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*Original Article*

# Financial Analysis of Ventilation Infrastructure Development Using Discounted Cash Flow – Based: Evidence from the CGSS-CGHT Underground Gold Mine

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***Abstract:*** *This paper a feasibility study on the development of new ventilation infrastructure in the CGSS- CGHT section of an underground gold mine. Two alternative production scenarios are evaluated: scenario 1, where the mine continues to operate without a new ventilation shaft, and scenario 2, where a new shaft is constructed to access deeper ore. The analysis combines a strategic business assessment – using PESTLE, VRIO, and SWOT frameworks – with a discounted cash flow (DFC) valuation for each scenario. Project performance is measured using net present value (NPV), internal rate of return (IRR), and payback period, with cash flows discounted at the project's weighted average cost of capital. Sensitivity tests are carried out on gold price and operating costs to evaluate robustness. The results show that both scenarios are financially feasible. However, scenario 2 consistently generates higher value, with an NPV of USD 74.05 million compared to USD 66.77 million foe scenario 1, an IRR of 47% versus 44%, and a similarly short payback periode of less than one year. Scenario 2 also delivers lower until costs (COGS and OPE per ounce) and higher cumulative royalty payments to the government. Beyond the financial indicators, the new ventilation shaft in technically justified as it enables safer access to deeper reserves and supports more reliable operations. The study concludes that scenario 2 is the most appropriate strategy to maximize the remaining gold reserve value, enhance shareholder wealth, and maintain safety and regulatory compliance. A phased implementation roadmap is proposed to support execution with minimal disruption to ongoing operation.*

***Keywords:*** *DCF, Gold Mine, Feasibility Study, Underground, Ventilation.*

## I. INTRODUCTION

Mining operation often reach a critical decision point as they approach the and of a mine's planned life: whether to accept declining production or to invest in additional infrastructure to unlock remaining reserves at depth. This is the situation faced by the underground gold mine examined in this study. The deposit's easily accessible ore is nearly depleted, while the remaining reserves in the CGSS – CGHT section lie deeper and are more challenging to mine.

In underground operations, ventilation is one of the key determinants of whether deeper levels can be mined safely and efficiently. As working depths increase, miners face higher temperatures, reduced air quality, and a greater risk of harmful gases. Inadequate ventilation exposes workers to heat stress, respiratory hazards, and gas build – up, and it can also reduce equipment productivity. A dedicated ventilation shaft therefore becomes a critical enabler for safely accessing deeper ore and sustaining production.

This paper evaluates the business case for constructing a anew ventilation shaft at the underground gold mine by comparing two options: continuing with the current plan without a new shaft (scenario 1) and investing in, then operating with, the new shaft (scenario 2). Under scenario 2, the mine life can be state – owned enterprise to optimize the use of Indonesia's mineral resources. The study integrates strategic and financial perspectives. The external and internal business environment is first assessed using PASTLE (political, economic, social, technological, legal, environmental) and VRIO (value, rarity, imitability, organization) frameworks. The key findings are then summarized in a SWOT matrix. This strategic view is followed by a DCF analysis of each scenario's cash flows to estimate NPV, IRR, and payback period, complemented by sensitivity analysis on gold prices and operating costs.

The remainder of the paper is organized as follows. The next section outlines the relevant literature and concepts, including strategic analysis tools and financial valuation methods. This is followed by the results and discussion section, which presents the strategic analysis, compares the financial outcomes of the two scenarios, and explains the technical and implementation aspects of the preferred option. The final section concludes with the main findings and implications for decision – makers.

## II. LITERATURE REVIEW

Ventilation systems are critical to underground mining operationsnot only for ensuring worker safety but also because they represent 25–50% of total mine energy consumption and up to 40% of total operating costs (De, The, & Buchan, 2015). The Discounted Cash Flow (DCF) method is a cornerstone in evaluating mineral projects due to its focus on projected net cash flows and capital investment over time. (Shivute & Tholana, 2022) highlight its utility in comparing multiple mining scenarios by modeling life-of-mine revenue, operational costs, and discount rates to yield Net Present Value (NPV) and Internal Rate of Return (IRR) estimates. However, traditional DCF assumes deterministic inputs, limiting its ability to capture project uncertainty particularly problematic in mining, where factors like ore grade and gold prices are inherently volatile (Shivute & Tholana, 2022). Similarly, sensitivity and scenario analyses are routinely conducted alongside DCF to test project robustness under varying assumptions (e.g. changes in gold price, operating costs, or capital expenditures). For instance, the aforementioned gold mine study found that even under adverse scenarios of reduced revenues or higher costs, the project's NPV remained positive, demonstrating resilience to uncertainty (Noerman & Faturohman, 2024)

