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OPTIMISING THE UTILISATION OF STATE-OWNED ASSETS USING A MULTICRITERIA APPROACH

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Abstract

State-Owned Assets in Indonesia represent substantial economic potential, however, many remain underutilised, generating limited non-tax revenue and often being deployed without rigorous analytical support. This study aims to identify the most optimal utilisation of state-owned land by integrating the Highest and Best Use framework with asset utilisation schemes using a multicriteria decision-making approach. The findings reveal that Legally Permissible is the most influential criterion in determining optimal asset utilisation, underscoring the central role of zoning, regulatory compliance, and land-use permissibility. Among the evaluated development alternatives, Mixed-Use development emerges as the most optimal form of utilisation, outperforming hotel and apartment options in terms of overall priority. These results highlight the importance of aligning legal considerations with economic and investment feasibility to achieve sustainable and value-maximizing utilisation of SOAs. The study provides empirical support for evidence-based decision-making in public asset optimisation and offers practical insights for policymakers and asset managers in designing legally sound and economically viable utilisation strategies.

Keywords: Asset Optimisation, Analytical Hierarchy Process, Highest and Best Use, State-Owned Assets

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INTRODUCTION

State-Owned Assets (SOAs) constitute a significant component of public wealth and play a strategic role in supporting fiscal sustainability and public service delivery; therefore, their effective optimisation requires systematic planning and identification of assets with revenue-generating potential (Dorojatun & Purwanto, 2019). In many developing countries, including Indonesia, governments hold extensive portfolios of land and buildings that possess high economic potential but remain underutilised or idle. This condition is reflected in the relatively modest contribution of asset utilisation to non-tax state revenue and the continued reliance on conventional utilisation decisions that are not always supported by systematic analytical assessment. Recent studies indicate that suboptimal asset utilisation is frequently attributable to weak integration among regulatory constraints, economic feasibility, and strategic planning considerations (Kaganova & Amoils, 2020); Niekamp et al., 2015).

Existing literature on public asset management has emphasised the importance of adopting evidence-based approaches to optimise asset use. Applications of the Highest and Best Use (HBU) framework demonstrate its effectiveness in identifying alternative land uses that maximise economic value while satisfying physical, legal, and financial constraints (Fanning, 2014; Lennhoff & Parli, 2020). Empirical applications of HBU in the public sector have been conducted at both local and national levels, including analyses of municipal assets and state-owned enterprise land (Santoso & Nurbiyanto, 2021); (Susanto & Utomo, 2019). Alkausar et al. (2018) emphasise that the identification of the most optimal business form must be preceded by a systematic land-use analysis. However, these studies tend to focus primarily on land-use feasibility and valuation outcomes, with limited attention given to the institutional and contractual mechanisms governing asset utilisation.

More recent asset utilisation studies argue that optimal outcomes cannot be achieved solely through land-use analysis, but must also account for the utilisation schemes that define the relationship between the government and private investors (Kuntadi et al., 2022). In the Indonesian context, utilisation of SOA is subject to strict regulatory frameworks that determine permissible schemes such as leasing, utilisation cooperation, or build–operate–transfer arrangements. Legal feasibility, zoning compliance, and regulatory certainty therefore play a decisive role in shaping both government decisions and investor participation. Despite this, the legal dimension is often treated as a preliminary screening factor rather than a central criterion in optimisation models.

From a methodological perspective, multi-criteria decision-making (MCDM) approaches-particularly the Analytical Hierarchy Process (AHP)-have gained increasing attention in asset management and planning research due to their ability to integrate qualitative judgments with quantitative assessment (Saaty, 2008; Barić et al., 2016). Recent studies demonstrate that AHP is well

suited for resolving complex public-sector decisions involving multiple stakeholders, competing objectives, and regulatory constraints (Azizi, 2009; Berkman et al., 2017). Nevertheless, applications that combine HBU analysis, asset utilisation schemes, and MCDM methods in a single integrated framework remain relatively limited, especially in the context of state-owned land assets in Indonesia.

