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The Feasibility Study of Business Model Innovation in Gold Tailing Flotation Plant

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Abstract

XYZ Company, part of a multinational company with extensive experience supplying chemicals to mineral processing companies worldwide, is exploring a new Business Model to expand its reach and become the manager of the mineral processing business. In this business model innovation, XYZ has opened a feasibility study to partner with Company A. Some of the aspects that are the focus of attention are capital budgeting for project funding, operational critical aspects in joint operations, joint operation analysis and risk assessment. XYZ's joint-venture project with company A has the potential to deliver an investment return of USD 10.28 M with an IRR of 32.57% for a project duration of 6 years. This shows that joint operations through vertical integration can deliver a more optimal return on investment than XYZ's conventional role as a chemical supplier. The Company's initial strategy of allocating 100% of its capital budget to equity proved to be suboptimal. Based on financial analysis, a 50% debt ratio is a more optimal capital budgeting choice for companies. The use of this ratio not only provides financial advantages but also reduces XYZ's debt risk, especially when the corporation seeks to enter a strategic alliance. To be able to provide added value for company A, so that company A wants to work together to make a joint operation with XYZ, XYZ must be able to improve operations at the XYZ flotation plant. Based on financial analysis, the minimum profitable recovery for XYZ is 32.3%. Risk mitigation measures to be carried out by XYZ include hedging to mitigate commodity price risk and conducting advanced resource studies. Hedging is applied at the alliance level to achieve optimal hedging benefits. The implementation of advanced resource studies will help companies make better forecasts and plan production.

INTRODUCTION

XYZ, a flotation-focused mineral processing company, supplies chemicals for mineral extraction and seeks a partnership with Indonesia's Company A, which is permitted for mining in Malaysia. Since this collaboration is innovative for XYZ, a feasibility study is needed. This proposal outlines a joint business model to boost gold recovery in tailing flotation plants, a strategy rarely studied in emerging markets, and examines vertical integration for strategic alliances (Baatartogtokh et al., 2018; Lahiri et al., 2022; Um & Kim, 2019).

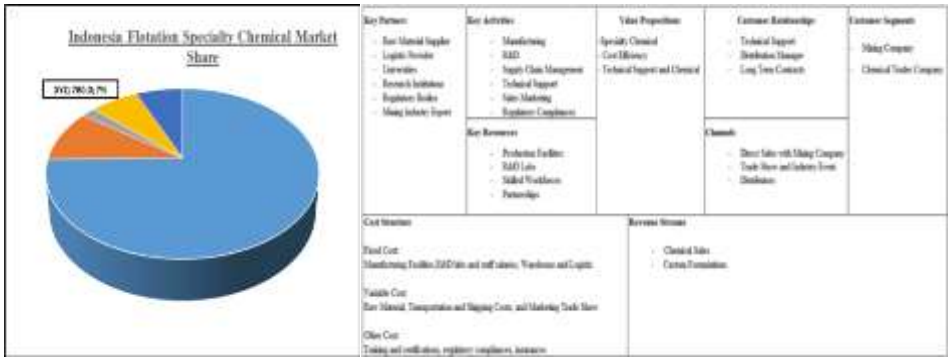

Figure 1. (Left) market Share flotation chemical reagent for XYZ in Indonesia; (Right) Business Model Canvas for XYZ.
(Source: Company Internal data with Modified)

Industry and Business Conditions

In the Indonesian flotation market, XYZ captures 7% of consumption, generating $2,765,520 in annual sales from 780 tons of frothers and collectors. However, the landscape is largely defined by one established firm that commands almost 75% of the market due to its high level of trust among local consumers. Given that a few Indonesian mines use flotation, XYZ must develop markets outside Indonesia. One underexplored market is Southeast Asia, near where XYZ operates (Delbufalo, 2021; Huo et al., 2018; Li et al., 2022). To generate new income and expand, XYZ plans to enter joint operations with other companies, including mining firms, to leverage vertical integration.

Business Problem Statement

XYZ's decision to rely solely on equity for its joint operations stems from a corporate preference for debt-free financing and the reality that chemical companies usually do not require the massive capital outlays seen in other industries.