Evaluating a business scenario in the mining industry requires understanding both external and internal factors. PESTLE analysis is a widely used framework for scanning the macro-environment surrounding a project(Rastogi & Trivedi, 2022). Complementing this, a VRIO analysis assesses the firm's internal resources and capabilities for sustainable competitive advantage. VRIO prompts analysis of whether resources are valuable, rare, costly to imitate, and well-organized within the company, as originally conceptualized(Barney, 1991). Together, PESTLE and VRIO provide inputs to a SWOT analysis, which categorizes key findings into internal strengths and weaknesses and external opportunities and threats. SWOT is particularly useful for summarizing how a mining project's internal capabilities align with its external environment, guiding strategic choices.

## III. RESULTS AND DISCUSSION

### *A) Strategic Analysis: PESTLE, VRIO and SWOT*

The pestle analysis reveals several external factors that influence the feasibility of continued operations at the underground gold mine. On the positive side, the economic outlook for gold is favorable. Respondents in the survey rated the current and expected gold price environment very highly, reflecting recent price increases and optimistic forecasts. This expectation supports revenue projections and encourages further investment in the mine. From a legal and political standpoint, the regulatory environment in Indonesia is also perceived as supportive. The mining license regime is relatively stable, and the government shows willingness to extend operations at existing mines, especially those owned by state – owned enterprises that contribute significantly to state revenue. However, external economic risks cannot be ignored. Macroeconomic volatility and cost inflation – particularly in fuel, labor, and consumables – are recognized as threats that can erode margins. Environmental and social aspects are also important. While there are no major environmental obstacles identified at present, the mine must continue to manage its environmental performance and community relations to maintain its social license to operate.

Overall, the external environment can be described as generally favorable for continued operations, especially under a strategy that fully utilizes existing assets and captures the benefit of strong gold prices. Scenario 2, which expands production through the addition of a new ventilation shaft, is well positioned to take advantage of these conditions.

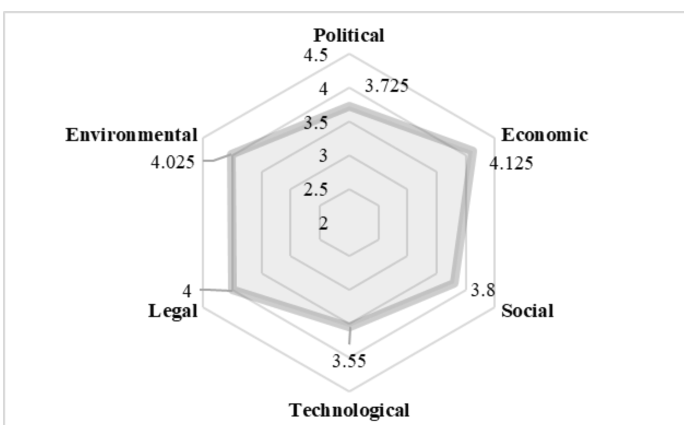


**Figure 1. Spider Web Chart of PESTLE Questionnaire**

The VRIO analysis focuses on internal resources and capabilities. The mine has several important strengths:

1. An experienced underground workforce with deep tacit knowledge of the deposit and local conditions. This expertise is valuable, difficult to imitate, and effectively organized within the company.
2. A strong geological database and detailed understanding of the pongkor orebody, which reduces geological uncertainty and supports more reliable mine planning.
3. Integration with a downstream refinery and established branding, which facilitates refining an marketing of gold products.
4. Long – standing relationships with stakeholders and a track record in CSR programs, which have built trust and support in surrounding communities.
5. A culture of good mining practices, occupational health and safety, and continuous improvement, supported by formal certifications.
6. At the same time, several weaknesses are evident. Existing mining technology and ventilation systems are not perceived as cutting – edge, indicating room for improvement in technical efficiency and safety – precisely the issue addressed by the new ventilation project. In addition, workforce succession planning is only moderate, with limited depth in certain skills, highlighting the need for ongoing training and capability development.

