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Strategy of Utilization of Air Side Idle Land at Raja Sisingamangaraja XII Airport

Ardon Marbun[1], M. Iqbal Firdaus[2], Abdullah Ade Suryobuwono[3]
[1]Institute of Transportation and Logistics Trisakti, Jakarta, Indonesia, doni_1801@yahoo.com
[2]Institute of Transportation and Logistics Trisakti, Jakarta, Indonesia, iqbal@itltrisakti.ac.id
[3]Institute of Transportation and Logistics Trisakti, Jakarta, Indonesia, adesuryo.lptl@itltrisakti.ac.id

Corresponding Author: adesuryo.lptl@itltrisakti.ac.id[3]

Abstract: This research is motivated by the existence of empty land in the airside area that is not utilized but still requires routine maintenance so that it requires operational costs. This study aims to analyze strategies that can be carried out to utilize idle airside land at Raja Sisingamangaraja XII Airport. The research method is qualitative. The informants in this study are informants who provide convenience to researchers in conducting analysis and obtaining research results regarding the strategy for utilizing idle airside land. Data collection methods consist of: observation (direct observation), interviews, and Focus Group Discussions, documentation. Interactive data analysis methods are used in research and data from the research results are validated. The results of this study indicate that one strategy that can be applied in utilizing idle airport side land is to be used as a means of generating solar power so that it can reduce operational costs and can also produce electrical energy that can be used by the airport and is environmentally friendly. Based on the results of the study, airport managers can continue to observe and utilize land in the airport area. In addition, it is also hoped that airport managers can supervise and maintain solar power plants that have been selected as one of the strategies for utilizing idle airside land.

Keyword: Idle Airside Land, Solar Power Plant, Airport

INTRODUCTION

An airport is an area on land or water that serves as a location for aircraft to land and take off, facilitate passenger boarding and disembarkation, conduct cargo loading and unloading, and enable intra- and intermodal transportation transfers, equipped with necessary facilities and aviation security measures (Hamzah & Adisasmita, 2015). Airports function as organizations with diverse revenue streams and expenditures, all of which are managed by airport management. Airport operations management also includes overseeing the airport environment, which can impact the efficiency of operational costs (Zarraga, 2023). This perspective is further supported by the notion that one of the key factors contributing to the success of airport management is effective airport infrastructure management. The human resources operating within the airport must be capable of managing the facility to maximize revenue generation, ensuring the airport's financial sustainability (Gundelfinger, 2023).

According to the Directive of PT Angkasa Pura II (Persero) No. INS. 05.01/00/02/2021/0110 concerning the Control of the Company's Work Plan and Budget (RKAP) for Quarter 1 of 2021 through a Cost Leadership or Optimization Mechanism, PT Angkasa Pura II (Persero) has implemented cost-reduction measures by minimizing activities that contribute to corporate expenses. Consequently, the maintenance of certain areas has been neglected, leading to aviation security findings by regulators that remain unresolved by the management of Raja Sisingamangaraja XII Airport (DTB).

Proper maintenance and utilization of vacant land in the airside area can significantly reduce operational costs. One of the strategies to optimize these vacant areas is by transforming them into energy conservation zones, such as renewable energy sources like solar power. Installing solar panel systems in airside areas presents a viable solution for airports to achieve energy efficiency. By implementing such energy management systems, airports can reduce electricity consumption costs, ultimately decreasing overall corporate expenditures.

Beyond financial benefits, efficient asset utilization in airports can also contribute to environmental sustainability, particularly in reducing carbon emissions. The implementation of solar power plants (PLTS) in airports significantly aids in lowering greenhouse gas emissions by replacing a portion of fossil fuel consumption with renewable energy sources. This initiative aligns with the concept of an eco-airport, reinforcing the airport's commitment to environmental sustainability (Mulyani et al., 2023). The adoption of renewable energy solutions such as PLTS enhances an airport's reputation as an environmentally responsible facility, demonstrating its dedication to sustainability and corporate social responsibility (Handayani et al., 2022).

The application of solar power plants (PLTS) has extended into the aviation industry, with numerous airports worldwide integrating PLTS into their energy supply systems. Some airports rely on PLTS to supplement a portion of their electricity needs, while others have adopted PLTS as a primary energy source. For instance, Soekarno-Hatta International Airport has implemented PLTS to partially meet its electricity demands (Suartawan et al., 2025).

METHOD

This study follows several steps or procedures across different stages, as outlined by Chatra et al (2023). The Pre-Field Stage involves preliminary activities conducted before data collection, including field assessments to identify research problems and define the study's focus. The Fieldwork Stage is where researchers gather data at the study site, ensuring alignment with the research objectives. Data collection methods include observations, interviews, and document analysis, with researchers preparing necessary tools such as interview sheets, cameras, and voice recorders. Lastly, the Data Analysis Stage focuses on analyzing the collected data by identifying key principles, uncovering themes, and formulating conclusions based on the findings.