As XYZ enters its first joint venture, it is essential to focus on key alliance components, including the assessment of critical financial and functional risks. A sensitivity analysis is utilized to pinpoint these high-priority factors (Bals & Turkulainen, 2017; Lacity et al., 2009; Zhao et al., 2022). Following the risk assessment, XYZ must establish mitigation strategies for the joint operation. Since the company lacks prior experience in this area, it must look beyond finances to focus on strategic alignment and operational details. Addressing these factors will give XYZ the necessary confidence to proceed and help shape its long-term strategic roadmap (Barney, 1991; Belhadi et al., 2021; Di Mauro et al., 2018).

Operationally, Company A is testing XYZ's capabilities at its plant to see if they can enhance recovery prior to officially starting the joint venture. A one-month trial already saw recovery climb from 20% to 30%, with projections suggesting a rise to at least 55% as the team becomes more accustomed to the facility's specific machinery and resources.

Theoretical Perspective

XYZ must choose an entry mode that corresponds with its core strengths to successfully join the Southeast Asian chemical market. The international strategy framework offers five distinct paths for entry (Hitt et al., 2017):

1) Exporting
2) Licensing

3) Strategic Alliances
4) Acquisitional
5) New Wholly Owned Subsidiary

Guided by its core competencies, XYZ chose to form a strategic alliance with Company A through a joint operation. For XYZ, selecting a partnership model involves evaluating standard chemical supply deals, labor agreements, and joint operational frameworks, all of which have major strategic consequences that can be analyzed using a vertical integration lens.

Low integration characterizes the basic chemical supplier model, where the supplier's role ends at delivery and the mining company oversees operations. This often creates a mismatch in goals, with the provider seeking high volume and the miner seeking lower costs and higher recovery rates. This method is suitable for straightforward tasks but may fail in more intricate environments. Conversely, a model that combines chemical supply with on-site labor offers better governance and efficiency by merging specialized knowledge with product delivery without the mining firm losing ownership of its assets. The contractual approach often restricts long-term innovation because of the uneven split between risk and reward. In contrast, a joint operation model synchronizes ownership and risk-sharing between the mining firm and the chemical provider, promoting collective responsibility and creative solutions. Nevertheless, this path brings about increased expenses, greater legal intricacies, and less freedom to exit the arrangement compared to basic contracts.

Three main theories explain why a joint operation might be established between a chemical provider and a mining company: Transaction Cost Economics, Vertical Integration, and the Resource-Based View. From a Transaction Cost Economics standpoint, businesses opt for governance models that effectively lower the costs of coordination and the hazards associated with market transactions (Williamson, 2024). At the same time, when alliances involve specialized assets, high uncertainty, and regular exchanges, the danger of one party taking unfair advantage increases, often leading to incomplete contracts (Holland, 2014). Empirical studies, such as those of Acemoglu, Johnson, and Mitton (Acemoglu et al., 2009), also demonstrate that industries characterized by volatile operational environments tend to adopt higher levels of integration to mitigate contracting inefficiencies.

Vertical integration theory elaborates on the way organizations synchronize their activities throughout the value chain. This coordination helps mitigate problems such as misaligned incentives, quality-control issues, and the negative effects of double marginalization (*International Gold Price*, 2023; Joskow, 2025). The difficulty of replacing critical mining resources like dosing technology and chemical expertise makes synchronized decision-making a strategic necessity for better coordination. From the perspective of the Resource-Based View (RBV), these internal strengths drive sustainable advantage. A joint operation facilitates the integration of chemical engineering and lab-based formulation with the mining operator’s understanding of ore and plant systems, creating a powerful combination of capabilities. Prior research (Gulbrandsen et al., 2009) support the idea that hybrid governance models which merge matching resources result in unique capabilities that are difficult for rivals to imitate.

Based on these theoretical frameworks, a joint operation represents a validated approach to partial vertical integration that boosts efficiency, lowers costs, and fosters specialized

capabilities. It is also noted that the specific valuation method used can greatly change a project's estimated value, with three primary approaches typically applied to mining projects (Nur, 2021). To value XYZ, the income approach is employed as it centers on the future economic value the asset is likely to provide. By using Net Present Value (NPV), this strategy calculates the present worth of those future benefits. This valuation technique is highly suitable for assets that have reached the stages of production or development.