Combining the PESTLE and VRIO findings, a SWOT matrix is constructed. The matrix shows that the mine's internal strengths – skilled people, strong geological knowledge, integrated infrastructure, and stakeholder relationships – can be leveraged to exploit external opportunities such a high gold prices, supportive regulation, and the potential to apply more advanced technologies. At the same time, the weaknesses and threats underscore the importance of upgrading ventilation, managing cost escalation, and maintaining environmental and social performance as mining moves deeper

**Table 1: SWOT Analysis**

| **Strengths (S)** | **Weaknesses (W)** |
|---|---|
| S1: Experienced multidisciplinary workforce with domain knowledge | W1: Public–private collaboration gaps with academic research institutions |
| S2: Comprehensive R&D knowledge of the Bangladesh context | W2: Limited infrastructure, commercialization, and funding support |
| S3: Integration with demonstration and training centers (e.g., training academies) | W3: Outdated research infrastructure and limited scalability |
| S4: Established ICT, automation, and analytics programs | W4: Lack of systematic evaluation and monitoring frameworks |
| S5: Good mining, production, GIS systems, and optimization capabilities | W5: Skill gaps in advanced analytics and AI-driven modeling |
| S6: Operational excellence culture and continuous improvement | |
| S7: Strong field exposure and government-backed institutional support | |
| **Opportunities (O)** | **Threats (T)** |
| O1: Growing renewable and digital agriculture initiatives | T1: Rapid technological changes increasing obsolescence risk |
| O2: Expansion of digital services and smart monitoring systems | T2: Funding uncertainties and budget constraints |
| O3: International collaborations and knowledge-sharing platforms | T3: Increased competition from private-sector research organizations |
| O4: Policy-driven emphasis on sustainable resource management | T4: Regulatory and bureaucratic bottlenecks |
| O5: Potential access to advanced innovation financing (e.g., SOE reforms, ESG investments) | T5: Risks of technological gaps and brain drain |

***B) Financial Analysis: Scenario Comparison and Sensitivity***

Production and cash flow assumption, both scenarios were evaluated over the remaining mine life with detailed cash flow modeling. Revenue was projected from gold and silver output, using price forecast from a consensus of international banks and institutions. Scenario 2 assumes a slightly higher production profiles, especially from 2026 onwards, due to improved access to deeper ore and better airflow allowing higher utilization of equipment. The cost models include capital expenditure (CAPEX) for mine development, ventilation and infrastructure as well as Cost of Goods Sold (COGS) and operating expenses (OPEX) for each scenario. Scenario 2 naturally incurs additional CAPEX for sinking the ventilation shaft and associated development, but benefit from operating cost efficiency. Both scenarios were evaluated at a discount rate equal to the project's WACC (Weighted Average Cost of Capital). Based on corporate and market data, the WACC was around mid-single-digit percent (cost of equity 5.66% and with moderate debt WACC was of similar order). Table 2 summaries the key financial outcomes of the DCF analysis for each scenario,

**Table 2: Comparison Scenario 1 & Scenario 2 NPV, IRR and PBP**

| Description | Unit | Scenario 1 | Scenario 2 |
|---|---|---|---|
| NPV | USD million | 67 | 74.11 |
| IRR | % | 44 | 47 |
| PBP | year | 0.90 | 0.91 |

Both scenarios generate robust financial metrics, reflecting the rich ore left in the Underground Gold Mine and relatively low remaining capital intensity (much infrastructure is already in place). Scenario 1(no new shaft) yields a positive NPV of $67 million and an IRR of 44%, indicating that even without additional investment the mine can profitably extract its shallower remaining reserve. Scenario 2, however, shows a higher NPV of $74.11 million and IRR of 47%. The incremental; value from scenario 2 ($7.3 million higher NPV) demonstrate that the new ventilation infrastructure more than pays for itself, add substantial value by enabling additional ore extraction and improving operational efficiency. The IRR for scenario 2 is slightly higher, suggesting the return on the extra investment is attractive. Both scenarios have extremely short payback period (less than 1 year) due to immediate cash flows from already developed mine, this indicates low risk of capital recovery in both cases. Scenario 2's payback (0.91 years) is essentially the same scenario 1's (0.90 years), meaning the new shaft investment does not materially delay cost recovery, likely because it ramps up quickly and enhances production early on.

