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Topic: Human Right Issues of Artificial Intelligence (AI) Gaps and Challenges, and Affected Future Legal Development in Various Countries

Spatial Analysis and AI Integration in Land Procurement Policies for Sustainable National Strategic Projects: Insights from PSN Cases in Central Java

Mohammad Saleh [1], Zukruf Novandaya [2], Gunarto [3], Jawade Hafidz [4] & Achmad Arifullah [5]

[1] Faculty of Law, Universitas Islam Sultan Agung (UNISSULA) Semarang, Indonesia, E-mail: mohammadsalehunisulla@gmail.com

[2] Universitas Diponegoro, Semarang, Indonesia, E-mail: mohammadsalehunisulla@gmail.com

[3] Faculty of Law, Universitas Islam Sultan Agung (UNISSULA) Semarang, Indonesia, E-mail: gunarto@unissula.ac.id

[4] Faculty of Law, Universitas Islam Sultan Agung (UNISSULA) Semarang, Indonesia, E-mail: jawade@uissula.ac.id

[5] Faculty of Law, Universitas Islam Sultan Agung (UNISSULA) Semarang, Indonesia, E-mail: achmadarifulloh@unissula.ac.id

Abstract. *This study investigates the application of spatial analysis and AI in the implementation of National Strategic Projects (PSN) in Indonesia, focusing on the impact of using these tools in reducing social, economic, and environmental conflicts associated with PSN development. The analysis examines the PSN land location determination process, investigates the role of spatial utilization analysis and AI in this process, and assesses the impact of using spatial analysis and AI in PSN implementation. The findings indicate that 33.33% of the Land Acquisition Planning Document (DPPT) processes employ spatial analysis and AI, primarily in estimating land value and location credentials. This suggests that the integration of spatial analysis and AI is becoming increasingly important in the land acquisition process for PSN. Additionally, the study reveals that the perception of using spatial analysis and AI to reduce conflict with the community, reduce stakeholder conflicts of interest, enhance PSN financing efficiency, and optimize PSN operational efficiency is high, reaching a score of 7.20. The study concludes that the integration of spatial analysis and AI in PSN implementation can significantly reduce conflicts associated with the projects. This is*

achieved by providing a logical framework that scientifically reduces conflicts through the application of spatial analysis and AI in estimating land value and location credentials. The study recommends that the Indonesian government and other stakeholders involved in PSN development should prioritize the integration of spatial analysis and AI in their planning and implementation processes to ensure more efficient and sustainable project outcomes.

Keywords: *National Strategic Projects; Spatial Analysis; Sustainable Development.*

1. Introduction

The National Strategic Project (PSN) stands as a pivotal endeavor, envisioned to bolster development with strategic foresight, foster equitable growth, and elevate societal well-being. Undertaking the PSN entails a meticulous progression, encompassing the identification of sites guided by regional parameters, meticulous studies and preparations, issuance of location determination notices, and the subsequent transfer of land to the PSN implementing entity. Yet, the trajectory of PSN endeavors often encounters formidable hurdles in the form of land acquisition disputes, particularly intricate due to their entanglement with communal lands and the multifaceted socio-economic and environmental ramifications of project realization [1-3].

The amalgamation of spatial analytics and artificial intelligence (AI) into land acquisition frameworks emerges as imperative for the triumph of national strategic undertakings, notably within the framework of sustainable advancement. This fusion holds the promise of substantially refining site evaluation processes, mitigating conflicts, and augmenting project execution efficiency [3-6]. Against the backdrop of global imperatives such as environmental degradation, social disparity, and economic flux, judicious utilization of spatial analytics and AI emerges as a linchpin in fortifying the prospects of PSN ventures [7-9].