RESEARCH METHODS

The research employed a business feasibility study approach using a quantitative–descriptive analytical method that integrates financial and operational assessments to evaluate the feasibility of a Joint Operation (JO) between XYZ and Company A in a gold tailing flotation plant. The study utilized secondary data consisting of plant operational data, laboratory and trial results, CAPEX and OPEX information, capital structure, and international gold price data. Financial analysis was conducted using the Discounted Cash Flow (DCF) method to generate key feasibility indicators such as NPV, IRR, and Payback Period, followed by sensitivity analysis on influential variables including feed grade, gold price, CAPEX, and OPEX. Scenario analysis was applied to assess project robustness under different market conditions, and probabilistic modeling using Monte Carlo simulation was performed to estimate the likelihood of project success. In addition, operational analysis was carried out to determine critical performance thresholds, formulate risk mitigation strategies, and provide technical recommendations to ensure the project's sustainability and feasibility.

RESULTS AND DISCUSSION

Financial Analysis

The evaluation turns operational forecasts into Free Cash Flow to the Firm (FCFF), applying a Discounted Cash Flow (DCF) analysis to determine the Net Present Value (NPV). Alongside NPV, metrics like the payback period and IRR are used to gauge feasibility across three alternatives: simple chemical supply, supply with manpower, and a Joint Operation (JO). These results are interpreted based on their profitability and their resilience against risk. To address the inherent risks in tailings reprocessing, the study also features scenario and sensitivity analysis centered on influential variables like operating costs, gold market prices, and feed grades.

Investment Return

High investment returns in the joint operation data are a result of a project valuation influenced by fluctuating gold prices. With a capital expenditure of USD 6 million, the 50% revenue-sharing model was based on 2023 price levels, but gold has seen a major surge starting in 2024. It is likely that the actual capex and expenses incurred in 2026 will be higher than what was documented in the initial research phase.

Based on six years of operational data, laboratory testing, and commodity pricing, the return on investment under a deterministic approach is as follows:

NPV	= $10,228,674.87
IRR	= 33%
Payback Period	= 3.34 Years

A positive Net Present Value (NPV) confirms that the venture is both viable and profitable. The results indicate that once all future cash inflows and outflows are adjusted to their current value, the project is projected to generate $10.22 million in excess of XYZ's initial investment. This figure represents substantial value added above the minimum required return, while an IRR of 33% demonstrates that the project's gains surpass the company's cost of capital, making it a highly attractive opportunity. Yet very high IRR can also suggest overly optimistic forecasts or higher risk. Strong IRR and NPV boost bargaining power for better terms, with XYZ well-positioned during financing and joint venture negotiations, demonstrating experience. A 3.34-year payback period means recouping initial investment quickly, reducing risk, but it ignores the time value of money and cash flows after breakeven.

In this study, the subjects were dominated by the male gender, namely 67 cases (73.6%), while the female subjects were 24 cases (26.4%). The age grouping in this study was divided into eight groups, with the number of cases in each age group variing. The majority of cases occurred in the 0-9 and 60-69 age brackets, with each accounting for 21 instances or 23.1%. These were followed by 17 cases in the 40-49 age group at 18.7%. Smaller segments included 12 cases among those aged 20-29 (13.2%), 7 cases for ages 10-19 (7.7%), and 6 cases for ages 50-59 (6.6%). The 30-39 age group represented 5 cases (5.5%), while the smallest proportion of subjects was found in the 70 and older category, with just 2 cases (2.2%).

Success in these financial metrics justifies a faster rollout of expansion strategies, particularly into different geographical areas and with new collaborators. This path offers the chance to scale up operations for greater throughput and better performance. In the immediate future, the firm will see improved liquidity and more effective bargaining power along with streamlined financing. Looking further ahead, the results lead to lasting value, financial health, a more prestigious reputation, and the necessary infrastructure for bold business development.

Assessment of Commercial Engagement Model

The flotation joint operation emerges as the most profitable choice based on NPV analysis, provided that operational efficiency can be raised from 30% to 55%. Laboratory scale tests justify this increase, suggesting that XYZ's specialized chemical applications and operational techniques can improve process recovery by a minimum of 40%. In addition to evaluating NPV, this joint operation model incorporates a deep dive into financial performance via IRR and PBP. Using the established operational data and parameters, the calculated figures for IRR, PBP, and NPV are as follows:

Table 1. Comparison for supplier and Joint Operation

Parameter	Joint Operation	Chemical Supplier	Chemical & Workforce Supplier
NPV	$10,288,674.87	$3,212,454.00	$3,860,655.83
IRR	33%		
Payback Period (Years)	3.34		

ROI	129%

Sensitivity Analysis

Using the discounted cash flow method, a sensitivity analysis is conducted to test the company's npv parameters. The primary inputs affecting cash flow include cap bottle and operating costs, feed grade, and global commodity prices. The current analysis confirms that the net present value of this investment is most sensitive to changes in feed grade, commodity pricing, capital investment, and operational spending.