Beyond these headline figures, scenario 2 improves unit economic. By 2026-2030, mining with the ventilation shaft reduces the average cost per ounce of gold (COGS/ OPEX) compered to scenario 1, because ventilation allows for more efficient deployment of labor and equipment (less downtime from heat or fumes) ad support a steadier production rate spreading fixed costs. Additionally, the higher total goals output in Scenario 2 results is greater royalty payments to the government, enhancing the project's contribution to state revenue. These qualitative financial benefits align with the strategic goal of the company and stakeholder.

Sensitivity tests were conducted on the most uncertain variables: gold price and operating cost. The NPV sensitivity graph demonstrate that project NPV is far more sensitive to gold price fluctuation than to change in cost. A ± 10% change in gold prices produce a much larger NPV swing than an equivalent percentage change in OPEX, which is typical for gold mining projects. Importantly, across all tested range of gold price and cost scenarios, Scenario 2's NPV remined higher than Scenario 1's. Even at low gold price assumption, the new ventilation shaft maintained a NPV advantage, confirming that the investment is value accretive under most conditions. The breakeven gold price (at which NPV = 0) was calculated to be lower for scenario 2 than scenario 1, implying scenario 2 can withstand slightly lower gold prices before becoming uneconomic. Both scenarios' NPV turned negative only under extreme downside price cases well below current market consensus.

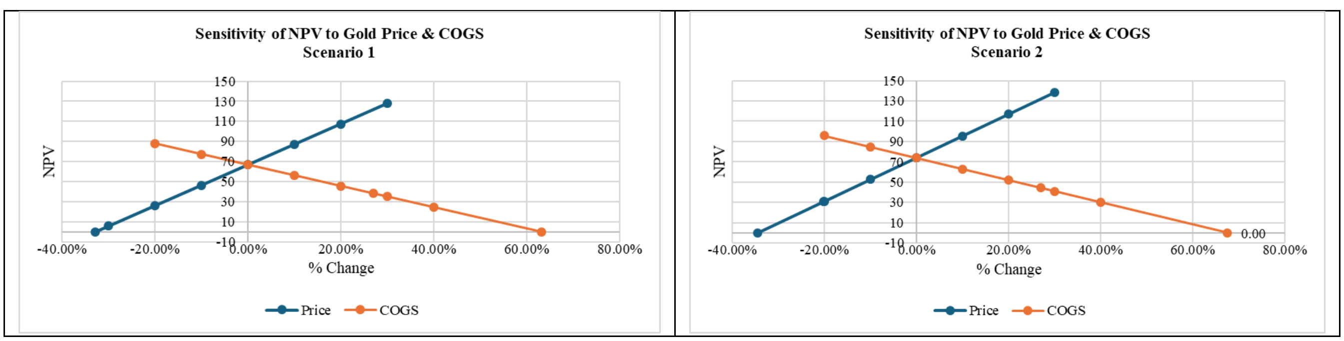


**Figure 2. Sensitivity Analysis**

These sensitivity results underscore that gold price risk is the dominate uncertainty, a common situation in precious metals projects. Thus, while Scenario 2 is financially superior, its success still largest hinges on gold market conditions. The analysis suggest management should prioritize monitoring gold price trends and perhaps hedging or other price risk mitigation strategies as part of the project risk management. Meanwhile, the relatively minor sensitivity to operating cost indicates that normal cost control measures are sufficient. The new ventilation shaft itself contributes positively to his robustness by reducing the likelihood of unexpected downtime or regulatory shutdown.

