis metode yang berbeda sangat penting bagi penelitian lebih lanjut mengenai kesesuaian lahan pada ruang terbuka hijau. Penelitian ini menggunakan metode studi literatur dari makalah internasional yang relevan dari tahun 2016 hingga 2023. Sejalan dengan penelitian sebelumnya, temuan studi ini menunjukkan bahwa proses hierarki analitis merupakan metode yang paling populer digunakan untuk analisis kesesuaian lahan pada ruang terbuka hijau di Ibu Kota Nusantara. Kriteria evaluasi yang sesuai dengan Ibu Kota Nusantara adalah elevasi, kemiringan lereng, tutupan lahan dan penggunaan lahan, aksesibilitas, badan air, dan populasi. Proses hierarki analitis dapat membantu penelitian lebih lanjut dalam analisis kesesuaian lahan untuk ruang terbuka hijau di Ibu Kota Nusantara

Kata Kunci: kesesuaian lahan, ruang terbuka hijau, analytical hierachy process, Ibu Kota Nusantara.

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1. INTRODUCTION

Pressure on the urban ecological environment is increasing as a result of rapid urbanization in cities, which contributes to the biodiversity preservation and life quality in urban areas (Ustaoglu and Aydınoglu, 2019). This is due to the fact that green open spaces (GOS) are a crucial and essential component of the urban ecology. In general, GOS contribute to the urban environment quality by influencing temperature and microclimate (Moisa *et al.*, 2023), absorbing carbon dioxide (F.N. *et al.*, 2016), reducing air and noise pollution (Al-Ghorayeb *et al.*, 2023), serving as water catchment areas (Anteneh *et al.*, 2023), maintaining biodiversity (Waheeb *et al.*, 2023), and providing recreational and social value (Gelan, 2021). GOS development is becoming a crucial component of city planning and urban policy (Sharma *et al.*, 2022). Therefore, identifying suitable locations for GOS development is an important role in supporting urban planning and policy that aim to improve the ecological environment.

In the context of Indonesia, which is an archipelago with diverse environmental challenges, GOS has great potential to make a positive contribution to sustainable development (Bakri *et al.*, 2023). Indonesia is currently facing the challenge of moving the country's capital city from the previous one in DKI Jakarta, to Nusantara Capital City. Nusantara Capital City is a city built from scratch in the Penajam Paser Utara Regency area, East Kalimantan. Nusantara Capital City carries the theme "Forest City" as a city with a forest concept that is smart (Pokhrel, 2019), resilience (Apud *et al.*, 2020), and sustainability (Morales and de Vries, 2021).

The development of Nusantara, Indonesia's new capital, poses significant environmental challenges that must be addressed for sustainable urban growth. One primary concern is the potential degradation of Kalimantan's ecosystems, a region renowned for its biodiversity and dense forests. Urban development may lead to deforestation and habitat loss, threatening endemic species. This deforestation also risks increasing carbon emissions and reducing the region's capacity for carbon sequestration, compounding global climate challenges (Li, Fan and Shen, 2018). These challenges necessitate resilient infrastructure and effective land management to mitigate the adverse impact.

There has been quite a lot of research and publications on the analysis of land suitability of GOS and most of them are related to the case that have been built. No land suitability analysis has been found, especially for GOS Nusantara Capital City. Based on the significant role of GOS in Nusantara Capital City, it is important to conduct research on land suitability analysis. This research focuses on mapping the methods to be used for assessing the land suitability, with a focus on GOS in Nusantara Capital City.

2. METHODOLOGY

2.1. Research Method

The purpose of this study is to determine the methodologies employed in the investigation of land suitability for GOS with literature review method. Various sources are available about the analysis of land suitability for GOS, included credible journal papers to guarantee the literature examined in this study meets academic standards. There are twenty papers in this literature review, spanning the years 2016 to 2023.

