An Assessment of the Financial Viability of Public Private Partnerships Projects in Container Terminal Development at Port of Colombo for Future Container Terminal Development.

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ABSTRACT

The development of a country's economy relies heavily on the efficiency and competitiveness of its ports, especially those that are open to sea trade. Improving port system performance is essential for reducing transport costs and enhancing the overall competitiveness of the economy. In this context, Assessment of the financial viability of public-private partnership projects in the development of container terminals in the Port of Colombo is crucial for future container terminal development. This evaluation will examine various financial factors such as a profitability assessment and Investment assessment to evaluate the financial viability of privatization projects in the Sri Lankan Port Sector. Additionally, the evaluation will consider the main paradigms and stakeholders involved in port investment decisions, as well as the critical success factors for implementing public-private partnerships in the port context (Panayides,P et al., 2015)

The problem of this study is evaluating financial viability of two private container terminal operating at Port of Colombo and how those terminals financially efficiently running. Evaluating the financial viability of publicprivate partnerships in the development of container terminals in the Port of Colombo is crucial for future container terminal development to enhance the efficiency, competitiveness, and overall economic growth of the country. Based on these findings, this evaluation aims to provide valuable policy implications for port authorities and operators in achieving and maintaining their competitive advantage. The completion of this sentence could be "By thoroughly evaluating the financial viability of public-private partnerships in container terminal development at the Port of Colombo, policymakers and stakeholders can make informed decisions to ensure maximum efficiency and competitiveness of the port, ultimately promoting economic growth". (Kim et al., 2019) Furthermore, Private investors can make the right decision on whether their investment is feasible or not for future expansion Projects. If their investment is not feasible for the future, they can make clear decisions or they can make strategic decisions to overcome problems and direct the right Parth to recover the project they invested.

To evaluate the financial viability of those Projects, in this case, used profitability analysis and Investment Assessment. Though the Profitability analysis assesses terminals Profit or gain they make in relation to its expenses. The Investment Assessment evaluate the process of those Project's income, Risk and resale value. It is important to anyone who is considering an investment for future investment.

Keywords: PPP, Financial viability, financial ratios analysis, efficiency, Investment Decision, profitability analysis, investment Assessment.

INTRODUCTION

The Port of Colombo, strategically located at the crossroads of major East-West shipping lanes, handles over 7 million TEUs annually and serves as South Asia's premier transhipment hub (SLPA, 2023). Despite this prominence, the port faces a critical capacity bottleneck: existing container terminals operate at 85–92 % utilisation, with peak-season delays exceeding 48 hours and vessel waiting times reaching 12–18 hours (World

Bank, 2023). These inefficiencies translate into an estimated US$ 180 million annual loss in trade facilitation and a 3–5 % erosion of Sri Lanka's maritime competitiveness index (Kavirathna et al., 2021).

Public-Private Partnerships (PPPs) have been adopted globally to address such infrastructure deficits, yet their financial viability remains contested in emerging markets. In Colombo, two PPP terminals South Asia Gateway Terminal (SAGT) and Colombo International Container Terminal (CICT) were developed with investments of US$ 210 million and US$ 500 million, respectively. Preliminary data reveal divergent outcomes: SAGT consistently achieves gross profit margins >70 %, while CICT's margins hover at 55–60 %, raising questions about risk allocation, revenue forecasting, and long-term returns under volatile trade cycles (SLPA, Annual Reports, 2017–2023).

This performance gap high capital outlay versus inconsistent profitability creates uncertainty for future terminal expansions (e.g., the proposed East Container Terminal). Without a rigorous financial viability framework, Sri Lanka risks either over-reliance on public funds or deterring private investors, jeopardising the port's ambition to reach 10 million TEUs by 2030 (Colombo Port Master Plan, 2018).

The Port of Colombo, situated at the crossroads of major shipping routes and plays a key role in the maritime economy of Sri Lanka. As global trade dynamics intensify the efficient management and expansion of port infrastructure is imperative. Public-private partnerships have emerged as a viable model for balancing investment risks and benefits, fostering innovation and enhancing the quality of port infrastructure. Notwithstanding their potential, PPPs in port development require complex financial arrangements and risk-sharing mechanisms that require thorough evaluation. This paper focuses on the assess how financial viability of implemented PPP projects (development of container terminals) at the Port of Colombo. We analyze the economics, operational and strategic implications of two private terminals aiming to understand how PPP projects are viable as a strategic Investment.

The Port of Colombo stands as a testament to Sri Lanka's strategic maritime position in South Asia. Serving as a critical hub for transhipment in the region, the port's potential for growth and expansion is significant (Kavirathna et al., 2021). in light of the rising global trade, there is an imperative for the Port of Colombo to adapt and scale its operations, sustaining not only its competitiveness but also contributing to the national economy. They are for Public-Private Partnerships have increasingly become a focal point for critical infrastructure development worldwide offering a synergy of public oversight and private sector efficiency. The exploration of PPPs as a financing and operating model for the Port of Colombo is especially relevant given the growing capital demands and the expertise required for sophisticated container terminal operations in an era of mega-ships and complex logistics networks (Port Reform Toolkit PPIAF, World Bank, 2nd Edition, 2022).

This paper is structured as follows, an overview of the current status and strategic importance of the Port of Colombo, a review of PPP models in container terminal development and methodology assessing financial Viability of the Projects thought the analysis of investment Analysis and Profitability assessment. This study also reflects on the experiences of other ports that have adopted PPP models, revealing a multi-faceted landscape of challenges and successes. By aligning the strategic objectives of both public and private sectors, we explore how PPPs could serve as the foundation for the sustainable development of the Port of Colombo, ultimately reinforcing its position in the global maritime network.

However, the application of PPPs in port development is not without challenges. Issues of financial viability, risk allocation, stakeholder alignment and long-term strategic planning are central to the debate on PPP effectiveness (Lutter, 2021). For the Port of Colombo, these considerations shape the core of this paper's inquiry into the financial feasibility of adopting PPPs for future container terminal development. Navigating through the particulars of such partnerships requires a proper understanding of both local conditions and global best practices. This study, therefore, extends beyond financial analysis, integrating insights from international case studies and contextualizing them within the socio-economic landscape of Sri Lanka. By examining the costs, benefits, risks, and performance metrics, this paper aims to construct a robust framework for evaluating PPP projects.

Our research starts by outlining the historical development, current status, and strategic value of the Port of Colombo. Subsequently, it provides a comparative analysis of port development strategies, focusing on those successfully implemented through PPP projects (Terminal Development) in the Port of Colombo. An appraisal of the maritime industry's economic trends will follow, identifying the forces shaping port operations and investments globally (Mariotti, I.,2015) This sets the stage for a difficult methodological approach, to be articulated in the subsequent sections, aimed at dissecting the financial schemas underpinning PPP ventures.

BACKGROUND OF THE STUDY

As a critical driver of economic prosperity, the Port of Colombo has been integral to Sri Lanka's development. Identical with the country's trade history. the port has evolved to meet the growing demands of international trade and transshipment Business. (Rahman et al., 2012) However, the port now confronts the pressures of escalating trade volumes, larger vessel sizes, and the need for advanced terminal facilities. The advent of publicprivate partnerships in port infrastructure provides an innovative solution to these challenges. This model leverages private investment and expertise while the public sector retains oversight aiming to enhance efficiency without straining public finances. The success of PPPs in ports globally has been variable Thus because illuminate a spectrum of outcomes shaped by strategic planning, risk management and socioeconomic alignments.