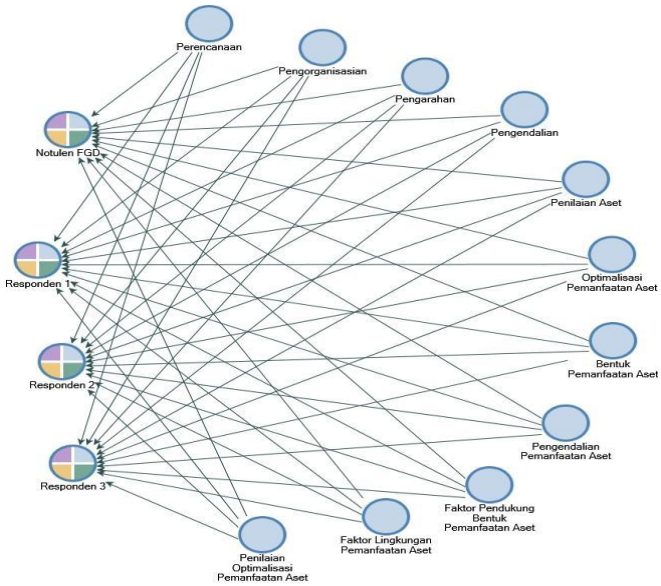
The informants selected for this study were chosen based on their ability to facilitate the research process, allowing for in-depth analysis and meaningful findings. This study involved a total of three key informants, while the Focus Group Discussion (FGD) included 13 participants, comprising regulators, local government representatives, airline representatives, and airport management personnel. The data collection methods employed in this research included direct observation, in-depth interviews, Focus Group Discussions (FGDs), and documentation. The study utilized an interactive analysis model, as described by Miles in Hermawan (2016), where data analysis was conducted concurrently with data collection and continued after all data had been gathered. To process and analyze the research data, the researcher employed the *Nvivo* software as an analytical tool.

RESULTS AND DISCUSSION

Research Findings

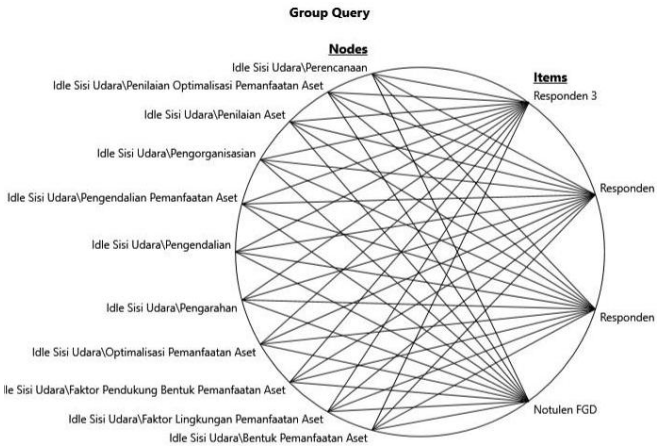
1. Data Triangulation

Triangulation is a technique for verifying the validity of data by utilizing other data sources beyond the primary data for comparison or cross-checking purposes. In this study, the researcher employed Nvivo software to conduct data triangulation, incorporating data obtained from interviews with research respondents as well as the results of the Focus Group Discussion (FGD), which were documented in the form of FGD minutes. The triangulated research findings are presented in Figures 1 and 2 below.



Source: Processing with Nvivo Software by Author

Figure 1. Triangulation of Sources Using Inter-Code Linkages



Source: Processing with Nvivo Software by Author

Figure 2. Group Query Relationship Between Codes

Based on Figures 1 and 2 presented earlier, the intersecting lines between each respondent and the FGD results indicate consistency in the findings. This alignment confirms that the data triangulation falls within the category of validity.

Assets Management

Sisingamangaraja XII International Airport (IATA: DTB) requires high operational costs, which ideally should be accompanied by a proportional return on investment to maintain a balance between operational expenses and revenue. However, in reality, the expenditures

incurred are not proportional to the revenue generated. These expenses include employee costs, operational expenses, as well as general and administrative costs. A significant factor contributing to these high expenditures is the presence of idle land within the airside area, which remains underutilized due to its location, making it unsuitable for commercial use.