Based on this gap, the present study seeks to address the following research question: What is the most optimal utilisation alternative for state-owned land assets when legal, financial, physical, investor feasibility, and government capitalisation criteria are jointly evaluated within an integrated HBU and asset utilisation scheme framework?

By explicitly integrating HBU criteria with utilisation schemes through an AHP-based multicriteria approach, this study contributes to the existing literature in two ways. First, it provides empirical evidence on the dominant role of legal feasibility in determining optimal SOA utilisation. Second, it offers a structured decision-support model that aligns regulatory compliance with economic and investment considerations. The findings are expected to offer practical insights for policymakers, planners, and asset managers in developing more effective and legally robust strategies for optimising state-owned land assets.

LITERATURE REVIEW

SOA Utilisation and Public-Sector Planning

The utilisation of SOAs is a critical component of public-sector planning, as it affects asset productivity and fiscal sustainability. Effective SOA management therefore requires optimisation strategies, particularly through formal utilisation schemes that enable value creation while maintaining public ownership. Asset performance provides an essential basis for evaluating such strategies, as it reflects the efficiency and long-term value generated by asset utilisation decisions. (Puspitarini & Akhmadi, 2019) highlights that the proposed performance measurement framework supports more efficient public asset planning and reduces asset underutilisation.

SOA, particularly land and buildings, represent a strategic instrument for supporting public finance, urban development, and service delivery. Within the planning literature, asset utilisation is increasingly viewed not merely as an administrative function but as a form of spatial and economic policy intervention. Recent studies emphasise that ineffective utilisation of public land often stems from fragmented decision-making, weak analytical grounding, and insufficient alignment between regulatory frameworks and economic objectives (Kaganova & Amoils, 2020).

However, despite offering valuable planning perspectives, this body of literature provides limited guidance on explicit decision-support mechanisms for

selecting optimal asset utilisation alternatives in contexts characterised by multiple criteria and diverse stakeholders. This limitation highlights the need for structured multicriteria approaches capable of integrating legal, economic, and planning considerations within a coherent analytical framework.

HBU as a Framework for Asset Optimisation

The HBU concept is a foundational framework in property appraisal and asset optimisation. HBU defines the use of a property that is physically possible, legally permissible, financially feasible, and maximally productive (Appraisal Institute, 2013; (Fanning, 2014). HBU is an essential competitive factor in investment decision-making (Bravi & Rossi, 2013). Within public-sector asset management, HBU analysis has been widely adopted to assess alternative land uses that maximise economic value while complying with planning and regulatory requirements.

Empirical studies applying HBU to public assets demonstrate its effectiveness in identifying value-maximising development options. Santoso & Nurbianto (2021) applied HBU analysis to municipal assets in Batam and found that legal permissibility and zoning constraints significantly influenced feasible development outcomes. Similarly, Susanto & Utomo (2019) combined HBU with life-cycle cost analysis to optimise state-owned enterprise land assets, highlighting the importance of financial feasibility alongside regulatory compliance. Rashid et al. (2023) propose a Sustainability HBU framework based on GIS-integrated multicriteria decision analysis to guide the sustainable optimisation of Federal Land Development Authority land.

Despite its strengths, prior HBU-based studies tend to focus primarily on land-use feasibility and valuation outcomes. These studies often fail to incorporate utilisation schemes-such as leasing, shared use, built-operate transfer, infrastructure utilisation cooperation, and limited concession schemes-as explicit criteria in assessing the optimal utilisation of government assets. This creates a conceptual gap, particularly in jurisdictions like Indonesia, where legal utilisation schemes are strictly regulated and directly affect both government returns and investor incentives. The present study addresses this gap by embedding HBU analysis within an explicit asset utilisation scheme framework.

