E-3050-9637
P-2795-3222

10.5281/zenodo.17367801 Vol. 08 Issue 09 Sept - 2025 Manuscript ID: #02118

DEFENSE BUDGET PREPARATION BASED ON LIFE CYCLE COST (LCC) AS AN EFFORT TO IMPROVE THE READINESS OF TNI'S DEFENSE EQUIPMENT

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Abstract

This study analyzes the Life Cycle Cost (LCC)-based defense budgeting as an effort to improve the readiness of the Indonesian National Armed Forces (TNI)'s Main Weapons Systems (Alutsista). To date, Indonesia's defense budget has tended to focus on the procurement of new defense equipment, while aspects of maintenance, modernization, and long-term logistical support have not been fully accommodated. This creates an imbalance between capital expenditures and maintenance expenditures, which has resulted in a degradation of the operational readiness of defense equipment. This study uses a qualitative approach with descriptive-analytical methods, through in-depth interviews, observations, and documentation studies at the Ministry of Defense, TNI Headquarters, the three branches of the TNI, and defense experts. The results indicate that the LCC concept has not been fully integrated into defense budget planning due to regulatory constraints, limited life cycle cost data, and a lack of human resource capacity. However, there is a strong awareness that implementing LCC can improve transparency, efficiency, and fiscal sustainability in supporting the readiness of TNI's defense equipment. This study recommends the need for budget regulation reform to enable multi-year budgeting, strengthen the maintenance and operational cost database, and improve human resource competency in LCC analysis. Furthermore, synchronization between institutions (Ministry of Defense, Indonesian National Armed Forces (TNI), Ministry of Finance, Bappenas, and economic experts) is key to realizing more realistic budget planning oriented toward long-term readiness. With consistent implementation of the LCC, the defense budget will not only be more effective and efficient but will also ensure the TNI's continued combat readiness in the face of dynamic global threats.

Keywords

Defense Budget, Life Cycle Cost (LCC), Defense Equipment, TNI Readiness, Fiscal Efficiency.

How to cite: Irwanto, B., Saputro, G. E., & Novalino, R. D. (2025). DEFENSE BUDGET PREPARATION BASED ON LIFE CYCLE COST (LCC) AS AN EFFORT TO IMPROVE THE READINESS OF TNI'S DEFENSE EQUIPMENT. *GPH-International Journal of Social Science and Humanities Research*, 8(9), 24-30. https://doi.org/10.5281/zenodo.17367801.

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Introduction

National defense is a fundamental aspect in maintaining the sovereignty and territorial integrity of the Republic of Indonesia. In the increasingly dynamic regional geopolitical context, the need for modernization and increased readiness of primary weapon systems (alutsista) is becoming increasingly urgent. However, Indonesia's defense budgeting model has tended to focus on the procurement of new defense systems. As a result, support for maintenance, modernization, and long-term sustainability has not been fully accommodated. This situation has the potential to create an imbalance between capital expenditures and maintenance expenditures, ultimately reducing the TNI's readiness rate (Sukma, 2020).

One approach that can address this issue is Life Cycle Cost (LCC). LCC is a cost calculation method that takes into account the total cost of ownership of an asset from acquisition, operation, maintenance, to disposal (Fabrycky & Blanchard, 1991). By using this approach, defense budget planners can obtain a more comprehensive picture of the long-term costs of defense systems, allowing for more efficient and sustainable procurement and maintenance decisions. This paper aims to analyze the relevance of applying LCC to Indonesia's defense budgeting, identify implementation challenges, and provide strategic recommendations for relevant stakeholders. In various developed countries, such as the United States and European countries, the Life Cycle Cost (LCC) concept has been applied in defense budget management to ensure the long-term readiness of defense equipment (Blanchard & Fabrycky, 2011). This concept considers all costs associated with a system's life cycle, from procurement, operation, maintenance, to disposal or decommissioning (Kossiakoff et al., 2011).

This approach allows the defense budget to be managed more efficiently and effectively, thereby maintaining the long-term readiness of defense equipment. However, in Indonesia, the application of Life Cycle Cost (LCC) in defense budget planning still faces several challenges. First, regulations and budget policies have not yet fully accommodated this approach comprehensively, resulting in short-term planning and insufficient consideration of the total life cycle costs of defense equipment (Yuniarto, 2020). Second, there are limitations in human resources and management systems capable of effectively implementing LCC in the budgeting process (Setiawan, 2021). Third, there is a lack of research and academic studies specifically addressing LCC implementation in the context of Indonesian defense, particularly in improving the readiness of the Indonesian National Armed Forces (TNI) defense equipment (Wijaya, 2022).