Currently, the land is overgrown with dense vegetation and tall trees, which pose a risk to aviation safety. The company allocates a substantial budget for maintaining this idle land, in addition to its obligations for land lease payments and annual land and building taxes payable to the North Tapanuli Regional Government. The potential for innovation in managing idle land emerges from the awareness of environmental, social, and economic challenges associated with its optimal utilization. Furthermore, advancements in technology and management practices present opportunities for more efficient and sustainable solutions.

Exploring innovative potential in the management of idle land requires careful planning, direction, and control to ensure that such potential is beneficial and profitable for the airport. This process is an integral part of asset management, aiming to maximize asset utilization while maintaining operational efficiency and avoiding disruptions to airport activities.

The planning of idle land management in the airport's airside involves formulating detailed strategies for land utilization based on past and ongoing land use. This serves as a foundation for determining future actions in optimizing land use. One of the key aspects of this planning is the inventory of idle land assets available for management within the airside area.

Asset inventory plays a crucial role in an organization as it provides comprehensive records of property or assets in use. Accurate and complete asset inventory data is essential for supporting planning and budget allocation related to asset management. Moreover, such data serves as valuable information for stakeholders responsible for monitoring the airport's performance, including its asset management practices. One respondent emphasized the importance of this process, stating:

"The planning process in supporting the utilization of idle land is a critical step for airport management. Through this process, the available land can be identified and further discussed to determine its optimal use in the airside area."

Following the planning stage, the next step involves organizing the implementation process. This stage focuses on devising tactics and strategies formulated during planning to ensure that land utilization aligns with its intended objectives. It also aims to maintain managerial stability, enhance profitability, and achieve effective and efficient operations. The ultimate goal is to ensure that idle land utilization meets its intended purpose. As one respondent stated:

"The planned strategies should be followed by proper execution, ensuring that the utilization of idle land in the airside area proceeds as intended. Effective management should prevent any disruptions to airport traffic, generate financial benefits for the company, and transform the land into a valuable asset rather than an ongoing maintenance expense."

To proceed with the previous stages, the actuating phase is implemented, which involves directing efforts to achieve the optimal utilization of idle airside land at the airport. This phase focuses on guiding and motivating employees to collaborate in maximizing the land's use, ensuring that it provides substantial benefits to the company. One respondent emphasized the importance of this directive, stating:

"Guidance is provided to employees to enhance their understanding of the utilization of idle airside land, which is currently overgrown with shrubs and incurs operational costs for maintenance. Additionally, this directive aims to inform employees about the intended form of land utilization."

Beyond the previously outlined stages, the controlling phase is also crucial for the company in ensuring the effective execution of idle airside land utilization. Controlling refers to the process of monitoring and ensuring that all planned, organized, and implemented activities align with the targeted objectives, even in the face of changes within the company or

its operational environment. This phase is essential to maintain proper administrative oversight of land management. A respondent highlighted the significance of this phase, stating:
"After completing the planning, organizing, and directing stages, the next critical step is control. This phase is essential to ensure that the planned utilization of idle airside land aligns with the expected targets, including adjustments to any changes in the surrounding area or within the organization itself."

The findings of this study align with previous research conducted by Suwandi et al. (2022), which underscores that airport operators must implement asset management practices, as effective asset management enhances airport operational performance, including profitability. Additionally, research by Simatupang et al. (2023) highlights that asset management within a company requires several key stages: asset inventory, legal audit, asset valuation, optimization of utilization, and monitoring and control.

Asset Utilization

The management of the airside area at Raja Sisingamangaraja XII International Airport must be conducted efficiently and effectively. The utilization of idle airside land should always consider operational safety and security aspects, as this land is located near the runway and aircraft traffic at the airport.

Idle airside land at Sisingamangaraja XII Airport must be optimized to become productive land, which can reduce maintenance costs and potentially increase the company's revenue. This perspective aligns with the respondent's statement:
"The current idle airside land must be utilized while maintaining airport operational safety and security aspects. Such utilization is also expected to reduce operational costs, as the company currently incurs monthly expenses for maintaining and trimming shrubs or vegetation growing on the idle airside land."

According to the follow-up mitigation results of the Aviation Security Audit findings, idle airside land within the restricted security area (Daerah Keamanan Terbatas/DKT) contains overgrown shrubs and trees obstructing visibility during patrols or inspections at the end of runway 09 (western side of the airport). Given this condition, land utilization should be implemented in a manner that does not interfere with airport operational activities.

Airports possess various assets and infrastructure that require operational costs for management, and these expenses can be offset by optimizing existing assets and infrastructure. This issue becomes even more critical for smaller airports, where operational costs often exceed revenue, necessitating strategies to address and accommodate this challenge. The current challenges in the airport business demand efficient financial management, which is also linked to environmental and security issues. Thus, airport and facility management must be conducted with careful consideration of environmental utilization and user safety (Voger, 2016). Airport management also includes the utilization of vacant land, which may undergo changes based on the airport's development. The utilization of such land should align with its designated function to prevent improper use and potential negative impacts (Sillia & Yuliastuti, 2020).