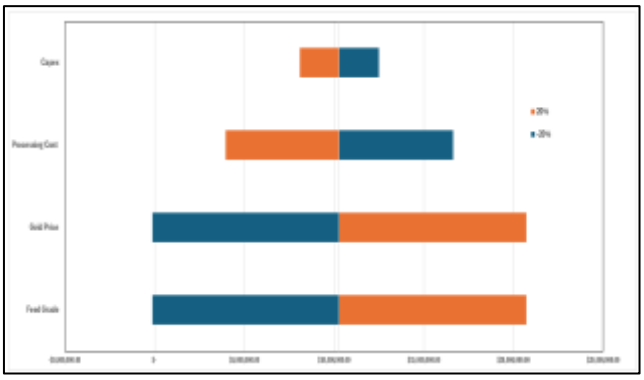

Figure 2. Sensitivity Analysis effect on Investment Return

The company will be able to refine its forecasting and strategic planning once the tailing dam resource and reserve study provides more clarity on feed grade and availability. A projected 10% growth in production will also impact the overall cost and revenue structure of the venture. In such a case, XYZ would see an enhanced return on investment, as detailed in the table below:

Table 2. Effect of 10% Growth to Investment Return

Parameter	Growth 10%	Base Case
NPV	$13,874,349.83	$10,288,674.87
IRR	38%	33%
Payback Period (Years)	3.59	3.34

Scenario Analysis For feed grade, price and recovery

For exploring the scenario during the project is not profitable because of the gold price the author found that when the gold price is around 2100 USD/Oz, the investment return is near 0, with a detailed breakeven achieved at 2103.2 USD/Oz.

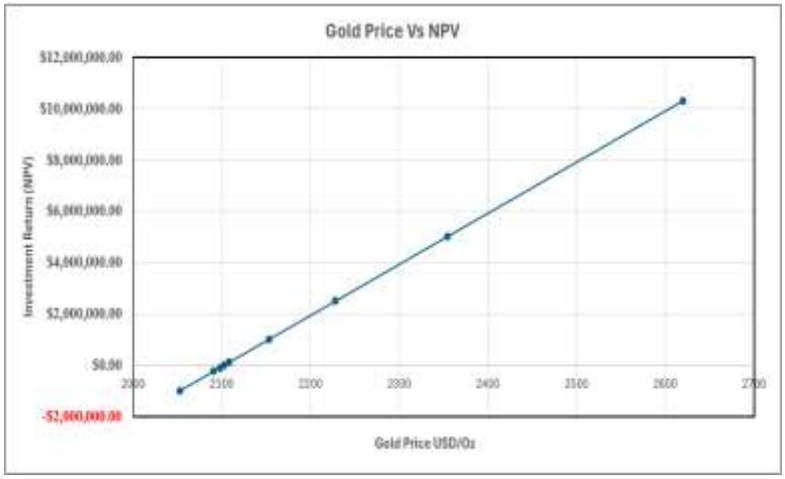

Figure 3. Gold Price for Breakeven Condition

A minimum threshold of 0.11 g/t has been determined for processable material to ensure operational consistency and successful mineral recovery.

Past records show that this value is quite different from earlier plant statistics, where the gold grade in feed tailings generally ranged between 0.3 and 0.6 g/t. Meanwhile, for XYZ to generate value, a minimum recovery rate of 32.3% is necessary. If the recovery falls below this level, the company risks incurring financial losses.

Capital Budgeting

From a capital budgeting standpoint, the organization needs to review the option of using 100% equity for this project. The data indicates that as the amount of debt in the capital budget increases, the project's return on investment grows more substantial, which is depicted in the graphic below:

Table 3. Effect of Capital Budgeting to NPV

Equity Portion	100%	70%	50%	30%	0%
WACC	7.050%	7.041%	7.035%	7.029%	7.020%
NPV	$10,288,674.87	$10,294,689.00	$10,298,699.87	$10,302,711.89	$10,308,732.09

The interest rate provided by a lender tends to decrease as the equity share of an investment grows. Moreover, the nature of the loan itself affects the overall interest expense. Depending on whether the loan covers working capital or fixed assets, the company will be charged different rates. A lower interest rate is often achievable if the firm manages its working capital effectively and uses the debt specifically to grow its assets.