Based on this gap, this study seeks to address the gap in literature and policy by analyzing how Life Cycle Cost (LCC)-based defense budgeting can improve the readiness of the Indonesian National Armed Forces (TNI) defense equipment. By understanding the implementation and challenges of this concept, it is hoped that this research can provide more effective policy recommendations for managing Indonesia's defense budget going forward. This study aims to evaluate how the application of the Life Cycle Cost (LCC) concept in defense budgeting can improve the readiness of the TNI's defense equipment. With LCC-

based budget planning, it is hoped that the readiness and operational sustainability of defense equipment can be better assured, while the efficiency of defense budget use can be improved.

Research Methods

This research uses a qualitative approach with descriptive-analytical methods. A qualitative approach was chosen because this research focuses on understanding defense budgeting phenomena, policies, and practices from the perspectives of actors and decision-makers. Data were collected through in-depth interviews with officials from the Ministry of Defense, the Indonesian National Armed Forces (TNI) Headquarters, and planning staff from all three branches of the TNI. Additionally, a documentary study was conducted by reviewing the Ministry of Defense's Strategic Plan (Renstra), the TNI's Strategic Plan (Renstra), and defense budget realization reports for the past five years.

Secondary data was obtained from academic literature, reports from international institutions such as SIPRI and the World Bank, and official government publications. Data analysis was conducted using the methods of reduction, presentation, and verification (Miles & Huberman, 1994). The results of the analysis were used to identify patterns regarding the challenges of LCC implementation, opportunities for implementation, and their impact on defense fiscal effectiveness.

Results and Discussion

Using the query and matrix coding features in NVivo, researchers found a consistent pattern in which all interviewees linked the low readiness of defense equipment to a budgeting system that was not yet LCC-based. The relationship between the theme of annual budget limitations and declining readiness of defense equipment was very strong, while the implementation of LCC was seen as a strategic solution.

The results of data analysis using the query and matrix coding features in NVivo revealed a consistent pattern emerging from all interviewees. The majority of respondents stated that the defense budgeting system, which remains annual and conventional, is the primary factor directly impacting the low operational readiness of the Indonesian National Armed Forces (TNI) defense equipment. This confirms that limitations in the budget planning model, which does not take into account the full life cycle costs, have led to an imbalance between the maintenance, modernization, and operational sustainability needs of defense equipment.

Furthermore, the relationship between the theme of "annual budget limitations" and "decreasing readiness of defense equipment" was identified very strongly in the data processing results. Nearly all sources emphasized that these limitations not only create problems with budget availability but also impact maintenance delays, limited spare parts procurement, and difficulties in implementing weapons system modernization. Thus, the resulting relationship can be understood as a causal chain, where annual budget inadequacies directly impact combat readiness and the effectiveness of defense equipment.

On the other hand, the implementation of Life Cycle Costing (LCC) emerged as a strategic solution seen as addressing fundamental issues within the defense budget system. The analysis revealed that LCC allows for more comprehensive budgeting, considering all costs incurred throughout the defense equipment's lifespan, from acquisition, operation, maintenance, to disposal. This approach allows for more targeted budgeting to support the long-term sustainability and readiness of defense equipment. Sources agreed that without the implementation of LCC, the classic problems of budget limitations and inefficiency would continue to recur.

A key finding from this analysis also demonstrates a shared awareness that transparency and accountability in defense budget planning can be better ensured through the implementation of the LCC. The interviewees assessed that this mechanism can minimize potential waste and strengthen accountability for the use of substantial defense funds. In other words, the emerging relationship patterns are not limited to the technical aspects of defense equipment readiness but also relate to more modern, efficient, and long-term budget governance.

Based on the analysis of these patterns and relationships, it can be concluded that a transformation to an LCC-based budgeting system is an urgent need to improve the readiness of the Indonesian National Armed Forces (TNI)'s defense equipment. The patterns identified through NVivo matrix coding show that all interviewees consistently emphasized the close relationship between annual budget limitations and declining readiness and viewed LCC as a strategic solution. Therefore, adopting LCC is not merely an option but a strategic step that must be implemented immediately to ensure the nation's future defense superiority.