According to the results of the Focus Group Discussion (FGD), the preferred approach to utilizing idle airside land is one that directly benefits the airport. Such utilization should not only be advantageous but also contribute to the airport's revenue and operations. One proposed solution is transforming idle airside land into a solar power generation facility.

A solar power plant is one of the potential uses for idle airside land, as it supports the airport's efforts to optimize its infrastructure and enhance operational efficiency. Electricity is a critical resource for sustaining airport operations, and at Sisingamangaraja XII Airport, electricity demand has increased significantly from 64 kVA to 197 kVA.

"The idle airside land at Sisingamangaraja XII Airport can be utilized as a site for a solar power plant, as its use must not interfere with flight activities. Additionally, the

establishment of a solar power plant serves as a strategic initiative by airport management to meet the airport's electricity demands, supporting various operational facilities."

The utilization of idle airside land for solar power generation aligns with asset optimization principles, maximizing asset functionality while minimizing costs, including land management expenses and energy-related operational costs. With the integration of solar energy, the airport can reduce its dependency on external electricity sources, making operations more cost-efficient. This is supported by the respondent's statement:

"The idle land, which is currently overgrown with shrubs and trees, requires monthly maintenance costs. However, repurposing it for a solar power plant can reduce these operational expenses. Furthermore, such an initiative benefits airport management by decreasing electricity costs paid to PT PLN. If the solar power plant can fully meet the airport's operational energy needs, electricity expenses may be significantly reduced or even eliminated altogether."

In recent years, including 2023, the first quarter of 2024, and the second quarter of 2024, airport expenditures have remained high. These expenditures include employee costs, operational expenses, and general administrative costs. A substantial portion of these expenses is attributed to the maintenance of idle airside land, which cannot be converted into commercial use due to its location near aircraft operations. The current state of this land—overgrown with shrubs and tall trees—poses a potential risk to flight safety. Additionally, the airport incurs significant expenses for land maintenance, lease payments, and land and building taxes payable to the North Tapanuli Regional Government.

The push for innovative idle land management stems from growing awareness of environmental, social, and economic challenges associated with land optimization. Advancements in technology and modern asset management practices have also introduced more efficient and sustainable solutions (Shi et al., 2015).

Establishing a solar power plant represents a best-practice approach in asset management, transforming previously underutilized land into a valuable resource that contributes directly to airport operations. Airport authorities have increasingly focused on optimizing land use, recognizing that prior efforts in land development and utilization have not been fully realized.

To optimize the use of idle airside land for a solar power plant, strict supervision must be implemented to ensure that only authorized personnel can access the area. The airside is a restricted zone within the airport environment, where activities requiring a high level of security are conducted. This aligns with a respondent's statement:

"To optimize the use of idle airside land for a solar power plant, strict supervision is essential. This area is inherently a high-security zone, and access should be limited. Once the solar power plant is established, only authorized personnel and individuals with specific responsibilities should be allowed to enter."

Facilities within the airport and terminal play a critical role in both revenue generation and operational expenditures. Therefore, airport management must ensure proper management of all airport facilities and the surrounding environment (Jahn, 2022). The management of airside facilities, including their spatial organization, directly impacts the operational efficiency of the airport and influences the associated costs of maintaining airside infrastructure (Tatjana & Obrad, 2020).

The findings of this study on airport asset utilization align with previous research conducted by Adrian (2017), which emphasized that the success of an airport depends on how well its assets are utilized to generate economic benefits. One of the key asset utilization strategies identified at Sisingamangaraja XII Airport is repurposing idle airside land for a solar power plant.

This study also corroborates previous research by Bimantara et al. (2021), which highlighted the advantages of airport solar power plants (PLTS). According to their findings, PLTS can be installed on various airport spaces, including rooftops, parking areas, and unused land adjacent to runways. The installation process is relatively simple and does not pose

significant environmental risks. Moreover, a solar power plant can serve as an additional revenue source for the airport, further supporting its financial sustainability.

CONCLUSION

The idle airside land at the airport is not being utilized optimally, resulting in overgrowth of shrubs and tall trees, which pose operational risks to flight safety. In reality, this idle airside land has significant potential for utilization, which could help reduce operational costs and generate financial benefits for airport management.

The idle airside land can be repurposed as an energy conservation area, specifically for electricity generation, by installing a solar panel system. The utilization of solar energy at Sisingamangaraja Airport is highly beneficial for operational activities, as numerous airport facilities rely on a single-phase electrical system.

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