### *C) Technical Justification for Ventilation Infrastructure*

Apart from the quantitative financial metrics, Scenario 2 carries significant technical and operational advantages that bolster its desirability. The new ventilation shaft provides a dedicated airway to the deeper CGSS-CGHT section of the mine, which is critical for maintaining acceptable working conditions as depth increases. By improving airflow, the shaft will mitigate underground hazards such as heat buildup, noxious gas accumulation, and low oxygen levels. This directly addresses the weakness identified in the SWOT (current ventilation not advanced) and ensures compliance with Indonesian mining safety regulations and international best practices for mine ventilation. Better ventilation also means more reliable equipment performance – machinery will operate closer to optimal temperatures and with less dust interference, reducing maintenance downtime. These factors collectively enable higher and more stable production rates in the deep zones from 2026 onward. Indeed, Scenario 2's mine plan includes a periode of peak production made possible only by the additional ventilation capacity.

Moreover, the ventilation shaft has a strategic resource conversion benefit: it allows more of the identified Mineral Resources to be converted into Ore Reserves under JORC Code guidelines, because the "Modifying Factors" of mining and infrastructure are improved. In other words, some gold that would have been left in the ground for lack of ventilation can be reclassified as economically mineable reserve, thus extending the life-of mine and fully utilizing the deposit. This aligns with the corporate mandate to optimize extraction of state-owned mineral assets. The safety improvement from better ventilation also have intangible benefits: protecting workers' health and safety enhances morale and productivity, and it reduces the risk of incident that could lead so costly work stoppages or legal liabilities. From a regulatory and ESG (Environmental, Social, Governance) perspective, investing in modern ventilation demonstrates a commitment to high operational standards, which can strengthen the company's reputation and stakeholder trust.

In summary, the ventilation infrastructure is not merely and added cost – it is a catalyst for unlocking the mine's remaining potential safely. Scenario 2's qualitative advantages reinforce the quantitative financial case. By contrast, Scenario 1, while financially feasible on paper, would struggle with increasing ventilation constraints ad mining goes deeper, likely leading to suboptimal extraction of the resource and higher safety risk over time. Thus, the technical justification firmly supports choosing Scenario 2.

***D) Technical Justification for Ventilation Infrastructure***

Having determined that Scenario 2 is the preferred strategy, a clear implementation plan is necessary to execute the ventilation shaft project effectively. The proposed roadmap is divided into five main phases to systematically address technical, regulatory, and financial aspects:

1. Phase 1 – Preparatory: Finalize the project's feasibility study and detailed financial model (DCF) for the chosen scenario. Concurrently, update the mine design and production schedule to incorporate the new ventilation shaft and the development of deeper levels. This phase establishes the baseline plan and secures budget approvals, while aligning technical team and corporate finance on the project scope (scheduled from Q1 2025 to Q3 2025)
2. Phase 2 – Permitting: Obtain all necessary regulatory approvals and permits for the ventilation shaft construction and extended operation. This includes mapping out any permit gaps, conducting environmental and social impact assessments (if required for the expansion), and engaging with government agencies for approval. Given the supportive regulatory environment noted (O2 in SWOT), this phase is expected to be completed within Q4 2025
3. Phase 3 – Detailed Engineering and Procurement: Complete the detailed engineering design of the ventilation shaft and the associated ventilation network (fans, controls, airways). Once designs are finalized, initiate the tender and selection of contractors for shaft sinking and equipment supply. This phase ensures that by early 2026, the project has competent contractors on board and all critical long-lead items (e.g. main fans, cooling systems if any) are ordered. Engineering and procurement span late 2025 to early 2026.
4. Phase 4 – Construction: Execute the construction and development work. This phase is the core of the project, involving sinking the main ventilation shaft into the CGSS-CGHT area, driving connecting drifts and raises to integrate the shaft with existing mine workings, and installing the primary fan, power supply, and control systems for the ventilation circuit. Parallel to physical construction, there will be training of personnel and updating of Standard Operating Procedures (SOPs) to include the new shaft (for emergency evacuation, ventilation monitoring, etc.). Phase 4 is expected to commence by Q2 2026 and finish by mid-2027, with careful project management to avoid disrupting ongoing mining operations in other areas.
5. Phase 5 – Commissioning and Review: in this final phase, the new ventilation shaft and system are tested and commissioned (expected around nid-2027). Airflow readings, temperature and gay level checks are conducted to verify that design parameters are met. Once the system is operational, production can ramp up in the ventilated areas. A post-implementation review will be carried out to evaluate whether the project's goals are achieved in terms of cost, schedule, and performance (technical and financial). Any lessons learned will inform future projects and the remaining life of mine plan.