In the final stage, triangulation of the coding results was conducted to ensure consistency of the findings. NVivo analysis results indicate that all interviewees agreed that preparing a Life Cycle Cost (LCC)-based defense budget is a crucial and urgent step to improve the readiness of the Indonesian National Armed Forces (TNI) defense equipment. This agreement is demonstrated by the frequency of the dominant "LCC" theme, which is connected to the main issue of defense equipment readiness.

The research findings indicate that Indonesia's defense budget has not yet fully adopted the LCC approach. Spending is predominantly directed toward the procurement of new, politically visible defense equipment, while long-term maintenance needs are often compensated for through annual budget reallocations. As a result, the readiness rate of several strategic defense equipment, such as the C-130 Hercules transport aircraft and Indonesian Navy warships, has fluctuated significantly (LIPI, 2021).

The implementation of LCC will provide benefits in three main aspects. First, fiscal efficiency, as the government can anticipate maintenance and modernization costs early, thus reducing emergency expenditures due to sudden breakdowns. Second, transparency, as LCC calculations produce a more realistic picture of total costs, thereby minimizing the risk of

underbudgeting. Third, long-term combat readiness, where defense equipment can be supported by a consistent sustainment budget, thereby increasing operational availability.

However, this study also identified several implementation obstacles. First, fiscal regulations in Indonesia are still based on an annual budget cycle, which complicates the implementation of multi-year budgeting for managing the life cycle of defense equipment (Basri, 2022). Second, limited historical data on operating and maintenance costs makes it difficult to accurately calculate LCC projections. Third, human resource capacity in planning and budgeting is still limited in the LCC methodology. Fourth, coordination between institutions (the Ministry of Defense, the Ministry of Finance, Bappenas, and the House of Representatives) is not yet fully synchronized in developing a life cycle-based budget framework. Comparative studies with other countries, such as the United States and Australia, show that LCC implementation can be successful if supported by regulations that allow for multi-year commitments, performance-based contracts, and strengthened cost information systems (GAO, 2017). Therefore, LCC implementation in Indonesia requires fiscal policy reform, enhanced data capacity, and improved human resource competency.

Based on the overall analysis, the final interpretation indicates that the conventional annual budgeting system is no longer relevant to support the readiness of the Indonesian National Armed Forces (TNI) defense equipment. Observation data, documentation, and NVivo coding consistently confirm that budgetary issues are a major factor in declining operational readiness. This interpretation emphasizes that the solution cannot simply be an increase in the budget but must involve fundamental changes to the budget planning framework.

The application of Life Cycle Costing (LCC) emerged as the most rational and strategic solution. By using LCC, budget planning can consider the entire life cycle of defense equipment, allowing for more planned management of maintenance, modernization, and disposal. This interpretation demonstrates that LCC adoption is not merely a technical necessity but part of a broader strategy to improve the efficiency, transparency, and accountability of defense budget management. Thus, LCC is seen as the key to answering the challenges of TNI's long-term defense equipment readiness.

Conclusion

This study concludes that the implementation of LCC in Indonesia's defense budget is highly relevant for improving fiscal efficiency, transparency, and the combat readiness of the Indonesian National Armed Forces (TNI). However, structural constraints such as limited fiscal regulations, data, human resources, and inter-agency coordination remain major obstacles. Therefore, strategic steps are needed to gradually integrate LCC into the national defense planning system.

Recommendations

First, the government needs to reform budget regulations by allowing for multi-year budgeting and performance-based logistics. Second, the Ministry of Defense and the TNI must develop an integrated defense equipment lifecycle cost database, accompanied by human resource training programs to improve LCC analysis competency. Third, the use of modern maintenance technologies, such as Condition-Based Maintenance (CBM) and Reliability-Centered Maintenance (RCM), needs to be expanded to reduce operational costs. Fourth, an inter-agency coordination forum is needed between the Ministry of Defense, the Ministry of Finance, Bappenas, and the House of Representatives (DPR) to develop a consistent long-term budget framework. Fifth, a pilot project for the implementation of LCC on strategic defense equipment should be conducted as a learning model and initial evaluation. With these recommendations, it is hoped that the implementation of LCC will not only be a theoretical concept, but can be operationalized in real terms as a strategic solution to increase the effectiveness of the use of the defense budget while ensuring the sustainability of the TNI's combat readiness.

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