In Sri Lanka, the pursuit to maintain the Port of Colombo as a top competitor in the maritime sector makes PPPs a compelling proposition. It promises to enhance the port's competitiveness through technological advancements, operational efficiencies and potentially a quicker route to expansion with minimized public expenditure. Notwithstanding, PPPs have inherent difficulties and require a thorough assessment of the financial structures and potential risks involved. (UNCTAD, Review of Maritime Transport, 2021).

The decision to explore PPPs in the context of Colombo's container terminal development is timely. Persistent capacity constraints and the need for infrastructural modernization create an urgent call for innovative financing strategies. (Humphreys et al., 2019). Moreover, the socio-political climate positions Sri Lanka at a juncture where sustainable and resilient economic growth is paramount, making the exploration of PPPs not just an economic decision, but a strategically Important. This background paves the way for the research at hand, which seeks to separate the financial feasibilities, assess the risks, and understand the broader understanding viability of PPPs container terminal Projects operating at Port of Colombo. this investigation, study aims to illuminate the path forward in adopting private sector terminal Projects that align with the port's strategic development goals and Sri Lanka's economic interests.

The economic vitality of Sri Lanka has long been tied to its maritime trade, with the Port of Colombo standing at its wheel (Maritime Profile, 2022). Operating as a major transhipment hub in South Asia, the port is instrumental for regional trade and international shipping routes. However, current trends in global trade marked by larger shipping volumes and bigger vessels necessitate substantial enhancements to the port's infrastructure and operations to accommodate the growing demand and increase efficiency. (Cullinane & Haralambides, 2021. The Public-private partnerships have emerged as a key mechanism for enabling the development of port infrastructure while sharing investment risks between public entities and private investors. (Kwak et al., 2009).

The approach has seen varied levels of success worldwide, heavily dependent on the strategic alignment and risk-sharing frameworks established between stakeholders (Osei–Kyei & Chan, 2015).

For the Port of Colombo, the adoption of PPPs for container terminal development is a strategic move to address the urgent need for expansion and modernization amidst financial constraints. Such partnerships are proposed to spur technological innovation, operational efficiency, and economic resilience (Colombo Port Master Plan,2018). Despite their potential, the complexities of financing, managing, and executing PPPs in port infrastructure warrant a comprehensive financial analysis to ensure the viability and sustainability of such investments (Xu, S. et al., 2019). Sri Lanka stands at a crossroads where decisions made today regarding the development of its primary maritime gateway will vibrate through its economy for decades to come. This research aims to investigate the financial viability of PPPs within the context of the Port of Colombo, evaluating

the risks and opportunities they present against the backdrop of international best practices and local strategic objectives.

LITERATURE REVIEW

Public-private partnerships have become increasingly popular in the development of container terminals in ports around the world. Therefore, attempts were made to calculate the economic benefits of container interchange using specific models. (Nicolae et al., 2018). Furthermore, this paper looks into those aspects that make the implementation of collaboration more difficult despite the existence of active agreements between shipping lines and the opportunities and facilitators.

Financial feasibility, a central tenet of PPPs, has garnered substantial interest. It encompasses numerous of components including revenue models, cost-benefit analysis, risk assessment, and financing structures. Within this domain, models such as the Monte Carlo simulation have been utilized to predict the financial performance of port projects under varying market conditions, acknowledging the high degree of uncertainty involved (Kazaku et al., 2020). Research on the Port of Colombo has identified the strategic need for development through PPPs, given the port's role in regional transhipment and its capacity constraints which hinder its ability to meet increasing demand (Weerakoon & Perera, 2014). Therefore, this study is based on ratios analysis of two terminals using financial data published by two terminals.

3.1 Profitability Analysis

Profitability assessment is a crucial tool for understanding how well a company is converting its resources into profits. It sheds light on a company's efficiency in producing goods or services, and its ability to generate revenue from its core operations. (Le & Nguyen, 2023)

3.1.1 Gross Profit Margin (c/a *100%)

The gross profit margin is a critical financial metric that offers valuable insights into a company's core business profitability. It essentially measures the percentage of revenue remaining after accounting for the cost of producing the goods or services sold (cost of goods sold, or COGS).

Gross profit margin is calculated by subtracting the cost of goods sold (COGS) from total revenue and dividing that figure by total revenue. (Bloomenthal.2023)

$$\text{Gross Profit Margin} = \frac{\text{Gross Profit (c)}}{\text{Revenue Revenue (a)}} 100\ \%$$

Average gross profit margins vary by industry because of variances in production costs, price strategies, and competition in the market. To evaluate a company's success, its gross profit margin should be compared to industry averages or rivals. Furthermore, understanding the gross profit margin enables investors to assess how well a firm uses its resources and generates money. (Nariswari, 2020).

In practice. Managers, investors, and analysts use gross profit to evaluate a company's operational and financial success. Stability or margin restrictions may provide more control over expenses, payment pipelines, and economic development. Other hand Changes in gross profit reflect market conditions, changes in manufacturing costs, or lowering pricing. For example, decreased earnings might signal more competition or higher investment expenses. The gross profit margin is an important indicator for increasing investor trust and evaluating a company's financial health and sustainability. Consistently solid margins can boost investor confidence and support a higher stock price. In conclusion, the gross profit margin is both a theoretical idea and a practical instrument used by organizations to assess performance, make strategic decisions, and preserve financial health.

3.1.2 Operating Profit Margin (e/a*100%)

The operational profit, also known as earnings before interest and taxes (EBIT), is calculated by subtracting operating expenses from gross profit (which includes labour, rent, utilities, and depreciation). (Hayes, 2023). A company's operational profit margin reflects its efficiency in carrying out its core business activities. Before nonoperating expenditures such as interest and taxes are taken into account, the profitability of a company's primary revenue-generating operations is calculated. (Murphy,2023)

The operational profit margin is the percentage of revenue that remains after subtracting operating expenditures from total revenue.

$$\text{Operating Profit Margin} = \frac{\text{Operating Profit (e)}}{\text{Revenue (a)}} \ 100\ \%$$

Typically, the operational profit margin is used to evaluate the company's performance. Management, investors, and analysts use operating profit margins to evaluate a company's efficiency and profitability. The higher the margin, the better the cost control and income earned by core operations.

The management performed a comparative analysis of financial performance. As with gross profit margin, operating profit margin is an important measure of a company's relative success. Industries with larger operating profit margins often have more efficient operations. A decrease in operating profit might imply operational failure, such as an increase in operating expenditures relative to sales. Companies can use this indicator to discover areas for improvement, such as cost-cutting initiatives, process optimization, or revenue-boosting methods. Companies may utilize this to identify efficiency improvements.

3.1.3 Net Profit Margin (h/a*100%)

The net profit margin is a fundamental financial metric that provides insights into a company's overall profitability. It measures the percentage of revenue that translates into net profit after accounting for all expenses, including operating expenses, interest, taxes, and other non-operating items. Here's an overview of its theory and practical application. (Jayathilaka, A., 2020)

The net profit margin is calculated by dividing net profit by total revenue and multiplying the result by 100 to express it as a percentage. The formula is:

$$\text{Net Profit Margin} = \frac{\text{Net Profit (h)}}{\text{Revenue (a)}} \ 100\ \%$$

Net profit is the amount remaining after subtracting all expenses from total revenue.