2.2. Land Suitability Analysis

The analysis of land suitability determines the level of the land's potential value for development by considering its attributes and requirements (Ustaoglu and Aydınoglu, 2019). The purpose of the land suitability analysis is to determine the suitability and potential capability for various goals. After that, the land use suitability investigation evaluates the land's suitability for a specific puprose (forest, industrial, agricultural, etc.); more significantly, though, it establishes the degree of suitability at which decisions can be made (Morales and de Vries, 2021). Based on its capabilities, it offers the essential information regarding various restrictions and potential prospects for the land use under observation. Land suitability research is, from a technical and quantitative perspective, a decision-making problem with multiple

components that gauge the relative significance of the criteria to be applied in the analysis (Osseni *et al.*, 2023).

2.3. Methods of Previous Research

There are two basic categories into which research methodologies can be divided: qualitative and quantitative. When applied to the study of populations or samples, the quantitative method can be understood as a positivist-based research technique. To test the established hypotheses, sampling procedures are typically utilized in a random manner. Research tools are used for data collection, and quantitative or statistical data analysis is performed (Sugiyono, 2008). A qualitative research method places emphasis on the importance of having a thorough grasp of a problem. As a result of its belief that each problem would have unique characteristics, the qualitative approach favours the employment of in-depth analysis tools in the examination of the situations (Sugiyono, 2008). Some of the methods employed in earlier studies on the land suitability analysis for GOS are listed below.

1). The Analytical Hierarchy Process (AHP) method was developed by Saaty (Saaty, 1987) and is extensively used in many relevant scientific domains (Pramanik, 2016). The AHP is frequently employed, among other purposes, in the evaluation of land suitability for upcoming urban land development (Nor and Abdullah, 2019; Morales and de Vries, 2021; Sharma *et al.*, 2022).
The method produces a weighted matrix where each criterion's significance is ranked. In land suitability analysis, these weights are integrated with GIS data layers, allowing researchers to create spatially explicit maps that reflect prioritized factors. AHP is particularly useful for integrating expert knowledge and addressing multi-dimensional land use problems. AHP facilitates decision-making on multi-criteria problems, which will subsequently be applied to analyse land suitability for GOS (Al-Ghorayeb *et al.*, 2023).

2). The foundation of Fuzzy-AHP is a sequence of pairwise comparisons displaying the relative preferences among pairs of criteria inside the same hierarchy (Ustaoglu and Aydınoglu, 2019). The Fuzzy set theory was first presented by Zadeh in 1965 and has since been extensively used in a wide range of scientific fields, including science, engineering, social science, agriculture, and medicine. Fuzzy-AHP handles uncertainties in land suitability criteria. Decision-makers provide their preferences in the form of linguistic terms (e.g., "moderately important," "very important"), which are then converted into fuzzy numbers, allowing for a more flexible representation of uncertainty.
The method involves constructing pairwise comparison matrices where the elements are expressed as fuzzy numbers. These matrices are then synthesized to derive priority weights for the criteria, reflecting their relative importance in the context of land suitability analysis. By accommodating imprecision in the evaluation process, Fuzzy AHP enhances decision-making robustness, making it particularly useful in complex scenarios where multiple conflicting criteria need to be balanced, such as in land use planning or environmental assessments (Ustaoglu and Aydınoglu, 2019).

3). The AHP-Map Overlay (MOV) is the method of combining data from multiple levels. Two digital maps are pasted together with their attributes, combining attribute data from both maps to create a composite map (Bakri *et al.*, 2023). The weights are derived from pairwise comparisons, allowing for a nuanced understanding of the criteria's influence on the decision-making process.
The AHP weights are then integrated into the map overlay process, where each layer is analyzed and combined using weighted overlay techniques. This results in a composite suitability map that visually represents the relative suitability of different areas for specific land uses. AHP-MOV effectively bridges quantitative decision-making with spatial analysis, making it a powerful tool for planners and researchers in fields like urban development, agriculture, and environmental management, as it allows for clear

visualization and prioritization of land suitability based on multiple criteria.