AHP in Asset Management and Planning Decisions

AHP is a multicriteria decision-making (MCDM) method designed to handle complex decisions involving multiple qualitative and quantitative criteria (Saaty, 2008; Saaty & Vargas, 2012). Within the theoretical framework of MCDM methods, decision-making is understood as a value-based process in which individuals evaluate and select alternatives according to the relative importance of the criteria they consider (Berkman et al., 2017; Rangel et al., 2008). These subjective valuations enable decision-makers to systematically compare available

options and ultimately choose the alternative that maximises overall perceived value (Berkman et al., 2017). One of the main theories in value-based decision-making assumes that choices are made by optimizing the value of various goals, for example, the benefits obtained from the choice (Suri et al., 2020). According to Kaufman & Woodhead (2006), value-based decision-making constitutes a structured analytical process that seeks to maximise value by fulfilling essential functions at the minimum cost without compromising required levels of quality and performance. AHP decomposes decision problems into hierarchical structures and uses pairwise comparisons to derive priority weights, making it particularly suitable for public-sector and planning contexts where stakeholder judgments and regulatory considerations play a critical role.

Within asset management and planning studies, AHP has been increasingly employed to support transparent and systematic decision-making. Barić et al. (2016) demonstrate that AHP effectively integrates technical, economic, and regulatory criteria in infrastructure planning decisions. In the context of asset utilisation, shows that AHP allows decision-makers to balance financial performance with operational and institutional constraints (Azizi, 2009).

More specifically, AHP has been applied to public asset utilisation studies to prioritise development alternatives and evaluation criteria. Kuntadi et al. (2022) employ AHP to assess asset optimisation strategies in the public sector, finding that legal and institutional factors often outweigh purely financial considerations.

Previous Studies Combining AHP and HBU in Asset Utilisation

Although both AHP and HBU are well established independently, studies that explicitly integrate these frameworks remain relatively limited. Existing research often applies HBU as a qualitative screening tool, while AHP is used separately for ranking alternatives without full integration of regulatory utilisation schemes. Santoso & Nurbiyanto (2021) demonstrate HBU analysis enhances transparency in weighting legal, physical, and financial criteria. However, their study does not extend the analysis to contractual utilisation schemes. Internationally, Niekamp et al. (2015) propose a multicriteria framework for sustainable asset management but do not operationalise HBU criteria within regulated public asset utilisation systems.

These limitations reveal a clear research gap, namely the absence of an integrated decision-support model that simultaneously incorporates HBU criteria and utilisation schemes reflecting stakeholder preferences. Given that AHP is particularly effective in resolving such multidimensional decision problems, its integration with HBU and utilisation schemes represents a methodological advancement in asset utilisation studies.

Research Positioning and Contribution to Literature

Based on the reviewed literature, it is evident that prior studies have either focused on HBU-based land-use optimisation or applied AHP to asset management decisions in isolation. Few studies, particularly in the Southeast Asian and Indonesian planning contexts, have integrated these approaches and explicitly incorporated asset utilisation schemes. Nevertheless, under the regulatory framework governing the utilisation of SOA in Indonesia, utilisation schemes constitute one of the officially recognised mechanisms for asset utilisation.

This study positions itself within this gap by integrating HBU analysis and asset utilisation schemes through an AHP-based multicriteria framework. By doing so, it responds directly to calls in the planning and asset management literature for more comprehensive, regulation-sensitive decision-support tools. The approach contributes not only to academic discourse but also to practical planning and policy formulation for SOA utilisation.

RESEARCH METHODOLOGY

Research Framework

The research framework is illustrated in Figure 1 and is developed based on insights derived from the literature review. The framework aims to optimise the utilisation of SOA, particularly fixed assets in the form of land, by integrating the HBU concept with SOA utilisation schemes through cooperative arrangements.

The land-use evaluation criteria are derived from the HBU framework, which comprises four main dimensions: legally permissible, physically possible, financially feasible, and maximum productivity. In addition, the asset utilisation scheme is assessed based on two key criteria, namely investor feasibility and government capitalisation.

Each criterion is further elaborated into a set of sub-criteria, drawing upon established HBU principles and relevant regulations governing SOA utilisation schemes. Based on the evaluation of these criteria and sub-criteria, alternative land development options are assessed to identify the alternative that most effectively optimises the utilisation of SOA.