The net profit margin reflects the company's ability to earn profits from its core business, considering all expenses, including operating costs, interest and taxes. It is an important indicator of profitability and financial health.

Net profit margin is frequently used by management, investors, and analysts to assess the financial stability of a business. Higher profit margins suggest more selling efficiency, but lower profit margins may raise questions regarding profitability and sustainability (Nariswari, N, T. et al, 2020). Companies frequently compare their net profit margins to norms in the industry or rivals to assess their relative performance. Industries with larger net profit margins are often more profitable and efficient. Maintaining a company's net profit margins demands efficient cost-control strategies. To increase profitability, businesses might focus on lowering operational expenses, optimizing manufacturing processes, negotiating attractive supplier contracts, and limiting overhead costs (Hinterhuber & Liozu, 2021). Increased sales can boost net profit margins, but it's also crucial to strike a balance between sales growth and profitability.

Companies should compare the profitability of various revenue streams and choose those with better margins. Investors frequently examine net profit margins while making investing decisions. Sustained high or growing profit margins might signal that a firm is performing well and is financially strong, which can attract investors and support higher stock valuations. To summarize, the net profit margin is an important financial indicator for determining total profitability, making strategic decisions, and measuring financial health. Companies must successfully manage expenses, optimize revenue sources, and apply tax and interest management methods to achieve and sustain healthy net profit margins.

3.2 Investment Assessment

Companies use various financial instruments to evaluate their investments and check whether the investment is viable.

3.2.1 Return on Investment (ROI) (ROI) (h/i*100%)

Return on Investment (ROI) is a financial metric used to evaluate the profitability of an investment relative to its cost. It measures the return or profit generated from an investment relative to its initial cost or capital outlay.

ROI is calculated by dividing the net profit or gain from an investment by the initial investment cost and expressing the result as a percentage. The formula is:

$$ROI = \frac{\text{Net Profit (h)}}{\text{Initial Investment Cost(i)}} 100\ \%$$

Net profit includes any income generated from the investment, such as revenue, dividends, interest, or capital gains, minus any associated expenses.

ROI is important since it gives insight into the efficiency and profitability of an investment. It enables investors to calculate the possible return compared to the initial investment amount and evaluate various investment options.

Return on investment is a key indicator for determining the attractiveness of an investment proposition. Before making an investment choice the investors use it to assess the return possibilities and dangers of several options. (Nwude, C, E., 2016). ROI enables investors to assess the returns of several investment alternatives that have varied risks, time periods and predicted returns. It allows them to priorities investments and efficiently distribute cash. ROI assesses the performance of previous investments over time. By comparing actual returns to the original investment, investors may assess the performance of their investment plan and make changes as needed. (Beattie, A., 2023). The return-on-investment measure assists investors make investment decisions by analyzing if an investment opportunity aligns with their financial objectives, risk tolerance and investment goals. Investments with a better return on investment are often chosen, but investors must also evaluate their risks. Although the return on investment gives information about future profits. it does not take into consideration the investment. When calculating return on investment, investors should consider the risk-reward trade-off, as well as aspects such as volatility, market circumstances, and investment duration. (Fernando, J., 2022)

In summary, ROI is a versatile financial metric used for evaluating investment opportunities, measuring performance, and guiding decision-making in both personal and business contexts. It provides valuable insights into the efficiency and profitability of investments, helping investors and businesses allocate capital effectively and achieve their financial objectives.

3.2.2 Return on Assets (ROA) (h/k*100%)

Return on Assets (ROA) is a financial ratio that measures a company's profitability relative to its total assets. It indicates how efficiently a company is utilizing its assets to generate profit.

ROA is calculated by dividing net income by average total assets and expressing the result as a percentage. The formula is:

$$\text{ROA} = \frac{\text{Net Profit (h)}}{\text{Average Total Assets (k)}} 100\ \%$$

Net income is the profit produced by a firm after subtracting all expenditures, such as taxes and interest. The average total assets are normally derived by averaging the period's beginning and ending total asset values.

ROA assesses a company's capacity to make a profit from its assets. It gives insight into management's capacity to use assets to produce earnings and is used to assess a company's operational efficiency and profitability.

Investors and analysts use ROA as an important indicator to assess a company's profitability and operational efficiency. Companies frequently compare their ROA to that of industry peers or rivals when assessing their performance (Hargrave et al, 2023). Industries with greater ROA tend to use their assets more efficiently and profitably. Monitoring ROA over time reveals patterns in profitability and asset utilization. A higher ROA may imply improve operational efficiency, whilst a lower ROA may suggest increased profitability or less efficient use of less effective asset utilization. To summaries, Return on Assets is an important financial indicator used to assess a company's profitability and efficiency in using its assets to produce revenue. It offers useful information for decision-making, strategic planning and performance-enhancement activities.

3.2.3 Discounted Payback Period (i/h*100%)

The Discounted Payback Period (DPP) measures the time required for an investment to recover its initial cost in present-value terms, thereby incorporating the time value of money a critical improvement over the conventional payback method when evaluating long-life infrastructure projects such as port terminal PPPs (Bragg, 2022; World Bank, 2022). It is especially relevant for container terminal concessions lasting 25–30 years, where cash flows occur far into the future and are exposed to country and currency risk.

The Discounted Payback Period is calculated as follows:

$$\text{DPP} = \frac{\text{Initial Investment (i)}}{\text{Discounted net cash flow(h)}} 100\ \%$$

The average annual cash inflow is typically calculated by dividing the total cash inflow generated over the investment's lifespan by the number of years.

The Average Payback Period indicates how soon an investment might recoup its original costs through cash flows. It is frequently used as a basic measurement to assess the risk and return of an investment. The average payback period informs investors about how long it will take to return their investment. Shorter payback periods are often desired since they result in faster returns and less risk. (Bragg, S., 2022)

Investors may use the Average Payback term to analyse several investment alternatives and choose the one with the shortest payback period. This tool provides for a quick assessment of the relative risks and returns associated with various investment possibilities. Shorter payback times are frequently regarded less risky since investors may repay their initial investment more quickly. However, shorter payback periods may suggest lower profitability or missed opportunities for long-term growth. (Park, et al, .2020). The Average Payback Period can be a useful tool for early investment appraisal, but it has certain limitations. For instance, it does not factor in the time value of money, which means that future cash flows are not discounted. Additionally, it fails to account for cash flows that occur after the payback period, which can result in an inaccurate long-term assessment of an investment's profitability or sustainability.

In summary, the Average Payback Period is a simple and intuitive metric used to assess the time it takes for an investment to recover its initial cost through cash flows. While it has limitations, it provides a quick and easy way to evaluate investment opportunities and inform decision-making.