4). The Multi-Criteria Approach (MCA) is recognized by Bryne & Sipe (Byrne, Sipe and Searle, 2010), by pointing out that GOS can be grouped based on multiple factors, including size, location, and user behaviour (Nor and Abdullah, 2019). MCDA is a decision-making method that evaluates land suitability by integrating various criteria, such as environmental, social, and economic factors. It assigns weights to each criterion to reflect its importance, typically using techniques like the Analytical Hierarchy Process (AHP). The final evaluation combines weighted criteria using GIS tools, producing a composite land suitability map. This method is versatile and well-suited for complex scenarios where multiple conflicting objectives must be considered.

5). Green Infrastructure Suitability Model (GISM) is predicated on a land suitability analysis, which centers on the process of identifying the best and worst places to locate a given purpose, like future land use (Apud *et al.*, 2020). In developing a GISM, researchers often consider multiple criteria, such as soil type, topography, land use, hydrology, and proximity to existing green spaces or infrastructure. These factors are assessed using Geographic Information Systems (GIS) to create suitability maps that visually represent areas where green infrastructure can be most effectively implemented.
By integrating ecological data with urban planning processes, the GISM promotes sustainable land use practices, enhances urban resilience, and supports climate adaptation efforts. Ultimately, the model aids decision-makers in optimizing land management and resource allocation for green infrastructure projects, contributing to improved environmental quality and community well-being.

6). Urban Green Space Suitability (UGSS) demonstrates the possibility of converting land into Green open space. It can offer an optimization reference base of GOS layout (Yan and Wang, 2023). In conducting a UGSS analysis, researchers and urban planners consider multiple criteria, including demographic factors (e.g., population density and accessibility), environmental conditions (e.g., soil quality, existing vegetation, and hydrology), and socio-economic factors (e.g., proximity to residential areas and community needs).
The resulting suitability maps help guide urban planning and decision-making processes by highlighting areas that would benefit most from green space interventions.

7). The AHP-CV (Coefficient of Variation) combined weight approach, which is based on the minimal information entropy principle, combines the benefits of the CV and AHP approaches to maintain an appropriate ratio of objectivity and subjectivity (Li, Fan and Shen, 2018). The dispersion of a probability or frequency distribution can be measured statistically using the coefficient of variation (CV).
In the AHP-CV approach, decision-makers first establish a hierarchy of criteria and sub-criteria relevant to the evaluation problem. They then perform pairwise comparisons, assigning scores to reflect the relative importance of each criterion. After calculating the weights using the AHP method, the CV is computed for each criterion's scores to evaluate their variability. This step allows decision-makers to identify which criteria have a higher degree of uncertainty or inconsistency in judgments.

3. RESULTS AND DISCUSSION

3.1. Result

Based on literature reviews, the land suitability of GOS can be analysed using a variety of research methods, which are categorized as either qualitative or quantitative data, specifically primary and secondary data. The primary involves gathering subjective judgments from decision-makers through structured methodologies such as surveys, interviews, or workshops (Ustaoglu, 2022). Secondary data encompasses information that has been previously

gathered, analyzed, and published by various entities, including scholarly research, governmental publications, academic journals, and accessible public databases (Morales and de Vries, 2021). This type of data provides valuable insights by leveraging existing knowledge and findings from earlier studies.

Based on the approach and kind of data, the many techniques employed in earlier research are listed below. Table 1 illustrates the usage of Y (Yes) to indicate utilizing the right technique or kind of data and N (No) to indicate using the incorrect method or kind of data.

Table 1. Theoretical mapping and literature review of previous research.