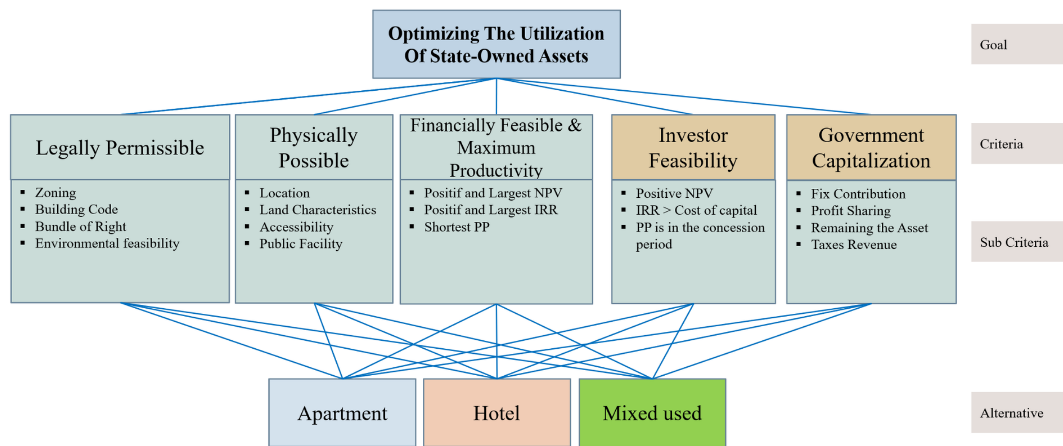


Figure 1: Framework
Source: processed by the Author

Research Design and Approach

This study adopts a quantitative decision-support approach using the AHP to determine the most optimal utilisation of state-owned land assets. AHP is employed to integrate multiple criteria derived from the HBU framework and legally defined asset utilisation schemes. The research design emphasises expert-based judgment to capture regulatory, financial, and planning considerations that are not fully observable through secondary data alone.

1. Data Collection and Questionnaire Design

Primary data were collected through a structured expert questionnaire designed specifically for AHP analysis. The questionnaire was developed based on an extensive review of the literature on HBU, public asset utilisation, and multicriteria decision-making. The structure of the questionnaire followed the hierarchical model of the study, which consists of four levels:

- (1) research objective,
- (2) evaluation criteria,
- (3) sub-criteria, and
- (4) utilisation alternatives.

The questionnaire was divided into three main sections. The first section gathered general information regarding the respondents' professional background and experience in asset management, planning, or valuation. The second section consisted of pairwise comparison questions to assess the relative importance of the main criteria and sub-criteria. The third section evaluated alternative asset utilisation options (hotel, apartment, and mixed-use

development) using pairwise comparisons under each criterion. All comparisons followed the standard nine-point Saaty scale to ensure methodological consistency.

Prior to distribution, the questionnaire was reviewed internally by senior academics and practitioners to ensure clarity, logical consistency, and relevance to the Indonesian regulatory and planning context. Minor wording adjustments were made based on this review to improve comprehensibility and reduce ambiguity.

2. Expert Selection and Validation

The selection of experts followed a purposive sampling strategy, which is commonly applied in AHP-based studies where informed judgment is required. Experts were selected based on predefined eligibility criteria to ensure the credibility and relevance of their assessments. These criteria included:

- (1) minimum of five years of professional or academic experience in asset management, urban planning, property valuation, or public-sector finance;
- (2) direct involvement in decision-making, policy formulation, or research related to SOAs; and
- (3) familiarity with regulatory frameworks governing public asset utilisation in Indonesia.

The expert panel comprised academics, practitioners, and government officials to capture diverse perspectives while maintaining substantive expertise. To validate expert input, consistency ratios (CR) were calculated for all pairwise comparison matrices. Responses with CR values exceeding the acceptable threshold of 0.10 were reviewed, and inconsistent judgments were clarified or excluded to ensure the reliability of the results. This validation process strengthens the robustness of the expert-based assessment.