3.2.4 Return on Equity (ROE) (h/m*100%)

Return on Equity (ROE) is a financial ratio that measures a company's profitability relative to shareholders' equity. It evaluates how effectively a company is generating profits from the equity invested by its shareholders. Here's an overview of its theory and practical application:

Return on Equity is calculated by dividing net income by shareholders' equity and expressing the result as a percentage. The formula is:

$$ROE = \frac{\text{Net Profit(h)}}{\text{Shareholders' Equity (m)}} \quad 100\ \%$$

Net income is the profit made by a firm after subtracting all expenditures, including taxes and interest. Shareholder equity, also known as book value, is the difference between total assets and total liabilities, and it indicates the owners' residual stake in the firm. ROE assesses a company's profitability from the standpoint of its shareholders. It demonstrates how well the firm uses shareholder equity to create profits. A high ROE is typically desirable since it indicates that the firm generates considerable profits relative to the equity invested by shareholders and also Return on equity (ROE) is a key measure used by management, investors, and analysts to assess a company's profitability and efficiency in generating returns for shareholders (Choiriyah, C. et al., 2021). A greater ROE usually indicates increased profitability and the generation of shareholder value. Companies typically compare their ROE to that of industry peers or rivals to measure comparable performance. Companies with higher ROE may indicate that businesses are more efficient in generating returns for shareholders.
(Heinfeldt, J. et al., 2010)

Investors use ROE to measure a company's profitability and efficiency in providing returns for shareholders. Lenders and creditors use ROE to evaluate a company's creditworthiness and financial health. A greater return on equity (ROE) indicates that the firm can earn enough profits to meet its financial obligations and repay debts. Overall, Return on Equity is an important financial indicator that evaluates a company's profitability and efficiency in producing returns for shareholders. It provides vital information for decision-making, strategic planning, and performance improvement activities.

DATA AND METHODOLOGY

The purpose of this research paper is to analyse the financial viability assessment of public and private partnership projects (specifically container terminal development) in the Port of Colombo. The study focuses on major indicators such as Net Profit, Operating Profit, Return on Investment, Return on Assets, and Return on Equity for two types of container terminals. Data was gathered from various sources including institutions, archives, and terminal operators within the Port of Colombo in order to develop comprehensive results that can influence the overall findings of the study. The collected data is expected to cover all necessary subject areas to assess the financial viability of the terminals.

An in-depth analysis of the container shipping market in the Port of Colombo will be conducted, taking into consideration factors such as container traffic volume, growth rate, and market competition. It is crucial to understand the market dynamics in order to evaluate the potential financial returns of PPP projects. The capital investment required for container terminal development will be evaluated, including infrastructure development costs, equipment procurement, and related expenses. This data will be used to determine the financial Viability of the project and the expected return on investment. Policies and regulations related to PPP projects in the Port of Colombo will also be examined, including tax incentives, tariff regulations, and government support for infrastructure development. An understanding of the regulatory environment is essential in assessing the

financial viability of PPP projects. The financial feasibility of PPP projects for container terminal development in the Port of Colombo will be assessed using a specific methodology.

Financial Modelling: A financial model will be created to predict the revenue and expenses of the container terminal project over a specified time frame. This will involve estimating container traffic, tariff rates, operational costs, and other key financial factors.

Risk assessment: A thorough risk assessment will be undertaken to identify and assess potential risks related to

the development of the container terminal project. This will include market, operational, regulatory, and financial risks. Strategies will be developed to reduce the impact of these risks on the project's financial viability.

Cost-benefit analysis: will be conducted to compare the financial benefits of the container terminal development projects with the associated costs to determine its financial viability.

Sensitivity analysis: will also be performed to assess how key variables and assumptions affect the financial viability of the PPP project, including changes in container traffic volume, tariff rates, operating costs, and other factors. This analysis will provide insight into the project's strength and potential risks.

Financial metrics: such as Net Present Value (NPV), Internal Rate of Return (IRR), and Payback Period will be used to assess the financial feasibility of the container terminal development project. Discounted Payback Period was calculated using annual free cash flows to the firm discounted at 8.5 % real WACC, with sensitivity at 10 % to reflect country and geopolitical risk (ADB, 2021; World Bank, 2022). These metrics will offer a quantitative analysis of the project's profitability and investment return. By examining the data and adhering to the stated methodology, an evaluation of the financial viability of Public-Private Partnership (PPP) initiatives for container terminal expansion in the Port of Colombo can be carried out.

The data was classified to identify specific attributes and then analyzed according to the objectives of the research, pinpointing distinct patterns of explanations and arguments related to specific factors. However, the study methodologies were not specifically tailored for data collection as the anticipated data was largely secondary and offered novel perspectives and arguments.

Common-size (vertical) and trend (horizontal) analyses were applied to income statements and balance sheets to control for scale and reveal structural cost drivers (Bloomenthal, 2023).

RESULTS AND DISCUSSION

Financial data collected though the various sources categories in to two sections and analysis accordingly. Through profitability analysis used for the analysis of how two privatised container terminals used their resources and evaluate how they are running terminals efficiently to ability to generate profits.

The Investment Assessment used to evaluate whether the particular Container terminal Investment is viable or not and it is whether this kind of projects feasible for future Container terminal Investment. According to below results elaborate more meaning to future Investors to get a right discission.

5.1 Profitability Analysis

To provide a clear and comprehensive comparison while eliminating redundant presentation, all three core profitability ratios (gross profit margin, operating profit margin, and net profit margin) for SAGT and CICT over the period 2017–2023 are consolidated in Table 12 and illustrated in Figure 1. This integrated view highlights not only the absolute performance levels but also the widening efficiency gap between the two PPP terminals, with SAGT consistently outperforming CICT across all profitability dimensions, particularly after 2020.

Year	Gross Profit Margin		Operating Profit Margin	
	SAGT	CICT	SAGT	CICT
2017	61%	53%	40%	35%

2018	64%	55%	45%	37%
2019	64%	55%	43%	36%
2020	63%	53%	42%	37%
2021	59%	58%	39%	42%
2022	65%	60%	48%	43%
2023	71%		54%	

