Construction of a supply chain for C.I. Bulk Trading South America S.A.S.

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Abstract

This project develops the logistics design and financial analysis of the company C.I. Bulk Trading Sur América S.A.S., focused on the export of thermal coal from Colombia to Germany, demonstrating that it is possible to operate profitably in international trade without owning coal mines, provided there is proper planning and effective supply chain coordination. Over a five-year period, an efficient national and international logistics chain is structured, from the mining regions in northern Colombia to the destination port in Europe, considering the characteristics of bulk cargo handling, operational risks, and economies of scale derived from a large annual shipment. From a financial perspective, the project is based on conservative growth assumptions, an initial investment of USD 2,000,000, and a controlled cost structure, which allows for the generation of positive cash flows from the first year of operation. The projected financial statements show stable revenue growth, a progressive increase in equity, and a strong capacity to meet financial obligations. Finally, the cash flow analysis and the Internal Rate of Return, close to 33%, confirm the project's viability, sustainability, and profitability.

***Keywords*:** Supply chain, coal export, financial viability, international logistics, internal rate of return (IRR)

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Introduction

This graduation project focuses on the logistics and financial design of C.I. Bulk Trading Sur América S.A.S. The company takes part in the Colombian energy sector by managing the export of thermal coal to international markets, mainly Germany. The project seeks to show that it is possible to operate successfully in international trade without owning coal mines, if there are clear planning and effective coordination along the supply chain.

The study follows a realistic and specific business model that considers one large shipment of approximately 78.000 tons per year; this approach helps keep the project clear and consistent from an academic perspective; a five-year period is used to observe how the operation develops over time. The document describes the movement of coal from mining areas in northern Colombia, such as La Guajira, to the port of Riohacha, and later to international markets in Europe.

The project examines both operational challenges and financial results. Along with financial figures, practical factors such as weather conditions, port delays, and the complexity of transporting bulk cargo are also considered, by applying conservative assumptions and an initial investment of USD 2.000.000, the project aims to show that this export model is financially sustainable and capable of producing positive results while maintaining a clear and organized structure.

Objectives

General Objective

To design and analyze the logistics and financial structure of a thermal coal export project from Colombia to Germany, using the case of C.I. Bulk Trading Sur América S.A.S., to evaluate its operational feasibility, cost behavior, and economic performance over a five-year period.

Specifics Objectives

To describe the national and international logistics chain involved in the export of thermal coal, identifying the main actors, processes, and operational stages from origin to destination.

To define an efficient logistics model suitable for bulk cargo exports, considering product characteristics, transportation methods, port operations, and shipment scale.

To estimate projected revenues, operating costs, and administrative expenses associated with the thermal coal export operation under conservative and stable market conditions.

To prepare a five-year income statement that reflects the project's profitability, cost structure, and financial evolution over time.

Logistics Design of C.I. Bulk Trading Sur América S.A.S.

The logistics design of C.I. Bulk Trading Sur América S.A.S. is structured to support large-scale thermal coal export operations from Colombia to the German market. Due to the product's characteristics (high volume, low unit value, and significant weight), the company adopts a logistics model focused on efficiency, cost optimization, and the coordination of actors in the national and international supply chain.

The company operates primarily as a commercial and logistics coordinator, rather than as a direct mining operator. This business model allows it to concentrate on supply chain management, supplier selection, port operations, and international transportation. Additionally, it minimizes fixed investments in extraction infrastructure.

National Supply Chain

The national supply chain begins with coal suppliers located in the mining regions of northern Colombia, primarily in La Guajira and its surrounding areas. These suppliers are responsible for the extraction and initial handling of the thermal coal.

Once extracted, the coal is transported by road freight (truck convoys) to the export port. Given the large volumes involved, transportation is scheduled in advance to ensure a continuous flow of cargo and to avoid congestion at the port facilities. The use of truck convoys allows flexibility in coordinating delivery times and adapting to port availability.