Effect of Tax Shield to Investment Return

As a result, depreciation tax shields are integrated into the FCFF calculations, serving as a key driver of value for large-scale infrastructure and mining projects. This investment utilizes two distinct types of tax shields: one arising from the project’s depreciation and another stemming from interest expenses.

1) Tax Shield from Depreciation

Tax savings are realized through depreciation as the company receives credit for the devaluation of its flotation columns. Using a yearly depreciation figure of 500 thousand USD and a 22% tax rate, the annual nominal tax shield is 110,000 USD. At a WACC of 7.05%, the discounted present value of this tax benefit for the six-year duration of the project equals 523,511.02 USD.

2) Tax shield from Amortization

Amortization applies to intangible assets with set lifespans, such as contractual rights and licenses. Much like depreciation, it lowers taxable income without requiring cash payments, thereby creating a tax shield. This benefit enhances operating cash flow and is factored into the Free Cash Flow to the Firm (FCFF). Because it is an operating tax shield, it raises the project's value independent of how it is financed, making it vital for assessing concession-based or contractual ventures. With an annual amortization of 1,000,000 USD and a 22% tax rate, the yearly nominal tax shield is 220,000 USD. At a 7.05% WACC, the total present value of this shield over six years is 1,047,022.05 USD.

3) Tax shield from Interest

Financing a project with debt creates an interest tax shield, as interest expenses can be deducted from taxable profits. This deduction lowers the amount of tax the company owes, resulting in higher cash flows than what would be achieved under an all-equity financing model. In the context of capital budgeting, increasing the debt ratio serves to maximize this tax shield and improve the project's financial efficiency.

Table 4. Interest Tax Shield Effect on Investment Return

Equity %	Debt %	WACC	Debt (USD)	Interest/year (9%)	Tax Shield/year (22% × Interest)	Total Tax Shield 6 year	Total Tax Shield from Interest 6 year after Discounted
0%	100%	7.020%	11,000,000	990,000	217,800	USD 1,306,800.00	USD 1,037,511.67
30%	70%	7.029%	7,700,000	693,000	152,460	USD 914,760.00	USD 726,056.50
50%	50%	7.035%	5,500,000	495,000	108,900	USD 653,400.00	USD 518,515.79
70%	30%	7.041%	3,300,000	297,000	65,340	USD 392,040.00	USD 311,051.89
100%	0%	7.050%	0	0	0	USD 0.00	USD 0.00

Scenario Analysis with Probabilistic Modelling

Probabilistic modeling is used to compare results against the deterministic approach, which serves as the base model for this research. In the Monte Carlo simulation, the two most

sensitive variables gold price and feed grade are treated as inputs, while all other factors remain unchanged.

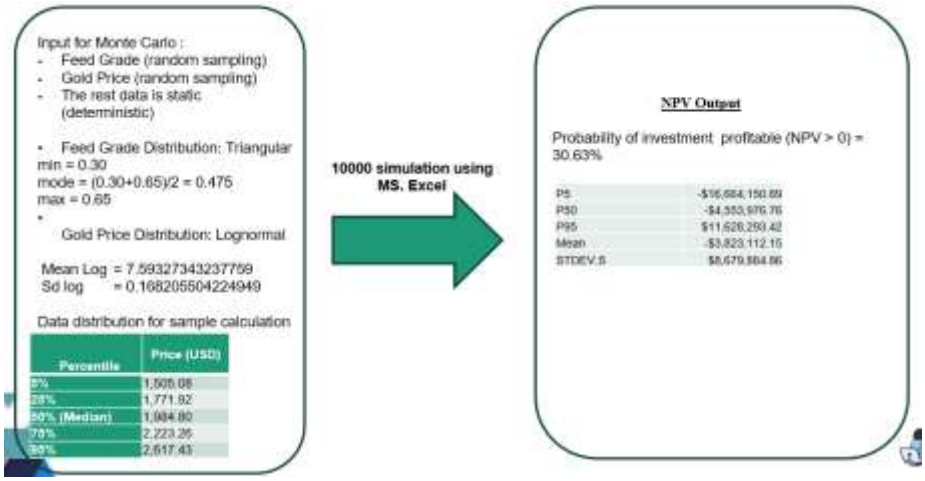

Figure 4. Probabilistic Modelling for this Project

The findings from both deterministic and probabilistic modeling indicate that the project's probability of success in the base case needs deeper analysis, as there is less than a 50% chance of achieving profitability. Additionally, the gold price has been integrated into the revised financial model.