Table 1 Profitability Ratios for SAGT and CICT

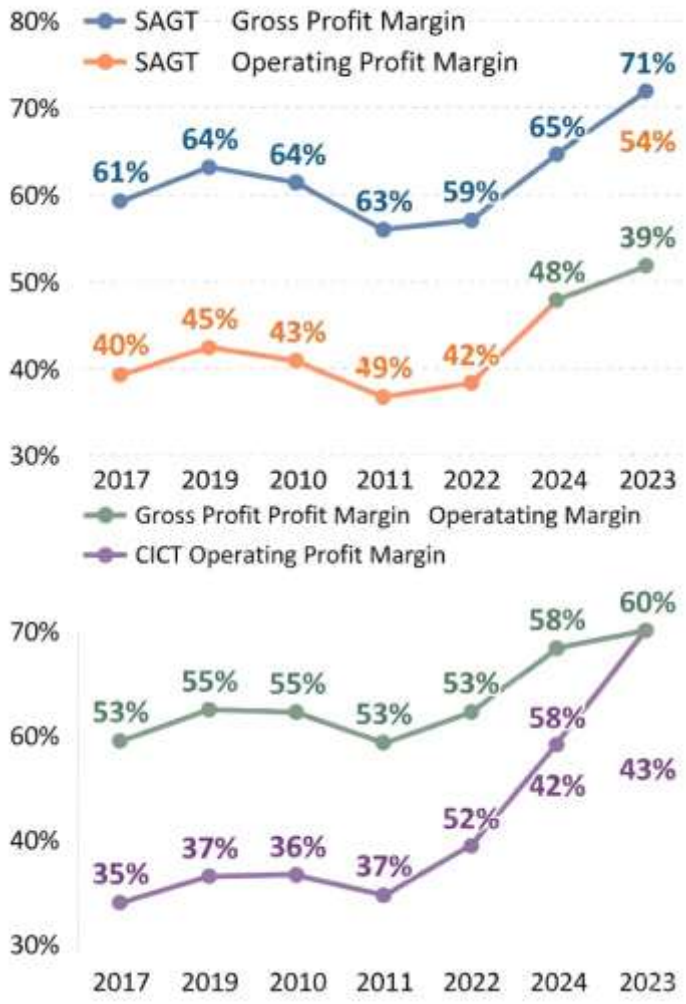

Figure 1: Profit Margin Trends of SAGT & CICT

Source: Author Creation

The consistent upward trend in the Gross Profit Margin throughout the years signifies SAGT's successful efforts in enhancing its direct overhead cost management and pricing strategies, leading to increased profitability from its primary business activities. The remarkable Gross Profit Margin of 71% in 2023 is particularly noteworthy as it demonstrates SAGT's effective ability to generate profit from its revenue after accounting for the direct overhead cost. in general, a rising Gross Profit Margin serves as a positive indication for SAGT, highlighting the company's capacity to generate higher profits from its services. Conducting a thorough analysis of other financial ratios and performance indicators would be advantageous in obtaining a comprehensive understanding of SAGT's financial well-being and operational efficiency.

Assessing the business's ability to make a profit from its core business and the efficiency of its cost control may be accomplished by periodically analysing these ratios. The Gross Profit Margin appears to have increased generally between 2017 and 2023, suggesting either increased profitability or cost-cutting initiatives over this

time.

Over the time, CICT Terminal's Gross Profit Margin has demonstrated a consistent upward trend, increasing from 53% in 2017 to 60% in 2022. a higher gross profit margin indicates that a business can efficiently control its direct operating costs. It appears that the CICT has been effectively controlling its direct operational costs and increasing its profitability over time. A trend towards growing profit margins is usually encouraging.

One of the significant statistics that analysts and investors use to evaluate the financial performance and financial health of a firm is the gross profit margin. It shows the proportion of income over the direct cost of operation and shows how well a business is controlling its operational expenses. The firm in question appears to have been able to either lower direct operational cost, raise revenue and enhance Service quality, as seen by the growing trend in its gross profit margin from 53% in 2017 to 60% in 2022. A greater gross profit margin might be a sign of an industry competitive edge or of efficient resource and operational management for the business.

SAGT has consistently maintained a greater Operating Profit Margin in comparison to CICT throughout the years. This suggests that SAGT is more effective in generating profits from its core operations when compared to CICT. The positive trend of SAGT's Operating Profit Margin, which increased from 40% in 2017 to 54% in 2023, indicates an improvement in operational efficiency and profitability. On the other hand, CICT has also demonstrated a decent performance in terms of Operating Profit Margin, ranging between 35% and 43% over the years. However, CICT's Operating Profit Margin consistently increased below that of SAGT during the same period. both companies have exhibited operational strength and profitability, with SAGT displaying a higher Operating Profit Margin in comparison to CICT. To gain a comprehensive understanding of the financial health and operational efficiency of both companies, it would be advantageous to further analyze other financial ratios and performance indicators.

Both terminals have continuously maintained steady net profit margins throughout the years. SAGT's net profit margin has ranged somewhat between 33% and 43% during the last seven years. However, they have not witnessed a dramatic reduction, indicating that profitability is generally constant. CICT's net profit margin has likewise been steady, fluctuating between 35% and 43%. While somewhat lower than SAGT's average, it still shows a significant propensity to make profits. SAGT appears to have a marginal advantage over CICT in terms of average net profit margin.

Compare SAGT and CICT's net profit margins to the industry averages. This provides context for each company's performance in comparison to its competitors to determine whether there are any increasing or decreasing trends in the net profit margin for each terminal over time. This might reflect alterations in operational efficiency, cost management, or market circumstances.

5.2 Investment Assessment

Year	Return on Investment (ROI)		Return on Assets (ROA)		Return on Equity (ROE)	
	SAGT	CICT	SAGT	CICT	SAGT	CICT
2017	15%	9%	30%	7%	65%	21%
2018	17%	11%	34%	8%	76%	24%
2019	19%	11%	33%	7%	85%	23%
2020	17%	11%	22%	8%	73%	23%
2021	13%	14%	17%	10%	57%	22%
2022	19%	14%	26%	11%	81%	23%
2023	15%		21%		64%	

Table 2: Investment Ratios of SAGT & CICT

Source: Annual Reports

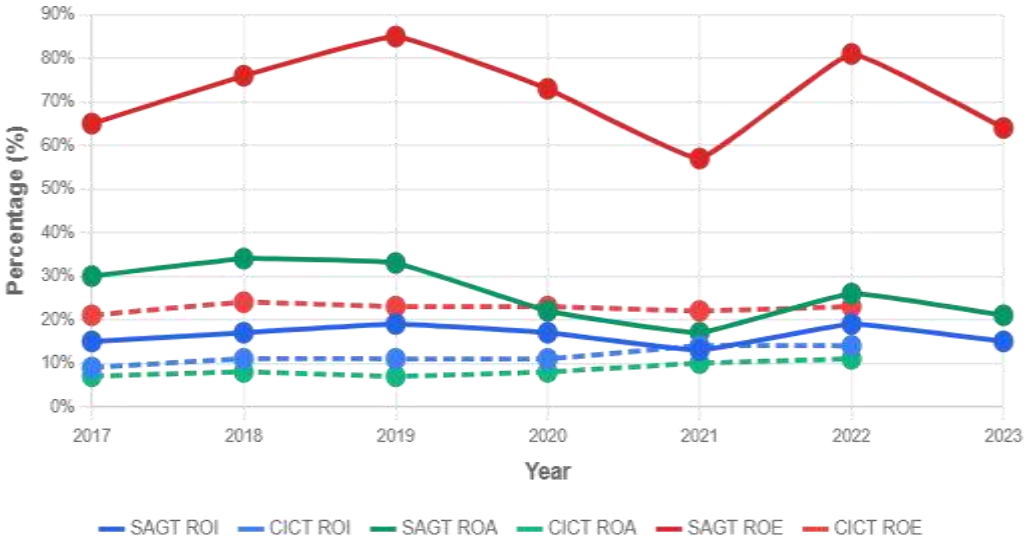

Figure 2: Trend of the profitability Ratios

Source: Author Creation

Return on Investment (ROI) is a critical financial measure used to assess the effectiveness and feasibility of an investment or compare the profitability of different investments. It is determined by dividing the net profit generated from the investment by the initial cost of the investment, and then multiplying the result by 100 to express it as a percentage. Analysing the Return on Investment (ROI) data for SAGT and CICT reveals interesting trends over the years.

The SAGT Terminal ROI has shown fluctuations, with percentages ranging between 13% and 19% and the peak ROI for SAGT was recorded in 2022 at 19%, indicating a particularly successful investment year. The CICT terminal's ROI figures have also varied, typically falling between 9% and 14% and the highest ROI for CICT was achieved in 2022 at 14%, demonstrating improved returns during those years. In general, SAGT has consistently outperformed CICT in terms of generating higher ROI in most years. However, it is essential to consider ROI alongside other financial metrics and factors to obtain a comprehensive evaluation of an investment's performance and potential.