Key players in the national supply chain include:

Coal suppliers

Land transport providers

Port operators and stevedoring services

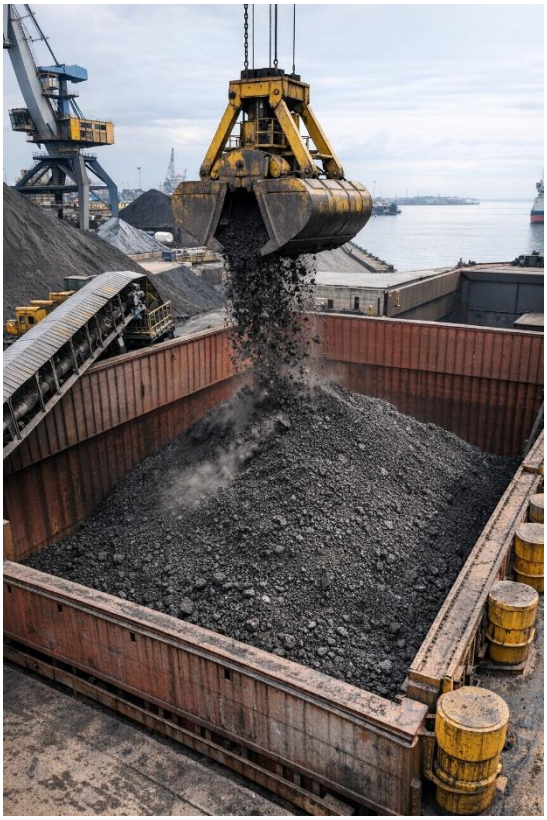
Customs authorities (DIAN – Colombia)

The selected export port is Riohacha, which offers proximity to mining areas and suitable infrastructure for bulk cargo. At the port, the coal is temporarily stored, consolidated, and prepared for maritime shipment. In this stage, customs clearance and export documentation are processed to ensure compliance with Colombian regulations.

Packaging, Handling, and Loading Characteristics

Figure 1

Bulk handling and transportation method for thermal coal exports



Note. The figure illustrates the handling of thermal coal as bulk cargo during port loading operations using specialized equipment such as conveyor belts and grab cranes.

Source: Own elaboration using AI-generated image.

Thermal coal is classified as a solid bulk cargo, meaning it does not require conventional packaging. Instead, the product is handled loose and loaded directly using specialized equipment such as conveyor belts, hoppers, and cranes designed for bulk materials.

Although no packaging is used, proper handling is essential to minimize material loss, control dust emissions, and comply with environmental and safety regulations. The coal is handled under controlled conditions to ensure its stability during loading and transport.

International Supply Chain

The international supply chain begins once the coal is loaded onto bulk carrier vessels. Due to the shipment volume—approximately 77,993 tons—maritime transport is the only viable option. The company follows a single large-scale shipment strategy, which allows it to benefit from economies of scale and reduce per-unit transportation costs.

The maritime route connects Colombia directly to Germany, where the cargo is received at a port equipped to handle bulk energy commodities. Upon arrival, the coal undergoes import customs clearance, verification of documentation, and environmental compliance checks required by German and European Union regulations.

Key actors in the international supply chain include:

International shipping companies

Port authorities in Germany

Customs and regulatory bodies

End buyers or distributors in the energy sector

Logistical Risks and Strategic Considerations

This logistics model offers cost advantages thanks to economies of scale; However, it also presents risks associated with the concentration of shipments. Any disruption (weather

conditions, port congestion, regulatory delays, or vessel availability) can affect the entire annual operation.

To strengthen the logistics strategy, the company could consider:

Diversifying shipping schedules

Establishing contingency providers

Strengthening coordination with international logistics partners

Overall, the logistics design supports the operational viability of the export project, while also highlighting opportunities for risk mitigation and long-term improvement.

5 Year Income Statement

This five years income statement for C.I. Bulk Trading Sur América S.A.S. is based on a conservative and realistic growth approach. The objective of this projection is not to maximize profits, but to show how the company could reasonably perform under stable market conditions and with the limitation of one large scale shipment per year.

Table 1

Five-Year Projected Income Statement for Thermal Coal Exports

Concept	Year 1	Year 2	Year 3	Year 4	Year 5
Total Revenue	7,410,000	7,632,300	7,861,269	8,097,107	8,340,020
Operating Costs (Variable)	-5,928,000	-6,105,840	-6,289,015	-6,477,686	-6,672,016
Gross Profit	1,482,000	1,526,460	1,572,254	1,619,421	1,668,004
Administrative Expenses (Fixed)	-300,000	-306,000	-312,120	-318,362	-324,730
Operating Profit (EBIT)	1,182,000	1,220,460	1,260,134	1,301,059	1,343,274
Income Tax (30%)	-354,600	-366,138	-378,040	-390,318	-402,982
Net Income	827,400	854,322	882,094	910,741	940,292

Note. The income statement projection is based on conservative financial assumptions, including a 3% annual growth rate in revenues and variable costs, and a 2% annual

increase in administrative expenses. Source: Own elaboration.