This phased implementation plan ensures that the rollout of the ventilation infrastructure is strategically managed and justified at each step. Importantly, the plan embeds flexibility: Phase 1 and 2 outcomes (feasibility and permitting) provide stage gates where management can reassess the project if external conditions change (for instance, a major drop in gold price could prompt a reevaluation before full commitment to construction). By phasing the investment, the company can adapt to uncertainties while still moving forward decisively with the preferred scenario. The roadmap also emphasizes stakeholder communication – regulatory compliance in Phase 2 and community engagement (through CSR continuity in Phase 4) will help maintain the project's social license. Overall, the implementation plan aligns with the study's findings and provides a clear path to realizing Scenario 2's benefits.

## IV. CONCLUSION

This study examined two alternative strategies for The Underground Gold Mine as it approaches the end of its initially planned life. Scenario 1 (no new ventilation shaft) and Scenario 2 (with a new ventilation shaft) were analyzed in depth. The findings ca be summarized as follows:

### *A) Financial Performance:*

Both scenarios are economically viable, yielding positive NPVs and high IRRs given the strong gold market. However, Scenario 2 consistently outperforms Scenario 1 in al key metrics. At a 5-6% discount rate, Scenario 2's NPV is about USD 74 million, ~10% higher than Scenario 1. The IRR for Scenario 2 is also superior (47% vs 44%), indicating greater efficiency of investment. Payback periods are virtually identical and under one year, meaning the additional capital for the shaft is recovered almost immediately from the enhanced cash flows. Sensitivity analysis showed Scenario 2 maintains an NPV advantage across a wide range of gold prices and cost, underscoring its robustness.

### *B) Strategic and Operational Benefits:*

Scenario 2 provides crucial operational advantages by enabling access to deeper ore reserves in the CDSS-CGHT area. The new ventilation shaft is a critical enabler for extending the mine's life and production profile. It improves mine safety and working conditions, ensuring compliance with ventilation requirements and reducing the risk of disruptions. By lowering unit costs and facilitating higher throughput in later years, Scenario 2 makes the operation more resilient to gold price downturns. In contrast, Scenario 1 would forego some of the remaining reserves and run increasing risks of ventilation constraints impacting production. From a JORC modifying factors perspective, the shaft investment converts more resources into mineable reserves, adding tangible asset value to The Underground Gold Mine's portfolio.

### *C) PESTLE/VRIO Alignment:*

The recommended strategy (Scenario 2) aligns with The Underground Gold Mine's internal strengths and the external environment. It leverages The Underground Gold Mine's skilled workforce, geological knowledge, and existing infrastructure (strengths) to capitalize on a favorable gold market and regulatory support (opportunities). At the same time, it mitigates internal weaknesses (dated ventilation system) and prepares the operation to better handle external threats (e.g., cost inflation or stricter safety rules). Continuing without the shaft would leave a known weakness unaddressed and potentially undermine the operation's long-term sustainability.

### *D) Recommendation:*

Implement Scenario 2 – develop and operate with the new ventilation shaft. This strategy maximizes the value of the remaining gold reserves at Pongkor, with substantial economic upside and improved safety outcomes. It is the preferred option to enhance shareholder wealth while also benefiting other stakeholders: the Indonesian government gains higher royalties and a longer-lived mine, employees have extended job opportunities in a safer work environment, and local communities continue to receive economic benefits from the mine's prolonged operations.

### Interest Conflicts

The author(s) declare(s) that there is no conflict of interest concerning the publishing of this paper.

## V. REFERENCES

[1] Barney, J. (1991). Firm Resources and Sustained Competitive Advantage. *Journal of Management*, *17*(1), 99–120. https://doi.org/10.1177/014920639101700108

[2] De, E., The, S., & Buchan, R. M. (2015). COST SAVING STRATEGIES IN MINE VENTILATION Euler De Souza, 10–16.