No.	Land Suitability for Green Open Space	Types of Method and Data				Methods	Location
		Quantitative	Qualitative	Primary Data	Secondary Data		
(1)	(Ustaoglu and Aydınoglu, 2019)	Y	N	Y	N	AHP and Fuzzy-AHP Comparison	Turkey
(2)	(Moisa *et al.*, 2023)	Y	N	Y	N	AHP	Ethiopia
(3)	(F.N. *et al.*, 2016)	Y	N	Y	N	AHP	Malaysia
(4)	(Al-Ghorayeb *et al.*, 2023)	Y	N	Y	N	AHP	Lebanon
(5)	(Anteneh *et al.*, 2023)	Y	N	Y	N	AHP	Ethiopia
(6)	(Waheeb *et al.*, 2023)	Y	N	Y	N	AHP	Saudi Arabia
(7)	(Gelan, 2021)	Y	N	Y	N	AHP	Ethiopia
(8)	(Sharma *et al.*, 2022)	Y	N	Y	N	AHP	India
(9)	(Bakri *et al.*, 2023)	Y	N	Y	N	AHP-MOV	Indonesia
(10)	(Pokhrel, 2019)	Y	N	Y	N	AHP	Nepal
(11)	(Apud *et al.*, 2020)	Y	N	Y	N	GISM	Uruguay
(12)	(Morales and de Vries, 2021)	Y	N	N	Y	AHP	-
(13)	(Nor and Abdullah, 2019)	Y	N	Y	N	MDCA	Malaysia
(14)	(Osseni *et al.*, 2023)	Y	N	Y	N	AHP	Nigeria
(15)	(Hailemariam, 2021)	Y	N	Y	N	AHP	Ethiopia
(16)	(Linh *et al.*, 2022)	Y	N	Y	N	AHP	Vietnam
(17)	(Yan and Wang, 2023)	Y	N	Y	N	UGSS	China
(18)	(Pramanik, 2016)	Y	N	Y	N	AHP	India
(19)	(Li, Fan and Shen, 2018)	Y	N	Y	N	AHP-CV	China
(20)	(Ustaoglu, 2022)	Y	N	Y	N	AHP	Turkey

Various methods have been used to analyse the suitability of land for GOS. One such method is the application of the Analytic Hierarchy Process (AHP) method, which has been shown in the research conducted by researcher number (2), (3), (4), (5), (6), (7), (8), (10), (12), (14), (15), (16), (18), and (20). The other researcher number (9) is using using method AHP-Map Overlay (MOV). Multi-Decision Criteria Approach (MDCA) by researcher number (13), Green Infrastructure Suitability Model (GISM) by researcher number (11). The AHP-Coefficient of Variation (CV) by researcher number (19), and Urban Green Space Suitability (UGSS) by researcher number (17). The comparison method of AHP and Fuzzy-AHP are conducted by researcher number (1).

3.2. Discussion

Table 1 displays a review of prior research for theoretical mapping. Table 1 illustrates that there are two methods of gathering data depending on the kind of data, specifically primary and secondary data. Secondary data is information that is gathered indirectly from sources like

books, journals, and media, whereas primary data is information that is directly gathered from research objects like interviews, experiments, questionnaires, and surveys. There are two categories of analytical techniques employed in earlier research journals, namely qualitative and quantitative. Using statistics and data analysis software, the quantitative analysis measures the numerous variables and determines their causal relationship. Qualitative analytical approaches stress mechanisms and interpretations that are not strictly evaluated or quantified. They also highlight the socially constructed nature of reality, the intimate connection between the researcher's subject matter, and the emergence and meaning making of social experiences. Figure 1 displays the position diagram for every study found in the literature. The picture illustrates that the quantitative approach with the main data type, which uses data taken straight from the research object under study, is the most often employed analytical technique.

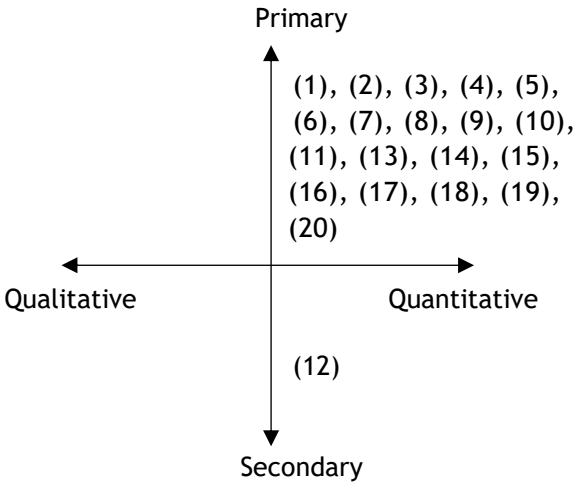

Figure 1. Schematic diagram.