Financial Evolution and Logic

The projected revenues start in Year 1 with USD 7,410,000. This value is based on the export of 78,000 tons of thermal coal at a conservative FOB price of USD 95 per ton. To keep the project academically sound, revenues are assumed to grow at a moderate annual rate of 3 percent, which represents small price adjustments or minor operational efficiencies rather than aggressive expansion.

Operating costs are treated as variable and grow at the same 3 percent rate as revenues. These costs include the purchase of coal, inland transportation, port operations, and maritime freight. Administrative expenses are considered fixed costs and increase at a lower annual rate of 2 percent, reflecting controlled spending on personnel and general administrative activities.

As a result, net income increases gradually from USD 827,400 in Year 1 to USD 940,292 in Year 5. This progression shows that the company is able to manage rising costs while maintaining profitability. Overall, the income statement is coherent with the operational assumptions of the project and presents conservative results that can be clearly justified in an academic graduation context.

Thermal Coal Export Project (FOB Colombia)

Introduction to the Balance Sheet

The Balance Sheet is a financial statement that shows the economic and financial position of a project at a specific point in time. In this case, the Balance Sheet is projected over a five-year period to analyze the evolution of assets, liabilities, and equity of the thermal coal export project.

This statement is essential because it allows the evaluation of the project's financial stability, its ability to meet obligations, and its capacity to generate value for the partners over time.

General Assumptions Used

The preparation of the Balance Sheet is based on the following assumptions, which are consistent with the logistical and financial structure of the project: evaluation horizon: 5 years (Year 1 to Year 5), currency: United States Dollars (USD), total initial investment: USD 2,000,000, the investment is financed through a combination of equity contributions and long-term debt part of the profits generated is reinvested in the project. The Balance Sheet is aligned with the Income Statement and the Cash Flow projections.

Balance Sheet Structure – Year 1

Assets

Assets represent all the economic resources owned by the company that are used to carry out its export operations.

Current Assets

Current assets include resources that can be converted into cash in the short term or are required for the daily operation of the project.

Cash and banks: represents the initial working capital used to cover operational and logistical expenses, estimated at USD 900,000.

Accounts receivable: amounts pending collection from international clients, estimated at USD 300,000.

Inventories: include thermal coal available for export and other operational inputs, estimated at USD 200,000.

Total current assets: USD 1,400,000.

Non-Current Assets

Non-current assets are long-term resources that support the continuous operation of the project.

Logistical setup and contracts: investments made to ensure the logistical operation of the project, valued at USD 600,000.

Systems, licenses, and initial setup: technological platforms, software, and licenses required for export management, valued at USD 500,000.

Depreciation: represents the loss of value of non-current assets due to usage and time. For Year 1, depreciation is estimated at approximately USD 110,000.

Total non-current assets: USD 990,000.

Total Assets – Year 1

USD 2,390,000

Liabilities

Liabilities represent the financial obligations that the company must pay to third parties.

Current Liabilities

These include obligations that must be settled in the short term, such as:

Payments to suppliers.

Operational liabilities related to export activities.

Total current liabilities: USD 300,000.

Non-Current Liabilities

These correspond to long-term financial obligations used to finance part of the initial investment.

Long-term financial debt: USD 800,000.

Total liabilities: USD 1,100,000.

Equity

Equity represents the portion of the project that belongs to the partners or shareholders.

Share capital: initial contributions from partners amounting to USD 1,200,000.

Net income for Year 1: USD 827,400, generated from the project's operations.

Retained earnings: a portion of the net income is reinvested to strengthen the project's financial position. Total equity: USD 2,290,000.

Fundamental Accounting Relationship

The Balance Sheet follows the basic accounting equation:

Assets = Liabilities + Equity

This relationship shows that the project's resources are financed through a combination of debt and equity.

Financial Evolution of the Project (Years 2 to 5)

Over the five-year projection period, the project shows a positive financial evolution: Assets increase steadily due to income growth and cash accumulation. Liabilities remain under control and tend to decrease as operational cash flows are used to meet financial obligations.