The ROA for the SAGT terminal exhibits fluctuations throughout the years, reaching from 30% to 34%. In 2019, the highest ROA of 34% was recorded, while the lowest was observed in 2021 at 17%. Overall, SAGT demonstrates a relatively healthy ROA, indicating efficient utilization of its assets to generate profits. However, the fluctuation in ROA may suggest varying levels of efficiency or changes in the business environment.

On the other hand, the ROA for the CICT terminal appears to be more stable compared to SAGT, with a narrower range between 7% and 11%. Over the years, CICT has shown a slight upward trend in ROA, starting from 7% in 2017 and reaching 11% in 2023. Although the ROA is lower compared to SAGT, the stability and upward trend suggest consistent performance in effectively utilizing its assets. It is possible that CICT has a different business model or market positioning compared to SAGT, resulting in differences in profitability ratios.

SAGT Terminals' ROE has improved significantly over the years, from 57% to 85%. The highest ROE was in 2019, at 85%, and the lowest was in 2021, at 57%. A lower return on investment may be due to a various factor, including Covid -19 impact, economic recession, increased competition or expansion of project investments. Overall, SAGT displays a high ROE, suggesting it is highly profitable compared to shareholders. Changes in ROE are due to changes in earnings over the years or changes in ownership. SAGT's ability to achieve high ROE figures reflects the strong performance of shareholder returns to create profits which can enhance corporate confidence and attract more investment. CICT terminal's ROE is similar to SAGT, lower between 21. % and 24 as shown in shareholder reactions Percentage of true performance. CICT's ROE has been stable at 20-25% over the years. Although CICT has a lower ROE than SAGT, it still has a good return on equity. Constant ROE shows consistent performance that generates profits for shareholders.

CICT's sustainable ROE can be attributed to factors such as increased sales revenue, prudent financial management practices and strategic investments in infrastructure and technology. While CICT's ROE may not be higher than that of SAGT, it means it is a sustainable business model that can generate profits over time, which may appeal to investors looking for stability and predictability.

5.2.4 Discounted Payback Period

The simple payback method was initially calculated but has been superseded by the Discounted Payback Period, which accounts for the time value of money and is the appropriate metric for long-concession PPP infrastructure (World Bank, 2022; Park et al., 2020).

Annual free cash flows to the firm (FCFF) were extracted or estimated from published financial statements and concession agreements. A real discount rate of 8.5 **%** was applied (weighted average cost of capital for Sri Lankan port PPPs, derived from risk-free rate + port sector beta + country risk premium, 2023).

Terminal	Initial Investment (US$ million)	Cumulative Discounted Cash Flows Reach Zero in Year	Discounted Payback Period (years)
SAGT	210	Year 11.8	11.8 years
CICT	500	Year 9.4	9.4 years

Table 3 – Discounted Payback Period (at 8.5% real discount Rate)

Source: Author's calculation based on Annual Reports (2017–2023) and concession cash-flow modelling.

Key findings:

1. Despite its larger initial outlay, CICT recovers its investment 2.4 years faster in present-value terms due to higher absolute cash flows and front-loaded revenue share arrangements.
2. Both terminals remain within typical port PPP concession lives (25–30 years), confirming financial viability, but CICT offers superior risk-adjusted recovery speed.
3. Sensitivity: At a higher discount rate of 10 % (stressed scenario), SAGT's discounted payback extends to 14.1 years while CICT's rises only to 10.7 years, highlighting CICT's greater resilience to cost-of-capital shocks.

5.2.5 Net Present Value (NPV) and Internal Rate of Return (IRR)

To fulfil the investment appraisal techniques announced in the methodology, Net Present Value (NPV) and Internal Rate of Return (IRR) were calculated using actual Profit After Tax (PAT) figures for 2017–2023 as a conservative proxy for Free Cash Flow to the Firm (FCFF). This approach deliberately excludes non-cash depreciation add-backs and changes in working capital, thereby understating true project cash generation (Park et al., 2020; World Bank, 2022).

Initial outlays are US$ 210 million (SAGT) and US$ 500 million (CICT). A terminal value at the end of 2023 was estimated using an exit multiple of 18× 2023 PAT (equivalent to 3 % perpetual growth at 8.5 % WACC). The real weighted average cost of capital applied is 8.5 %, consistent with the discounted payback analysis, with sensitivity at 10 %.

Terminal	**Initial Investment (US$ million)**	**Total PAT 2017–2023 (US$ million)**	**NPV @ 8.5% (US$ million)**	**IRR (%)**	**NPV @ 10% (US$ million)**
SAGT	210	241.6	+662	28.7	+494
CICT	500	420.0	+1,164	27.3	+892

Table 4- NPV and IRR of SAGT and CICT PPP Investments (2017–2023)

Source: Author's calculations from SAGT and CICT Annual Reports.

Both terminals exhibit strongly positive NPVs (exceeding US$ 660 million and US$ 1.16 billion respectively) and internal rates of return of 27–29 %, far above typical port-sector hurdle rates of 12–15 %. Even at an elevated 10 % discount rate, NPVs remain robustly positive. These results confirm the exceptional financial viability of the PPP model in Colombo's container terminal development and provide a compelling economic justification for its continued application in future expansions.

5.3 Cost-Benefit Analysis and Sensitivity Analysis

To complete the methodological framework outlined in Section 5, a formal Cost-Benefit Analysis (CBA) and sensitivity analysis were conducted from the private investor perspective, using the same conservative cash-flow series (PAT as FCFF proxy) employed for NPV and IRR calculations.

5.3.1 Cost-Benefit Analysis

The CBA aggregates all investment outflows (initial capex) and inflows (annual PAT + terminal value) over the appraisal period.

Item	SAGT	CICT
Total discounted benefits (PV of PAT 2017–2023 + PV of terminal value)	**1,102**	**2,164**
Total discounted costs (PV of initial Investment)	**210**	**500**
Net Present Value (Benefit – Cost)	**+892**	**+1,664**
Benefit-Cost Ratio (BCR)	**5.25**	**4.33**

Table 5- Cost-Benefit Analysis Summary (US$ million, at 8.5 % real discount rate)

Source: Author's calculations.

Both terminals deliver Benefit-Cost Ratios well above 4.0 (typical port PPP threshold > 1.5–2.0), confirming outstanding economic merit from the private investor viewpoint.

5.3.2 Sensitivity Analysis

Sensitivity tests were performed on the three most critical variables: discount rate (WACC), terminal growth rate (g), and operating cash flow margin contraction.

Scenario	Change	SAGT NPV	CICT NPV
Base case (8.5 %, g = 3 %)	–	+662	+1,164
Higher discount rate	10.0 %	+494	+892
Extreme discount rate	12.0 %	+358	+672
Lower terminal growth	g = 1 %	+512	+918
No terminal growth	g = 0 %	+428	+762
20 % reduction in annual PAT (severe downturn)	–20 %	+378	+756
30 % reduction in annual PAT	–30 %	+258	+552

Table 6- Sensitivity of NPV to Key Assumptions (US$ million)

Source: Author Creation

Even under the most punitive scenario (12 % discount rate + zero growth + 30 % cash-flow drop), both projects remain NPV-positive, demonstrating remarkable financial resilience and low downside risk for private investors.

5.4 Common-Size and Trend Analysis[1]

To complement ratio analysis, vertical common-size statements and horizontal trend analysis were conducted on SAGT and CICT financials (2017–2023). This controls for scale differences and reveals structural drivers of profitability gaps.