3. Justification for the Use of the AHP

The AHP was selected for this study due to its suitability for complex decision-making problems involving multiple criteria, qualitative judgments, and regulatory considerations. Unlike purely quantitative optimisation models, AHP allows decision-makers to explicitly incorporate expert knowledge and institutional constraints, which are critical in public-sector asset utilisation decisions.

Alternative multicriteria methods, primarily rely on numerical performance indicators and assume stable, measurable criteria. In contrast, the optimisation of SOAs involves legal permissibility, regulatory compliance, and institutional feasibility, which are difficult to quantify directly. AHP is

particularly effective in this context because it enables structured comparison of qualitative factors and provides transparent priority weights for each criterion.

Furthermore, AHP has been widely applied in planning and asset management studies due to its ability to integrate diverse stakeholder perspectives while maintaining analytical rigour. Its hierarchical structure aligns well with the HBU framework, allowing legal, physical, and financial criteria to be evaluated systematically. For these reasons, AHP is considered the most appropriate method for achieving the objectives of this study, namely identifying an optimal asset utilisation alternative that balances regulatory compliance, economic feasibility, and planning considerations.

4. Analytical Procedure

The AHP analysis followed standard procedural steps:

- (1) construction of the hierarchical decision model;
- (2) pairwise comparison of criteria, sub-criteria, and alternatives;
- (3) computation of priority weights using eigenvalue methods; and
- (4) consistency testing to validate expert judgments.

The final priority scores were used to rank the alternative utilisation options and determine the most optimal form of state-owned land utilisation.

ANALYSIS AND DISCUSSION

1. Interpretation of Key Findings

The results of the AHP analysis indicate that legal feasibility emerges as the most influential criterion in determining the optimal utilisation of state-owned land assets, followed by investor feasibility and financial productivity considerations. This finding reinforces the argument that public asset optimisation is fundamentally shaped by regulatory and institutional constraints rather than purely economic or physical factors. Within the context of SOA management, legal permissibility-including zoning regulations, building codes, and land tenure arrangements-functions not merely as a preliminary screening condition but as a decisive determinant of feasible and sustainable utilisation outcomes.

From a theoretical perspective, this result contributes to asset management and planning literature by extending the HBU framework beyond its traditional appraisal-oriented interpretation. While classical HBU analysis assumes legal permissibility as one of four equal conditions, the findings of this study suggest that, in the public-sector context, legal feasibility holds a dominant position due to the statutory nature of SOA governance. This supports emerging views in public asset management theory that emphasise institutional embeddedness and regulatory alignment as central elements of value creation in public assets (see Figure 2).

Hierarchy with Consolidated Priorities						
Decision Hierarchy						
Level 0	Level 1	Level 2	Glb Prio.	Apartemen	Hotel	Mix Used
Optimizing The Utilization of SOA	Physical 0.149	Location 0.318	4.7%	0.254	0.369	0.377
		Land Characteristic 0.157	2.3%	0.266	0.363	0.371
		Accessibility 0.407	6.1%	0.266	0.357	0.377
		Public Facility 0.117	1.7%	0.358	0.322	0.320
	Legal 0.287	Zoning 0.355	10.2%	0.306	0.320	0.374
		Building Code 0.346	9.9%	0.229	0.376	0.394
		Enviromental Feasibility 0.180	5.2%	0.273	0.351	0.376
		Bundle of Right 0.118	3.4%	0.279	0.334	0.387
	Financial & Max Productivity 0.170	Largest NPV 0.447	7.6%	0.206	0.393	0.402
		Largest IRR 0.361	6.2%	0.218	0.358	0.423
		Sortest PP 0.191	3.3%	0.233	0.363	0.405
	Investor Feasibility 0.281	Positive NPV 0.389	10.9%	0.225	0.344	0.431
		IRR > Cost of Capital 0.324	9.1%	0.197	0.344	0.459
		PP is in a concession period 0.287	8.1%	0.219	0.338	0.443
	Government Capitalization 0.113	Fix Contribution 0.457	5.2%	0.250	0.354	0.396
		Profit Sharing 0.305	3.5%	0.209	0.356	0.434
		Remaining Assets 0.149	1.7%	0.303	0.331	0.366
		Tax Revenues 0.089	1.0%	0.213	0.393	0.394
			1.0	24.2%	35.3%	40.5%