Each method has its unique features, strengths, and limitations, making it essential to understand their suitability for specific applications. Below is a detailed breakdown of the advantages and disadvantages of each method to guide their application effectively:

1). AHP

AHP is a widely recognized decision-making tool that simplifies complex problems by breaking them into a hierarchy of criteria, sub-criteria, and alternatives. Its structured approach allows decision-makers to systematically evaluate and prioritize criteria through pairwise comparisons, resulting in weighted scores that guide the final decision. AHP is flexible, easy to understand, and effective in incorporating expert opinions, making it suitable for a wide range of applications, from land suitability analysis to project planning.

The primary limitation of AHP lies in its reliance on subjective judgments, which can introduce bias, especially if the participants are not well-informed. Additionally, as the number of criteria and alternatives increases, the pairwise comparison process becomes tedious and time-consuming. Consistency in judgments can also be a challenge, as discrepancies may arise in complex or multi-criteria scenarios.

2). AHP-MOV

AHP-MOV combines the decision-making strengths of AHP with the spatial analysis capabilities of GIS, making it highly effective for location-based problems such as land suitability, urban planning, and resource allocation (Bakri *et al.*, 2023). By integrating weighted criteria into spatial overlays, this method provides a clear, visual representation of results, enabling decision-makers to identify optimal areas for development or conservation. The integration of AHP ensures a structured, priority-based evaluation of criteria, enhancing transparency and decision-making quality.

The method's reliance on high-quality spatial data can be a limitation, as inaccuracies in input layers may compromise the results. Additionally, the process can become computationally intensive, particularly when working with large datasets or numerous criteria. Implementing AHP-MOV also requires proficiency in GIS tools, which may pose a challenge for organizations without technical expertise.

3). MDCA

MCDA provides a flexible framework for evaluating complex problems involving multiple conflicting criteria

(Nor and Abdullah, 2019). It is adaptable to various contexts, whether qualitative or quantitative, and allows for the integration of expert opinions and stakeholder preferences. By assigning weights to criteria, MCDA enables decision-makers to prioritize objectives, making it particularly useful for balancing environmental, social, and economic factors. The use of techniques like weighted overlays in GIS further enhances its applicability to spatial planning and land use analysis.

MCDA heavily depends on the accuracy and relevance of the selected criteria and the assigned weights, which are often subjective and prone to bias. The process can also become computationally intensive when dealing with many criteria or alternatives. Moreover, it requires a clear understanding of the decision-making context to avoid inconsistencies in prioritization, making it less effective without careful stakeholder engagement or expert input.

4). GISM

The GISM is a targeted approach for promoting sustainable urban development by identifying areas suitable for green infrastructure (GI) (Apud *et al.*, 2020). It supports ecosystem-based solutions, such as stormwater management, biodiversity enhancement, and climate adaptation. The model's integration of ecological, social, and spatial criteria ensures a comprehensive evaluation, while GIS tools enable clear visualization of priority areas. GISM is particularly valuable in urban planning and environmental conservation, fostering resilience against urban challenges like flooding and heat islands.

GISM's effectiveness is contingent on the availability of high-quality spatial and ecological data. Limited access to such data can compromise the accuracy of the results. The model also requires significant expertise in GIS and environmental sciences, which may pose challenges for non-specialists. Additionally, GISM often involves integrating diverse datasets and criteria, which can make the process time-consuming and resource intensive.

5). Fuzzy-AHP

Fuzzy-AHP enhances traditional AHP by incorporating fuzzy logic, which accommodates the uncertainty and vagueness inherent in human judgment (Ustaoglu and Aydınoglu, 2019). By allowing decision-makers to use linguistic terms (e.g., "moderately important" or "very important") that are converted into fuzzy numbers, Fuzzy-AHP reduces the rigidity of precise numeric inputs. This makes it particularly useful in real-world scenarios where criteria are difficult to quantify, such as environmental assessments or subjective preferences. It also improves the robustness and accuracy of the results by addressing ambiguity.