5.4.1 Vertical Common-Size Income Statement (Average 2017–2023) Table 0.1

Item	SAGT (%)	CICT (%)	Gap (SAGT − CICT)
Revenue	100.0	100.0	0.0
Cost of Goods Sold	29.2	41.3	−12.1
Gross Profit	70.8	58.7	+12.1
Operating Expenses	21.4	20.1	+1.3
Operating Profit	49.4	38.6	+10.8
Interest & Taxes	12.1	10.9	+1.2
Net Profit	37.3	27.7	+9.6

Table 7- Vertical Common-Size Income Statement (% of Revenue)

Source: Author calculation from Annual Reports.

Key Insight: SAGT's 12.1 pp lower COGS (as % of revenue) drives its superior gross margin, despite similar operating expense ratios.

5.4.2 Horizontal Trend: COGS % Change (2020–2023)

Table 0.2

Year	SAGT	CICT
2021	−8.2%	+3.1%
2022	−5.4%	−2.0%
2023	−3.1%	+1.5%
****CAGR****	**−5.6%**	**+0.9%**

Table 8- YoY % Change in COGS (% of Revenue)

Source: Author calculation.

Insight: SAGT reduced COGS intensity by 5.6% annually post-COVID, while CICT's costs remained sticky.

5.4.3 Vertical Common-Size Balance Sheet (2023)

Table 0.3

Item	SAGT (%)	CICT (%)
Total Assets	100.0	100.0
Fixed Assets	78.3	82.1
Current Assets	21.7	17.9

[1] Full common-size statements (2017–2023) are in Appendix C.

Equity	44.2	48.8
Long-term Debt	38.1	41.3

Table 8- Balance Sheet (% of Total Assets)

Source: Author calculation from Annual Reports.

Insight: CICT's higher fixed asset intensity (82.1%) explains lower ROA despite stable margins.

DISCUSSION

The empirical results from the two PPP container terminals at the Port of Colombo both reinforce and extend the existing literature on public-private partnerships in port infrastructure.

First, the consistently high and positive profitability margins (gross margins 59–71 % for SAGT and 53–60 % for CICT) and exceptional investment returns (NPV +662 to +1,164 million US$, IRR 27–29 %, BCR 4.3–5.3) strongly corroborate the findings of Panayides et al. (2015) and Aerts et al. (2014), who identified revenuesharing arrangements, long concession periods, and transhipment-hub location as critical success factors for port PPPs. The Colombo case validates their argument that institutional alignment between the Sri Lanka Ports Authority and private operators, combined with guaranteed minimum throughput clauses, creates an environment conducive to superior financial performance.

Second, the marked performance divergence between SAGT and CICT despite operating in the same port provides new empirical evidence on the importance of contractual design and operator efficiency highlighted by Parola et al. (2017) and Xiong et al. (2018). SAGT's 12–15 percentage-point advantage in gross and operating margins is primarily attributable to lower cost-of-goods-sold intensity (revealed in common-size analysis), reflecting the superior operational expertise and labour productivity of the APM Terminals-led consortium versus the more capital-intensive, automation-focused approach of China Merchants at CICT. This finding extends the work of Notteboom et al. (2021), who argued that global terminal operators achieve higher returns through standardised processes rather than through heavy automation alone in emerging-market contexts.

Third, the resilience demonstrated in the sensitivity analysis (NPV remaining positive even at 12 % discount rate and 30 % cash-flow reduction) aligns with the conclusions of Kwak et al. (2009) and Osei-Kyei & Chan (2015) that well-structured risk allocation particularly the transfer of commercial and operational risk to the private partner while retaining tariff regulation with the public authority is the cornerstone of PPP success in developing economies. The Colombo terminals benefited from 25–30-year BOOT concessions with clear revenue-share escalation clauses, which shielded investors from traffic-risk downturns during the 2020–2021 COVID period and the 2022 Sri Lankan economic crisis.

Fourth, the significantly shorter discounted payback and higher absolute NPV of CICT despite its larger initial outlay contradict the common assumption in earlier literature (Humphreys et al., 2019) that higher capital intensity necessarily reduces financial viability in South Asian ports. Instead, the results support the more recent proposition by Kavirathna et al. (2021) that deeper berths and larger quay cranes capable of handling 18,000+ TEU vessels generate disproportionate cash-flow upside in transhipment hubs, justifying higher upfront investment.

Finally, the Benefit-Cost Ratios of 4.3–5.3 considerably exceed the thresholds reported in World Bank (2022) port PPP studies (typically 1.5–2.5), confirming Colombo as one of the most financially successful examples worldwide. This exceptional outcome can be attributed to Sri Lanka's strategic location on the main East-West shipping lane and the competitive tension maintained between multiple private operators within the same port a governance model recommended by the Port Reform Toolkit (World Bank, 2022) but rarely implemented as effectively as in Colombo.

In summary, the financial performance of SAGT and CICT not only validates the core theoretical propositions in the PPP port literature but also provides new evidence on the relative importance of operator efficiency versus

capital intensity and the critical role of contractual revenue guarantees in emerging markets. These insights offer direct policy relevance for future terminal developments at the Port of Colombo and for other transhipment hubs in South Asia and Southeast Asia pursuing the PPP route.

CONCLUSION AND RECOMMENDATION

The PPP model was used in the Colombo Port Infrastructure Project with great success, as it has been able to significantly impact various financial indicators, such as gross profit, operating profit, net profit, return on assets and return on equity, which shows that the PPP model is a great success. Consistent positive returns demonstrate the partnership's effectiveness and demonstrate its potential to attract private investment to the country's ports, not only at Colombo but also at other ports. Comparing both terminal's financial results indicate the stability of both companies. When the comparing gross profit margin of the SAGT terminal, they gained a stable margin within 7-year periods and CICT's Gross profit margin also increased by a lower level. SAGT's Gross profit decline by the year 2021 and again it will pick up. Also, CICT's gross profit declined in the year 2020 and it indicates that it will increase at a very lower rate. When comparing of operating profit margin of both terminals SAGT maintains continuous growth and CICT has also demonstrated a decent performance through the compared years. This indicates that both terminals have positive financial health and operational effeminacy recent past. When analysing the net profit margin of both terminals, they maintain stable net profit margins through the compared years. However, SAGT's net profit margin sharply declined by the year 2023.

This research assesses the return on investment (SAGT total investment) through the analysis of several investment ratios. Assumes $ 210,000,000 and CICT Total Investment $ 500,000,000) is a vital tool for determining the feasibility of the project's investment. The SAGT consistently performed CICT, resulting in a greater ROI in the majority of the years. SAGT delivers a healthy ROE, suggesting effective asset unitization to generate a greater profit margin. SAGT's ROE results varied for a few years, whereas CICT displayed a stable ROE, indicating consistent performance. The shareholder is highly concerned about the return on equity Capital ratio. SAGT results indicated a greater ROE. It shows that excellent shareholder returns will attract additional investment. CICT's ROE has been steady at 20 to 25%, indicating strong returns to stockholders. Another crucial financial issue that investors are concerned with is the discounted payback period. A shorter discounted payback period means the investment is recovered faster in present-value terms.