Figure 2: Determining Decisions on Selecting Alternatives for Utilising SOA Assets
Source: Processed by the author

2. Discussion of Optimal Utilisation Alternatives

The prioritisation of mixed-use development as the most optimal utilisation alternative reflects a convergence of legal compliance, financial feasibility, and investor attractiveness. Mixed-use development benefits from regulatory

flexibility, diversified revenue streams, and greater resilience to market fluctuations compared to single-use alternatives such as hotels or apartments. From a planning perspective, this finding aligns with contemporary urban development principles that promote functional integration, land-use efficiency, and sustainable intensification, particularly in strategic urban locations.

Importantly, the preference for mixed-use development also illustrates how AHP enables the integration of competing objectives within a single evaluative framework. Rather than maximising a single outcome (e.g., highest financial return), the AHP results demonstrate a balanced optimisation that reflects public-sector priorities, investor constraints, and planning regulations simultaneously. This reinforces the relevance of multicriteria approaches in public asset utilisation decisions, where trade-offs are inherent and unavoidable (see Figure 3).

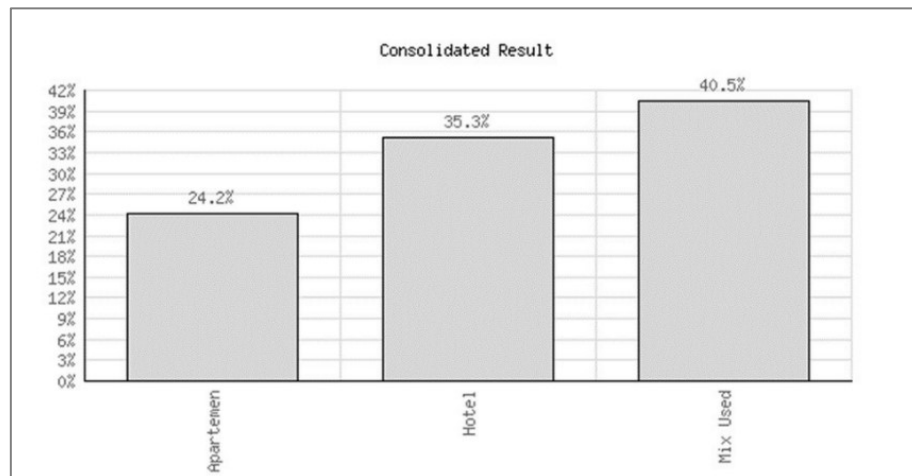


Figure 3: Results of Determining Alternative Use of SOA Assets
 Source: Processed by the author

3. Practical Implications for Policy and Practice

The results of this study have several important practical implications. For policymakers, the findings suggest that asset utilisation policies should prioritise regulatory clarity and legal readiness before pursuing economic optimisation. Streamlining zoning approvals, clarifying permissible utilisation schemes, and reducing regulatory uncertainty can significantly enhance the attractiveness and effectiveness of SOA utilisation initiatives.

For public asset managers and practitioners, the study provides a structured decision-support model that can be applied prior to engaging with private investors. By adopting an AHP-based evaluation framework, asset managers can proactively identify utilisation options that align with legal,

financial, and planning constraints, thereby reducing negotiation risks and improving long-term outcomes.

For investors, the results highlight the importance of regulatory certainty in investment decision-making involving SOA. Mixed-use development emerges as an attractive option not solely because of financial returns, but because it aligns with regulatory frameworks and public-sector objectives, thereby reducing institutional risk.