While Fuzzy-AHP adds flexibility, it is computationally more complex and may require advanced knowledge of fuzzy logic principles, which could limit its accessibility for non-experts. Moreover, the process of defining membership functions and aggregating fuzzy comparisons can be subjective, potentially affecting the reliability of the outcomes. This complexity might make it less appealing for projects with limited resources or tight timelines.

6). UGSS

UGSS focuses specifically on optimizing the placement and enhancement of green spaces in urban environments, aligning with sustainability and public well-being goals (Yan and Wang, 2023). By considering accessibility, demographic needs, and environmental factors, UGSS helps ensure equitable distribution of green spaces, fostering social inclusion and environmental justice. GIS-based suitability mapping provides a clear visual tool for planners, making UGSS an effective strategy for improving urban livability, biodiversity, and climate resilience.

The success of UGSS depends on the comprehensiveness of its input data, including demographic, environmental, and urban infrastructure layers. Data

inaccuracies or omissions can lead to suboptimal planning outcomes. Moreover, while UGSS can identify suitable locations, it does not inherently address challenges like land acquisition, funding, or competing land use demands. Similar to GISM, the method also requires technical expertise in GIS and urban planning, which can limit its accessibility for smaller municipalities or under-resourced teams.

7). AHP-CV

AHP-CV incorporates the coefficient of variance (CV) to evaluate the reliability and consistency of criteria weights in the AHP framework. This helps identify and address variability in judgments, ensuring that the final decision is based on consistent and dependable evaluations (Li, Fan and Shen, 2018). The method adds an extra layer of statistical rigor, making it particularly valuable in scenarios where diverse opinions or conflicting priorities are present. It enhances the robustness and credibility of the decision-making process.

The integration of CV adds a statistical dimension that may require additional expertise and effort to implement, especially for participants unfamiliar with variance analysis. Furthermore, while AHP-CV improves reliability, it does not address inherent subjectivity in the initial pairwise comparisons, meaning biases can still affect the results. Its complexity may also make it less practical for simpler decision-making contexts or projects with limited resources.

AHP is particularly well-suited for land suitability analysis in Nusantara Capital City due to its ability to systematically handle complex, multi-criteria decision-making scenarios, which are inherent in developing a new capital city. Nusantara's land suitability evaluation involves balancing diverse factors such as environmental sustainability, infrastructure requirements, urban livability, and socio-economic considerations. AHP's hierarchical structure allows these criteria to be organized, evaluated, and prioritized effectively, ensuring that all relevant aspects are considered in the decision-making process.

Additionally, AHP integrates expert knowledge, making it ideal for a project like Nusantara Capital City, where insights from diverse stakeholders—urban planners, environmentalists, and policymakers—are crucial. Its compatibility with GIS further enhances its utility by enabling spatial visualization of suitability, helping to identify optimal locations for green open spaces, infrastructure, and other key components of the city's development. Compared to other methods, AHP provides a balance of simplicity, flexibility, and rigor, making it a practical and robust choice for addressing the multifaceted challenges of building a sustainable and resilient capital city.

Table 2 shown the results from the comparison of previous studies that used AHP as the method, highlight the wide range of criteria employed in green open space suitability analysis, reflecting the diverse spatial, environmental, and socio-economic considerations across different regions. Among the criteria used, several themes emerge consistently across studies, including slope, elevation, land use and land cover (LULC), and proximity to roads. These factors are integral to urban planning as they influence accessibility, safety, and environmental sustainability.

For example, slope and elevation are critical geophysical attributes that directly affect land stability, drainage potential, and the feasibility of green space development (Ustaoglu, 2022; Moisa *et al.*, 2023; Yan and Wang, 2023). These criteria demonstrating their universal importance in suitability analysis. Similarly, land use and land cover was a prevalent criterion (Li, Fan and Shen, 2018; Gelan, 2021; Hailemariam, 2021), emphasizing the necessity of understanding existing land conditions to ensure compatibility with proposed green spaces.

Accessibility factors, such as proximity to roads, featured prominently in studies (Linh *et al.*, 2022; Anteneh *et al.*, 2023; Waheeb *et al.*, 2023). This criterion is essential for ensuring that green spaces are easily reachable for diverse user groups, including urban populations with limited mobility.