Equity grows each year as a result of profit reinvestment and the overall positive performance of the project. This trend reflects the financial stability and economic viability of the thermal coal export model.

Cash Flow & Internal Rate of Return (IRR)

Initial Project Investment (Year 0)

The initial investment required to launch the thermal coal export project amounts to USD 2,000,000, distributed as follows:

Table 2

Initial investment required for the project

Concept	Amount (USD)
Initial working capital	900.000
Logistics adaptation and contracts	600.000
Systems, licenses, and setup	500.000
Total initial investment	2.000.000

Note. This investment is made in Year 0, prior to the start of operations, and represents the base cash outflow used for the calculation of the Internal Rate of Return (IRR).

Source: Own elaboration.

Projected Cash Flow (5 Years)

The cash flow calculation is based on net profit, assuming there are no significant financial charges and that the operation is primarily financed through equity capital.

A prudent annual growth rate of 3% is considered for revenues and variable costs, while fixed expenses grow at 2% annually.

Table 3

Cash flow projection

Year	Net Cash Flow (USD)

Year – 0	-2.000.000
Year – 1	827.400
Year – 2	852.222
Year – 3	877.789
Year – 4	904.122
Year – 5	931.246

Note. The positive cash flow reflects the project's ability to generate stable and increasing liquidity throughout the evaluation period. Source: Own elaboration.

Internal Rate of Return (IRR)

Based on the initial investment and the projected cash flows, the project's Internal Rate of Return (IRR) is approximately:

IRR ≈ 33% per year

This level of profitability is well above the average cost of capital estimated for logistics and foreign trade projects, indicating strong financial attractiveness.

Financial Feasibility Analysis

The thermal coal export project proves to be financially viable, as it generates positive cash flows from the first year and maintains stable profitability throughout the five-year analysis period. The initial investment is recovered within a reasonable timeframe, which reduces the project's financial risk.

Additionally, the estimated IRR exceeds the average market return, indicating that the project is attractive to investors. Overall, the results reflect a solid and sustainable financial structure, supporting the project's long-term viability.

In conclusion, the project presents high profitability and low financial risk, making it an attractive alternative for investors and financial institutions.

Conclusions

Taking into account the development of the project, it was possible to demonstrate that the export of thermal coal from Colombia to international markets, specifically Germany, is both operationally and financially viable, even when the company does not own coal mines, provided that there is adequate logistics planning and efficient supply chain management, making the project profitable.

Based on the cash flow analysis and the calculation of the Internal Rate of Return (IRR), the project confirms that the export of thermal coal from Colombia to Germany is a viable and profitable alternative, even when the company is not a mine owner, as long as there is proper logistics planning and effective supply chain management. Proper coordination among the different logistics stakeholders allows the optimization of resources, cost reduction, and compliance with export processes.

From a financial perspective, the results show that the project generates stable profits from the first year of operation, maintains a solid financial structure, and offers high profitability, reflected in an Internal Rate of Return close to 33%. This makes the project an attractive option for investors, with a controlled level of risk and investment recovery within a reasonable timeframe.

Overall, it can be confirmed that a well-structured export model, supported by financial analysis and logistical efficiency, can be sustainable, competitive, and applicable to Colombian international trade, providing a comprehensive view of the export process.

Recommendations

Based on the development of this project, it is recommended that the company strengthen its logistics planning processes by implementing data analytics tools that allow it to anticipate variations in demand, optimize transportation routes, and improve coordination among the different actors in the supply chain. Incorporating Big Data-based approaches could significantly contribute to reducing operating costs and improving the overall efficiency of the logistics system.

Likewise, it is advisable for the organization to establish formal logistics risk management strategies, considering factors such as adverse weather conditions, port congestion, variations in ocean freight rates, and potential regulatory changes in international markets. Diversifying logistics providers and defining contingency plans would increase the resilience of the export operation.

From a financial perspective, it is recommended to maintain a prudent cost control policy and reinvest profits to ensure the long-term sustainability of the project. Periodic evaluation of financial indicators such as cash flow, operating margin, and project profitability would facilitate strategic decision-making and the early detection of deviations.

Finally, it is suggested that future studies broaden the analysis to include alternative market scenarios, such as fluctuations in international coal prices, variations in export volumes, and changes in logistics costs. This approach would provide a more comprehensive view of the project's performance under different economic conditions.

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