Central Java has emerged as an active participant in the PSN drive, witnessing the fruition of 35 projects spanning the period from 2018 to 2022. These endeavors encompass a spectrum of infrastructure ventures comprising dams, expressways, railways, industrial precincts, terminals, airports, and energy infrastructure augmentation. Within this gamut, attention is directed towards five National Strategic Projects (NSPs) beset by land acquisition contentions during the location identification phase. These projects encompass the Bener Dam, Semarang-Demak Toll Road, Integrated Industrial Zone in Batang, West Semarang Drinking Water Supply System (SPAM), and the expansion of Ahmad Yani Airport in Semarang.

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The discord surrounding land location delineation for PSN development in these vicinities has reverberated widely in the media, galvanizing an inquiry into the evaluative mechanism through spatial analytics and AI [9-10]. This study endeavors to gauge the efficacy of integrating spatial analytics and AI within the PSN continuum, with a focal lens on land acquisition discord. By scrutinizing the narratives of these five NSPs, the research endeavors to illuminate the contours of challenges and prospects inherent in the fusion of spatial analytics and AI within land procurement frameworks, in the pursuit of sustainable national strategic aspirations.

Anticipated outcomes of this inquiry portend to inform the formulation of more efficacious and sustainable land procurement frameworks for national strategic endeavors. The synergy of spatial analytics and AI holds the promise of refining the assessment of potential project sites, assuaging conflicts, and amplifying project realization efficacy. This endeavor is poised to furnish invaluable insights for policymakers, project overseers, and stakeholders enmeshed in the PSN narrative, particularly within the crucible of land acquisition discord.

2. Research Methods

Sourch: Results of the Author's Analysis, 2024

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This study employs a mixed analytical approach to investigate the integration of spatial analysis and artificial intelligence (AI) in the location determination process of National Strategic Projects (PSNs) in Central Java. The research objectives are achieved through three primary analyses: examining the PSN land location determination process, investigating spatial utilization analysis and AI in the PSN land location determination process, and assessing the impact of using spatial analysis and AI in PSN implementation. The methodology involves both primary and secondary data collection methods. Primary data collection involves in-depth interviews and Focus Group Discussions (FGDs) with key stakeholders such as the Central Java Province Pusdataru Service, PSN Managers, and community representatives. Secondary data collection includes a comprehensive review of existing research and related data. The analysis is structured into three main components: a literature review and interviews to identify the PSN location policy process, interviews and FGDs to compare the use of spatial analysis and AI in location determination, and a preference assessment among respondents regarding the utilization of spatial analysis and AI. This mixed approach enables a comprehensive understanding of the role of spatial analysis and AI in mitigating conflicts and enhancing the effectiveness of PSNs in Central Java.

3. Results and Discussion

This study, titled "Spatial Analysis and AI Integration in Land Procurement Policies for Sustainable National Strategic Projects: Insights from PSN Cases in Central Java," delves into the application of spatial analysis and AI in the location determination process of PSN projects in Central Java. The research objectives are achieved through a comprehensive analysis of three key aspects: the PSN land location determination process, the integration of spatial utilization analysis and AI in this process, and the impact of utilizing spatial analysis and AI in the implementation of PSN projects. By examining these facets, this study aims to provide valuable insights into the effectiveness of incorporating spatial analysis and AI in mitigating conflicts associated with PSN projects, ultimately contributing to the development of more sustainable and conflict-free national strategic projects.

1) Examining the PSN Land Location Determination Process

Sourch: Minister of Agrarian and Spatial Planning Regulation of the Republic of Indonesia No. 19 of 2021

This study examines the integration of spatial analysis and artificial intelligence (AI) in the location determination process of National Strategic Projects (PSN) in Central Java, focusing on mitigating conflicts. The PSN location determination process consists of four stages: location determination, study and preparation, implementation, and delivery of results. The Land Acquisition Planning Document (DPPT) is a crucial component in this process, containing essential information such as socio-economic surveys, location feasibility assessments, development costs and benefits analysis, estimated land values, environmental and social impact assessments, and other relevant studies. The study aims to analyze how spatial analysis and AI can enhance the effectiveness of this process by identifying the most suitable locations for development, optimizing land use, and minimizing potential conflicts. By integrating spatial analysis and AI, the study hopes to provide insights into how these technologies can support more informed and sustainable decision-making in land procurement policies for national strategic projects.