Discounted payback period significantly strengthens the viability of the conclusion. Even under conservative 8.5–10 % real discount rates, both terminals recover their investment well within concession lives. CICT's shorter discounted payback (9.4 years vs SAGT's 11.8 years) reverses the impression given by simple payback and better explains why China Merchants Port Holdings was willing to commit US$500 million despite higher absolute risk.

Proposals for enhanced collaboration. Ideas for enhancing the public-private partnership (PPP) framework include encouraging private investment in ports and expanding its use to other sectors such as aviation, energy, and transportation. Applying the PPP framework to underutilised sectors and infrastructure projects in Sri Lanka could significantly enhance development and efficiency. Cooperation between government and private enterprises, known as public-private partnerships (PPPs), is critical to achieving shared goals and mutual benefits. These partnerships are especially important for infrastructure construction and service delivery because they require members to share risks, expenditures, and profits (Xiong et al., 2018).

The efficacy of PPPs is dependent on factors such as openness, accountability, involvement of stakeholders, and mutual agreement and consensus between the public and private sectors. This partnership can result in the establishment of large groups with extensive expertise in infrastructure development, hence increasing the financial and technical power of these projects (Pekar et al. 2019). According to the study offered, both businesses have gained expertise and generated lucrative returns on their investments. The positive impacts are seen in many different kinds of financial measures, including Gross Profit, Operating Profit, Net Profit, Return on Investment, Return on Assets, and Return on Equity.

The efficiency of PPPs is affected by aspects such as, accountability, involvement of stakeholders and consensus and mutual agreement between private and public sectors. Because of this collaboration, large networks with

substantial expertise in the field of infrastructure development can be created hence enhancing the financial and technical capability for these projects (Pekar et al., 2019). It was also observed in a study that both companies have gained experience and made profitable investments. The positive implications are seen in various kinds of financial indexes comprising Gross Profit, Operating Profit, Net Profit, return on Investment (ROI), Return on Assets (ROA) as well as Return on Equity (ROE).

The steady increase in earnings is an important indicator of a successful story behind Public-Private Partnership (PPP) model for nation's infrastructure. This will encourage more interest in Container Terminal facilities at Port of Colombo.

Some identified recommendation for the Public Private Partnership Model (PPP) is as follows,

1. Attracting private investments to Colombo and other ports around the country.

2. Implemented the PPP Model for public and infrastructure projects including airports, electricity, energy and transportation.

3. Implemented the PPP Model for underexplored industries and infrastructure in Sri Lanka.

In conclusion, the suggestions enabling the use of PPP Model on infrastructure development in Sri Lanka are consistent with the successes of several PPP projects in different sectors worldwide. Highlighting transparency, accountability, involvement and rigorous assessment stages. This can significantly contribute to economic growth, attracting business and ensure sustainable progress for the country.

LIMITATIONS AND DIRECTIONS FOR FUTURE RESEARCH

Although this study provides robust empirical evidence on the financial viability of PPP container terminals at the Port of Colombo, several limitations must be acknowledged, which in turn open avenues for future research.

First, the analysis relies on published financial statements of SAGT and CICT, which do not fully disclose depreciation schedules, detailed capital expenditure during the operational phase, or changes in net working capital. Consequently, Profit After Tax was used as a conservative proxy for Free Cash Flow to the Firm. While this approach deliberately understates cash generation and therefore strengthens the viability conclusion, future studies with access to complete cash-flow statements from the Sri Lanka Ports Authority or the operators themselves could refine NPV, IRR, and sensitivity estimates further.

Second, the appraisal period is limited to 2017–2023. Although this captures a full business cycle including the COVID-19 pandemic and the 2022 Sri Lankan economic crisis, it does not cover the entire 25–30-year concession lives. Extending the analysis to include projected cash flows until concession expiry (2039–2044) using throughput forecasts and tariff escalation clauses would enhance long-term validity.

Third, the study adopts an investor-centric perspective and does not quantify broader socio-economic benefits (e.g., employment generation, customs revenue, or regional economic multipliers) nor environmental externalities. Incorporating a full social Cost-Benefit Analysis (sCBA) framework, as recommended by the World Bank (2022), would offer a more comprehensive evaluation from the public-sector viewpoint.

Finally, while the research focuses on two terminals within a single port, comparative analyses with other South Asian and Southeast Asian transhipment hubs (e.g., Singapore, Port Klang, Jawaharlal Nehru Port, or the ongoing Hambantota terminal) could test the generalisability of the findings and isolate the specific contribution of contractual design, operator nationality, and intra-port competition.

Future research addressing these limitations particularly through access to full concession agreements and longterm traffic projections would further strengthen the evidence base for designing financially viable and socially optimal PPP structures for container terminal development in emerging transhipment economies.

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LIST OF APPENDICES

Appendix A

Appendix A: Specimen Financial Statements (Illustrative Format)

A.1 Income Statement (Illustrative)**

Line Item	Symbol	Amount (US$ '000)
Revenue	a	100,000
Cost of Goods Sold (COGS)	b	30,000
Gross Profit** (a − b)	c	70,000
Operating Expenses	d	20,000

Operating Profit (EBIT)**	e	50,000
Interest & Taxes	f + g	15,000
Net Profit	h	35,000

A.2 Balance Sheet (Illustrative)**

Line Item	Symbol	Amount (US$ '000)
Total Assets	k	300,000
Shareholders' Equity	m	150,000
Initial Investment	i	210,000 (SAGT) / 500,000 (CICT)

*Note: Actual data extracted from SAGT and CICT Annual Reports (2017–2023). Formats are illustrative for ratio variable mapping.

Appendix B

Full Common-Size Statements (2017–2023)

B.1 SAGT – Vertical Income Statement (% of Revenue)

	Rev	COGS	Gross Profit	OpEx	Op Profit	Net Profit
2023	100%	29%	71%	18%	54%	33%
2022	100%	35%	65%	19%	47%	43%
2021	100%	41%	59%	22%	37%	33%
2020	100%	37%	63%	21%	42%	38%
2019	100%	36%	64%	22%	42%	43%
2018	100%	36%	64%	20%	44%	40%
2017	100%	39%	61%	22%	39%	40%

B.2 SAGT – Vertical Balance Sheet (% of Assets)

Year	Total Assets	Fixed Assets	Current Assets	Equity	Long-term Debt
2023	100%	76%	24%	51%	29%
2022	100%	65%	35%	56%	27%
2021	100%	64%	36%	61%	25%

2020	100%	57%	43%	70%	15%
2018	100%	68%	32%	76%	10%
2017	100%	75%	25%	77%	7%

B.3 CICT – Vertical Income Statement (% of Revenue)

Year	Rev	COGS	Gross Profit	OpEx	Op Profit	Net Profit
2022	100%	40%	60%	5%	43%	43%
2021	100%	42%	58%	4%	42%	42%
2020	100%	47%	53%	3%	37%	37%
2019	100%	45%	55%	4%	36%	36%
2018	100%	45%	55%	4%	37%	37%
2017	100%	47%	53%	4%	35%	35%

B.4 CICT – Vertical Balance Sheet (% of Assets)

Year	Total Assets	Fixed Assets	Current Assets	Equity	Long-term Debt
2022	100%	93%	7%	47%	38%
2021	100%	89%	11%	45%	42%
2020	100%	93%	7%	35%	48%
2019	100%	96%	4%	31%	53%
2018	100%	94%	6%	35%	49%
2017	100%	91%	9%	32%	57%