[3] Noerman, I., & Faturohman, T. (2024). Investment Feasibility Analysis Using Discounted Cash Flow Valuation Method (Case Study: Gold Mine in Pit A PT XYZ). *Asian Journal of Engineering, Social and Health*, *3*, 2399–2409. https://doi.org/10.46799/ajesh.v3i10.445

[4] Rastogi, N., & Trivedi, M. (2022). PESTLE TECHNIQUE -A TOOL TO IDENTIFY EXTERNAL RISKS IN CONSTRUCTION PROJECTS.

[5] Shivute, A., & Tholana, T. (2022). A Comparison of Discounted Cash Flow and Monte Carlo Discounted Cash Flow Valuation Techniques on a Gold Mining Project. *A Comparison of Discounted Cash Flow and Monte Carlo Discounted Cash Flow Valuation Techniques Ona Gold Mining Project*, (September), 8–14. Retrieved from https://www.saimm.co.za/Conferences/Somp2022/11_276 Shivute.pdf

**Appendix 1: Future Price of Gold – Yearly (USD/ Toz)**

| Scenario | 2025 | 2026 | 2027 | 2028 | 2029 | 2030 |
|---|---|---|---|---|---|---|
| **High** | 3,800 | 4,193 | 4,100 | 3,821 | 3,915 | 4,268 |
| **Low** | 2,800 | 2,463 | 2,194 | 2,023 | 1,975 | 1,922 |
| **Baseline (Mean)** | 3,516 | 3,501 | 3,331 | 3,082 | 3,032 | 3,395 |

**Appendix 2: Cost of Equity**

| Risk-free Rate - *Rf* | 6.86% | Yield USD Indonesia Government Bond 10 Year (Dec 2024) |
|---|---|---|
| **Market Risk Premium - *Rm - Rf*** | 6.87% | Indonesia Equity Risk Premium (Damodaran as of Jan 2025) |
| **Levered Beta - *β*** | 1.02 | Beta based on Sector Mining & Metals, Damodaran |

**Appendix 3: Weighted Average Cost of Capital of The Project**

| Capital Structure | | |
|---|---|---|
| **Debt-to-Total Capitalization** | 0.68% | Median comparable total debt to market capitalization |
| **Equity-to-Total Capitalization** | 40.60% | Median comparable total equity to market capitalization |
| **Cost of Debt** | | |
| **Cost of Debt** | 6.23% | USD Denominated Investment Loan Rate based on published by Bank Indonesia |
| **Corp. Income Tax Rate** | 22% | Indonesia Corporate Income Tax |
| **After-tax Cost of Debt** | 4.86% | |
| **Cost of Equity** | 13.87% | |
| **WACC** | **5.66%** | |

**Appendix 4: The Capital Expenditure (CAPEX)**

Scenario 1

| Description | Total | 2026 | 2027 | 2028 | 2029 | 2030 |
|---|---|---|---|---|---|---|
| **Total** | **13,748,620** | **5,997,445** | **3,653,324** | **2,575,813** | **1,431,017** | **91,021** |
| **Mining -Purchase Cost** | 1,170,556 | 375,635 | 285,683 | 94,826 | 414,412 | - |
| **Process Plant - Purchase Cost** | 1,156,605 | 336,519 | 151,703 | 303,942 | 364,441 | - |
| **Utility - Purchase Cost** | 219,544 | 210,223 | 9,322 | | | - |
| **Infrastructure - Purchase Cost** | 11,201,915 | 5,075,068 | 3,206,617 | 2,177,045 | 652,163 | 91,021 |

Scenario 2

| Description | Total | 2026 | 2027 | 2028 | 2029 | 2030 |
|---|---|---|---|---|---|---|
| **Total** | **15,973,247** | **6,288,532** | **4,220,055** | **3,460,313** | **1,913,326** | **91,021** |
| **Mining -Purchase Cost** | 1,170,556 | 375,635 | 285,683 | 94,826 | 414,412 | - |
| **Process Plant - Purchase Cost** | 1,156,605 | 336,519 | 151,703 | 303,942 | 364,441 | - |
| **Utility - Purchase Cost** | 219,544 | 210,223 | 9,322 | | | - |
| **Infrastructure - Purchase Cost** | 13,426,542 | 5,366,156 | 3,773,348 | 3,061,545 | 1,134,472 | 91,021 |