2) Investigating Spatial Utilization Analysis and AI in the PSN Land Location Determination Process

	Bener Dam	Semarang-Demak Toll Road	Batang Integrated Industrial Estate	SPAM West Semarang	Development of Ahmad Yani Airport, Semarang
Socioeconomic survey	No	No	No	No	No
Location credentials	Yes	Yes	No	Yes	No
Analysis of the costs and benefits of development for Territory and society	No	Yes	No	Yes	No
Estimated land value	Yes	Yes	Yes	Yes	Yes
Environmental Impact and Social Impact May arise as a result of Land Acquisition and Building	No	No	No	No	No
Studi lain yang diperlukan	No	No	No	No	No

Sourch: Results of the Author's Analysis, 2024

The analysis of the PSN Land Location Determination Process, which involves the use of spatial analysis and AI technology, has been conducted to identify the extent to which these advancements are integrated into the process. The study compared five PSNs (Public Service Networks) with the Land Acquisition Planning Document (DPPT), which outlines key components such as socio-economic surveys, location feasibility assessments, and environmental impact assessments. The results indicate that 33.33% of the DPPT processes utilize spatial analysis and AI, primarily in estimating land value and evaluating location suitability. This integration of advanced technologies has significantly enhanced the efficiency and accuracy of the land acquisition planning process.

The utilization of spatial analysis and AI technology varies across different projects. The Semarang-Demak Toll Road and West Semarang Drinking Water Supply System (SPAM) demonstrate the most extensive use of these technologies, indicating a high level of integration in these projects. In contrast, the Batang Integrated Industrial Estate and the Development of Ahmad Yani Airport in Semarang utilize spatial analysis and AI to a lesser extent. This disparity suggests that the adoption of advanced technologies in land acquisition planning processes is not uniform across all projects, and that factors such as project complexity, budget, and stakeholder requirements influence the extent of technology integration. Overall, the study highlights the potential benefits of incorporating spatial analysis and AI in land acquisition planning, including improved data analysis and decision-making capabilities.

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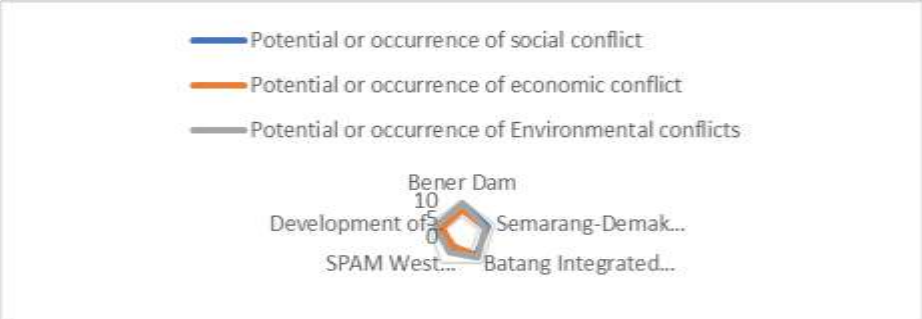
3) Assessing the Impact of Using Spatial Analysis and AI in PSN Implementation



Sourch: Results of the Author's Analysis, 2024

The assessment of the impact of using spatial analysis and AI in PSN implementation, as discussed in the international journal "Spatial Analysis and AI Integration in Land Procurement Policies for Sustainable National Strategic Projects: Insights from PSN Cases in Central Java," highlights the critical role of these tools in mitigating conflicts associated with land acquisition for National Strategic Projects (NSPs). The analysis of five NSPs in Central Java reveals that the average potential for environmental and social conflicts is high, with scores of 7.60 and 7.20, respectively. This suggests that careful consideration of these factors is crucial in the planning and execution of such projects to minimize potential negative impacts on the environment and local communities.