Operational Analysis

Based on the data from scenario analysis on the fall in gold price and feed grade becomes a reference for SOP Back-up during a Big Problem happen.

Gold Price < 2100 USD/Oz is a trigger for big problem and must follow the SOP

Feed Grade < 0.11 g/t is a trigger for big problem and must follow the SOP

Risk Scenario	Key Parameter	Trigger Threshold	Immediate Action
Low Commodity Price	Gold price (USD/oz)	< Minium price for Breakeven (2100 USD/Oz)	Reduce throughput by 20–30% and switch to low-cost reagent scheme/effective scheme
Low Commodity Price (Severe)	Gold price (USD/oz)	< minimum price for 30 consecutive days	Temporarily stop production
Low Ore Grade	Head grade (g/t)	< below 0.11 g/t	Increase reagent dosage and reduce throughput by 15%
Low Recovery	Metallurgical recovery (%)	< 30%	Adjust grind size and reagent blend; initiate metallurgical trial
Equipment Failure	Equipment availability (%)	< 90%	Activate standby unit and operate at reduced capacity
Critical Equipment Failure	Equipment availability (%)	< 80% or safety risk identified	Immediate shutdown of affected circuit

Figure 5. SOP for backup Plan

Two measures must be implemented to reduce operational risks: hedging through the alliance to stabilize gold price fluctuations and an in-depth study of tailing dam resources to address feed grade risks. It is important for XYZ to incorporate hedging options into the contractual details with its joint operation partner, Company A. Since the gold market is currently experiencing a rally, it is particularly hazardous for mining firms to operate without established hedging strategies.

Figure 6. International Gold Price

Based on the hedging options available, hedging at the Alliance level is the recommended and ideal approach. At this hedging level, XYZ approves the hedging policy and the production of the hedge, requiring the approval of both parties for transparency. It involves consensus among owners and the creation of internal hedging policies that include authorizations, instruments, and banking partners, which present challenges.

On the other hand, to mitigate fluctuations and gain in-depth knowledge about feed grade, the Company needs to make an advance research study on feed grade in tailings. Feed grade in tailings still needs to be checked because it is still in the measured stage and has not yet reached the Proven stage.

Implementation Plan

Following the completion of all analysis, a comprehensive execution plan for the joint operation is required. This plan covers two distinct periods. The primary short-term goal involves the seamless integration of XYZ's technical capabilities into the established production facility. Meanwhile, the long-term vision is to secure sustainable value and use this project as a benchmark for expanding into alliances with other entities.

Short Term Planning

The first six months constitute the short-term planning window, which is structured around the mobilization, stabilization, and optimization of the project's activities.

Table 5. Implementation Plan for Short Term

Phase	Jan-26	Feb-26	Mar-26	Apr-26	May-26	Jun-26
Mobilization	✓					
Stabilization		✓	✓	✓		
Optimization					✓	✓

Preparation of the column flotation and related gear, including dosing setups and quality monitoring, takes place during the critical mobilization phase. The company will assign a lead for short-term planning to oversee personnel onboarding and liaise with suppliers for importing chemicals from China. Key organizational documents, such as Standard Operating Procedures and RACI charts, are to be finalized now. Additionally, strategies for adding new column installations to improve recovery will be developed, with a six-month timeline allocated for setup and commissioning.

Throughout the stabilization stage, the company plans to execute specific procedures to assess reagent scheme results and verify them against laboratory data. The goal is to ensure plant availability reaches the intended targets, especially since adding the flotation columns typically does not interfere with the current operational flow.

During the optimization phase, the joint operation should begin to show visible progress. This stage focuses on performing metallurgical trials and refining reagent schemes to ensure chemicals are specifically suited to the ore characteristics of PT. XYZ. These efforts are intended to boost recovery rates and generate forecasts that reflect positive trends in Free Cash Flow to the Firm, highlighting attractive growth potential for investors.

Long Term Planning

A six-year plan defines the long-term outlook, moving through four essential stages: consolidation, enhancement, strategic optimization, and eventually exit or renewal.