4. Implications for Future Research

The study opens several avenues for future research. First, further studies could apply the integrated HBU–AHP framework across different asset types or urban contexts to assess the generalisability of the findings. Second, future research may extend the model by incorporating dynamic market variables or stakeholder preference analysis to enhance predictive capability. Finally, comparative studies using alternative MCDM methods could further validate the relative strengths of AHP in public asset optimisation.

CONCLUSION AND RECOMMENDATION

This study examines the optimisation of state-owned land assets by integrating the HBU framework with legally defined asset utilisation schemes through a multicriteria decision-making approach using the AHP. The findings demonstrate that legal feasibility is the most influential determinant in optimising SOA utilisation, surpassing purely financial or physical considerations. Among the evaluated alternatives, mixed-use development emerges as the most optimal utilisation option, reflecting its ability to balance regulatory compliance, economic viability, and investor attractiveness.

The results offer several actionable insights for policymakers and practitioners. First, regulatory readiness should be treated as a strategic priority in SOA asset optimisation. Policymakers are encouraged to strengthen zoning clarity, streamline approval processes, and provide explicit guidance on permissible utilisation schemes to reduce uncertainty and improve asset attractiveness. Without legal and regulatory certainty, economically viable asset utilisation options may remain unrealised.

Second, public asset managers should institutionalize evidence-based decision-making tools, such as the integrated HBU–AHP framework proposed in this study, prior to engaging with private investors. Conducting structured multicriteria evaluations at the planning stage can help governments proactively identify optimal utilisation alternatives, minimise negotiation risks, and align asset utilisation decisions with long-term planning objectives.

Third, for private-sector investors, the findings highlight that regulatory alignment is as critical as financial returns when considering investment in SOAs. Mixed-use development is particularly attractive not only due to diversified

revenue streams but also because it offers greater flexibility within regulatory and planning frameworks, thereby reducing institutional risk.

While this study focuses on a single state-owned land asset in particular location, future research could extend the multicriteria framework to different regions, urban contexts, or asset types, such as buildings, infrastructure assets, or heritage properties. Comparative studies across cities or countries may provide insights into how regulatory environments influence asset optimisation outcomes.

Further research may also incorporate dynamic market variables, stakeholder preference analysis, or alternative multicriteria methods to compare robustness and sensitivity of results. Integrating spatial analysis tools or sustainability indicators could further enhance the applicability of the model within urban and regional planning contexts.

Overall, this study underscores the importance of integrating legal, financial, and planning considerations within a structured decision-support framework for SOA optimisation. By providing both analytical rigor and practical guidance, the proposed approach contributes to more transparent, accountable, and sustainable public asset management practices.

Limitations and Underlying Assumptions

Despite its contributions, this study is subject to several limitations that warrant acknowledgement. First, the analysis is based on a single case study of state-owned land in Medan, which may constrain the generalisability of the findings to other regions characterised by different regulatory regimes, market conditions, or institutional arrangements. Second, the AHP relies on expert judgment which, although systematically assessed through consistency ratio testing, remains inherently susceptible to subjective bias. Therefore, the credibility of the AHP results depends critically on the selection of experts with appropriate technical expertise, thereby ensuring that the analysis is scientifically justifiable.

In addition, several simplifying assumptions underpin the analysis. The study assumes stability in the regulatory framework throughout the evaluation period and presumes that the identified utilisation alternatives sufficiently capture the range of feasible development options. Furthermore, financial indicators such as NPV and IRR are assumed to reflect prevailing market conditions, without explicitly accounting for potential macroeconomic volatility or dynamic changes over time.

Future research is encouraged to apply the integrated HBU–AHP framework across multiple locations, asset types, and planning contexts to test its robustness and adaptability. Comparative studies between regions or countries could further clarify the role of institutional and regulatory environments in shaping asset optimisation outcomes. Methodologically, future studies may incorporate alternative multicriteria techniques or sensitivity analyses to assess the stability of expert-based evaluations under different assumptions.

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