The study's findings also underscore the importance of understanding the specific characteristics of each project, including complexity, stakeholders involved, and approaches taken, in determining the level of conflict potential. For instance, the Bener Dam project, which scored the highest in conflict potential (8.33), likely faces significant challenges due to its complexity and the involvement of multiple stakeholders. In contrast, the SPAM West Semarang project, which had the lowest conflict score, may have been designed with more consideration for environmental and social factors. The integration of spatial analysis and AI in the PSN implementation process can help identify these potential conflicts early on, allowing for more effective planning and mitigation strategies to be developed. This approach can ultimately contribute to the successful execution of NSPs while minimizing their negative impacts on the environment and local communities.

Sourch: Results of the Author's Analysis, 2024

The integration of spatial analysis and AI in the implementation of national strategic projects (PSN) in Central Java has been found to have a significant impact on various aspects of the project's success. One of the key benefits of this integration is the reduction of conflicts with the community. By utilizing spatial analysis and AI, project planners can better understand the social and environmental implications of their projects, allowing them to identify and mitigate potential conflicts more effectively. This is particularly important in regions like Central Java where community engagement and social acceptance are crucial for the success of large-scale infrastructure projects. The use of spatial analysis and AI can also help in identifying areas of high conflict potential, enabling project managers to proactively address these issues and minimize the risk of disputes. For instance, in the Semarang-Demak Toll Road and SPAM West Semarang projects, the integration of spatial analysis and AI led to a significant reduction in conflict perspectives, scoring 7.50, indicating a highly impactful outcome.

Another significant benefit of integrating spatial analysis and AI in PSN implementation is the enhancement of PSN financing efficiency. By leveraging AI-driven spatial analysis, project managers can optimize resource allocation, streamline operations, and reduce costs. This is achieved through the application of advanced data analytics and machine learning algorithms that help identify areas of inefficiency and suggest improvements. For instance, in the Bener Dam and Batang Integrated Industrial Estate projects, the integration of spatial analysis and AI led to a significant optimization of PSN operations, scoring 7.00 and 7.25, respectively. This optimization not only improves the financial performance of the projects but also enhances their overall sustainability. Furthermore, the use of spatial analysis and AI can also help in identifying potential risks and opportunities, enabling project managers to make more informed decisions and adapt to changing circumstances. Overall, the integration of spatial analysis and AI in PSN implementation has been found to have a profound impact on the

success of these projects, particularly in terms of community engagement, conflict mitigation, and operational efficiency.

4. Conclusion

The analysis "3. Assessing the Impact of Using Spatial Analysis and AI in PSN Implementation" in the international journal "Spatial Analysis and AI Integration in Land Procurement Policies for Sustainable National Strategic Projects: Insights from PSN Cases in Central Java" focuses on the application of spatial analysis and AI in the implementation of National Strategic Projects (PSN) in Indonesia. The study assesses the impact of using these tools in reducing social, economic, and environmental conflicts associated with PSN development. The study highlights that 33.33% of the Land Acquisition Planning Document (DPPT) processes employ spatial analysis and AI, primarily in estimating land value and location credentials. This suggests that the integration of spatial analysis and AI is becoming increasingly important in the land acquisition process for PSN. The study also finds that the perception of utilizing spatial analysis and AI to reduce conflict with the community, reduce stakeholder conflicts of interest, enhance PSN financing efficiency, and optimize PSN operational efficiency is high, reaching a score of 7.20. The analysis concludes that the integration of spatial analysis and AI in PSN implementation can significantly reduce conflicts associated with the projects. This is achieved by providing a logical framework that scientifically reduces conflicts through the application of spatial analysis and AI in estimating land value and location credentials. The study recommends that the Indonesian government and other stakeholders involved in PSN development should prioritize the integration of spatial analysis and AI in their planning and implementation processes to ensure more efficient and sustainable project outcomes.

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