The most employed criteria, including slope, elevation, and LULC, offer a solid foundation for future research on green open space suitability in

Table 2. The evaluation criteria of previous research with AHP.

Researcher	Criteria
(Moisa *et al.*, 2023)	Population Density; Normalized Difference Vegetation Indeks (NDVI); Road; Land Use Land Cover; Slope; Elevation; River; Soil Types.
(F.N. *et al.*, 2016)	Size; Slope; Distance from Road.
(Al-Ghorayeb *et al.*, 2023)	Elevation; Slope; Distance from Urban Agglomeration; Distance from Industrial and Commercial Areas; Distance from Major Roads; Land Cover.
(Anteneh *et al.*, 2023)	Slope; Elevation; Proximity to Road/ Road Type; Proximity to Religius Institutions; Existing Land Use; Proximity to Market Place; NDVI; Proximity to Settlement; Flood Susceptibility.
(Waheeb *et al.*, 2023)	Topographic Position Indeks; Slope; Topographic Wetness Indeks; Distance to Water; Distance to Road; Rainfall; Wind Speed; Land Use/Land Change; Topographic Roughness Indeks; Employment in The Agriculture Sector.
(Gelan, 2021)	Existing Land Use; Vegetation Cover; Road Type; Proximity to Road; Proximity to Settlement Area; Population Density; Land Ownership; Slope; Elevation; Proximity to Water Sources; Flood Prone Area; Visibility.
(Sharma *et al.*, 2022)	Land Use Land Cover Mapping; River; Road; NDVI; NDBI; Slope; Elevation; Water Bodies.
(Pokhrel, 2019)	Emergency Road Network; Slope; Existing Park; Waterbody; Facility Location; Land Use Land Cover; Population Density; Historical & Cultural Places.
(Morales and de Vries, 2021)	Slope; Elevation; Distance from Residential; Distance from Main Roads; Distance from River; Distance from Shoreline; Soil Type.
(Osseni *et al.*, 2023)	Land Use; Elevation; Slope; Distance from Flood-Prone Areas; Proximity to Roads; Proximity to Built-up Areas.
(Hailemariam, 2021)	Land Use Land Cover; Slope; River; Road.
(Linh *et al.*, 2022)	Distance from Pollution Sources; NDVI; Distance to Historical Sites; Distance to Residential Areas; Distance to Main Roads; Current Land Use Types.
(Pramanik, 2016)	Slope; Elevation; Aspect; Land Use Land Cover; Drainage and Transport Network; Soil Characteristics.
(Ustaoglu, 2022)	Slope; Elevation; Aspect; Lan Use Land Cover; Distance from Reservoir; Distance from Roads; Distance from market Zone; Distance from Urban Dwelling; Geology; Soil Depth; Agricultural Land Use Capability; Other Soil Properties; Erosion Susceptibility.

the context of Nusantara Capital City. To enhance the rigor of such studies, additional criteria like flood susceptibility, urban heat island effect, and biodiversity indicators (Pramanik, 2016; Sharma *et al.*, 2022) should be incorporated to align with the unique environmental and socio-economic characteristics of Nusantara Capital City region.

4. CONCLUSION

According to the result above, it can be inferred that the most popular approach and data kinds in analyzing the land suitability for Green open space are Quantitative approaches using primary data. Based on some analysis, the most used is AHP which is suitable for land suitability analysis in Nusantara Capital City, given that it offers some benefits. AHP method is appropriate for analyzing and evaluating GOS Nusantara Capital City. The weighing, for instance, is more understandable than the other analysis methods.

The evaluation criteria that can be used are elevation, slope, land use land cover, population, vegetation, water bodies, and accessibility. The criteria identified in this study not only align with global best practices but also underscore the need for a tailored approach that considers the distinct challenges and opportunities of Nusantara Capital City. Future research should prioritize criteria that address climate resilience, vegetation, and accessibility, leveraging the strengths of established as AHP as methodology.

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