Table 6. Implementation Plan for Long Term

Phase	Year-1	Year-2	Year-3	Year-4	Year-5	Year-6
Consolidation	✓					
Enhancement		✓	✓			
Strategic Optimization				✓	✓	
Exit/Renewal						✓

Spanning six years, the long-term plan is designed to optimize free cash flow and safeguard the project NPV regardless of market changes. It begins with a focus on stabilizing margins through strict cost control and reduced volatility to align operational results with financial projections. After reaching cash flow stability, the plan emphasizes capital efficiency and the maintenance of positive FCFF. This ensures that the project delivers returns above the cost of capital and avoids redundant reinvestments that could dilute value for shareholders.

The six-year plan utilizes real-option logic to integrate financial flexibility into the valuation, giving management the tools to mitigate risks. New investments are only made if cash flows enhance the project's NPV, but the company may choose to suspend or abandon operations if costs exceed cash flows for a significant duration. These guidelines, integrated into yearly operational planning, prevent the loss of value and maintain strategic options, making the long-term plan a comprehensive capital allocation framework that synchronizes investment goals with risk and returns.

To bridge the gap between theory and practice, the joint venture analysis between XYZ and Company A utilizes case-based reasoning. This involves integrating the Resource-Based View (RBV), Transaction Cost Economics (TCE), and vertical integration models to evaluate the effectiveness of the alliance in a real-world setting. The success of vertical integration in the mining sector is determined by characteristics such as highly specific assets, high levels of uncertainty, transaction intensity, and complementary capabilities. In this collaboration, the tailings flotation process can only be operated in certain locations and optimized with

special chemicals, thus increasing the risk of hold-up when carried out through an ordinary contract.

This cooperation is dominated by high asset specificity, uncertainty, and intense coordination needs, which in the traditional supplier model often create incentive in synchronization between chemical companies and mining companies. Joint operations are able to overcome these problems through gain-sharing mechanisms, KPI unification, and integrated operational governance, thereby reducing double marginalization and increasing control over quality and inputs. The synergy of capabilities between XYZ's excellence in custom formulation, R&D, and technical know-how with Company A's excellence in ore understanding, plant control, and infrastructure creates a competitive advantage that drives innovation. The implementation of the alliance is carried out through the stages of data sharing, technical and operational optimization, and integrated KPI-based performance monitoring. Based on operational data, joint operations are considered more valuable than the role of suppliers if XYZ is able to achieve a recovery rate of at least 31%, which is realistic to be scaled from laboratory scale to factory scale. In addition, risk assessments and mitigation are agreed at the alliance level based on historical data, accompanied by exit plans if performance targets are not achieved, thus ensuring sustainability and alignment of interests of both parties.

CONCLUSION

Several critical questions about innovative business models are answered through this analysis of XYZ's recycling venture at Company A. The study highlights that adopting vertical integration leads to higher profitability and more strategic opportunities for XYZ. With a calculated NPV of 10,288,674.87 USD, the joint operation proves to be a lucrative path. This diversification effort improves XYZ’s market position and competitive capabilities. Beyond financial viability, the collaboration allows XYZ to take a leading role in the transition toward sustainable mining operations. Through the transformation of tailings into marketable products, this business model lessens environmental impact and promotes the sustainable use of resources. Using 100% equity financing, the project yields an NPV of 10,288,674.87 USD, an IRR of 33%, a payback period of 3.34 years, and a six-year ROI of 129%. These metrics suggest strong profitability, a quick return on investment, and minimal financial risk. In the near term, the venture should improve liquidity and facilitate immediate growth, while in the long term, it builds lasting value and a robust platform for future strategic moves. Operationally, a minimum recovery rate of 32.3% is required for the project to remain profitable and offer better prospects than the previous supplier role in block P. Based on sensitivity testing, the project's returns are most affected by the price of gold and the grade of the tailings. Mitigation strategies should include alliance-level hedging for price protection and a sophisticated resource study at Block P to manage feed grade uncertainty. Such steps will enhance XYZ's mine planning and future forecasting capabilities. If this resource study yields a 10% growth, the projected return reaches 13,874,349.83 USD. Furthermore, the current all-equity capital budgeting approach should be adjusted. A 50/50 mix of debt and equity is recommended to optimize the trade-off between returns and risk while safeguarding the company against financial distress and supporting strategic growth.

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