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Research Article

Integrative Cost Optimization Framework for FMCG Logistics: A Case Study of PT. KSN using SCOR, Five Levers, and Strategic Profit Modelling

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Abstract: *The increasing complexity of international logistics, particularly in the fast-moving consumer goods (FMCG) sector, has amplified the need for an integrative and data-driven framework to control export logistics costs. This research addresses that need by proposing and applying the Integrative Cost Efficiency Evaluation Framework (ICEEF), which combines three proven models: SCOR (for operational diagnostics), Gartner's Five Levers (for strategic cost driver identification), and Strategic Profit Modelling (SPM) (for profitability simulation). Using PT. KSN, as a case study, the research applied a mixed-method approach, combining quantitative data analysis of over 350 shipment records from 2021 to 2023 with qualitative insights from interviews and focus group discussions. SCOR metrics—including CO 1.1 (Total Supply Chain Cost), Metric 3.5 (Planning Cost Efficiency), and RS.1.1 (Cycle Time)—were used to evaluate baseline performance. Additionally, a new metric, the Planning Cost Index (PCI), was introduced to measure planning inefficiencies. Data analysis revealed that cost overruns peaked at 43% in 2022, while PCI increased to 9.4%, signaling fragmented coordination across internal functions. Three scenario simulations were conducted to assess the financial impact of various interventions. In the renegotiated vendor contract scenario, CO 1.1 improved from 43% to 21%, while PCI dropped to 6.7%. In the integrated planning scenario, operational projection saving (OPS) recovered to 97%, demonstrating that proactive synchronization between production readiness and dispatch significantly reduces overstay and premium costs. These findings were validated through stakeholder engagement, confirming the relevance of all Five Levers, particularly in the areas of Demand Management, Lean Operations, and Deal Structuring. This study concludes that the ICEEF framework provides an effective decision-support tool for diagnosing inefficiencies, quantifying cost-to-profit impact, and aligning operational execution with strategic objectives. Limitations include reliance on internal shipment-level data and assumptions of vendor behavior consistency. Future research is encouraged to expand validation across industries and integrate AI-based forecasting to enhance proactive cost control.*

Keywords: *Logistics Cost Optimization; SCOR Model; Gartner's Five Levers; Strategic Profit Modelling (SPM); Planning Cost Index (PCI); Operational Projection Saving (OPS); FMCG; Export Logistics; ICEEF Framework; Supply Chain Efficiency*.

I. INTRODUCTION

As globalization of trade has gone rapidly, whereas international trade within nations keep continues to stimulate the economy, this forces all economic sectors, especially enterprises whose products are ready to market, to find out the most reliable and cost-saving strategies in choosing their transport methods. Despite the rapid economic growth in terms of trade, most global goods are transported and shipped by sea; it is said that more than 90% of global trade is carried by sea. That implies how sea freight becomes a top priority for enterprises to ship their goods considering some points such as ocean freight is relatively lower compared to air freight, the capacity of cargo commonly bigger than airfreight that ensures a huge scale of the industry can be assured to send their goods as much as they wanted with lower costs. The FMCG industry has become one of the strongest industries to compete in the market. FMCG is considered a robust industry as it has shown its resilience to the downturns of economics as they have a steady demand for everyday products in general whilst innovating in its products. In modern days, supply chains are more complex than before as the robust growth has forced the industry to develop resilient strategies to keep the company steady to compete in the market. Unfortunately, the supply chain is highly affected by even minor disruption, which may result in long-term effects. Disruption may also affect the financial performance. Therefore, correcting the action of executing proper strategies is essential as the company is forced to take valid action to deal effectively with the customers, suppliers, and stakeholders to anticipated losses.

Rising consumer expectations and competitive pricing pressures have intensified the focus on cost efficiency in the FMCG sector. Logistics costs, which can constitute up to 25% of total costs in emerging market supply chains (World Bank, 2021), present a major opportunity for strategic intervention. PT. KSN, as one of Indonesia's leading FMCG producers, faces challenges

in freight, warehousing, and distribution due to network complexities, limited infrastructure, and volatile fuel prices. This research aims to design a comprehensive cost optimization framework addressing these challenges. As the the logistics field is faced with numerous challenges, whether it is regarding internal or external factors, it further affects enterprises whose goods are required to be exported. The previous issue, which had a huge effect on both logistics companies and manufacturing companies as COVID-19, resulted in supply chain disruption that created a "disaster" in the economic cycle. Container shortages hiked ocean freight, and unreliable sailing time from the shipping lines caused pending cash flow and warehouse issues on the manufacturer's side. As most of the global trade in the enterprise we focused on in this paper uses using sea-freight as their main transport method, the container disruption during COVID-19 had led to significant delays in sending out their goods to export and thus increased costs for the factory. This issue affected the extent to which the factory's output declined, which eventually led to delayed orders and worsened their productivity and profitability. The following table highlights the average ocean freight cost per country for PT. KSN from 2019 to 2022, reflecting the significant rate fluctuations triggered by the COVID-19 pandemic and global supply chain disruptions.

Table 1. Average Price per Country PT. KSN

Country	City	Avg Rate 2019	Qty Cont. 2019	Budget 2019	Avg Rate 2020	Qty Cont. 2020	Budget 2020	Avg Rate 2021	Qty Cont. 2021	Budget 2021
CHINA	SHANGHAI	449	1.875	52	700	1.589	392	1.913	1.658	3.000
	SHEKOU	309	2.945	241	125	2.011	327	1.838	2.544	2.200
	TIANJIN	118	1.059	67	663	689	137	1.213	800	1.100
INDIA	CHENNAI	765	74	1.194	1.196	43	894	3.714	53	2.584
KSA	DAMMAM	1.042	19	-	1.842	11	1.497	3.956	14	-
MALAYSIA	KINABALU	948	174	950	890	85	926	1.518	131	1.635
	KUCHING	750	66	861	1.068	30	890	1.168	46	1.300
	PORT KLANG	594	402	235	230	292	224	1.414	385	1.590
MIDDLE EAST	BAHRAIN	1.294	12	-	1.294	7	1.896	4.722	14	-
MYANMAR	YANGON	3.326	1.838	1.168	2.546	1.254	2.102	6.102	1.641	5.067
PHILPPINES	CEBU	323	95	368	535	56	376	1.189	81	1.200
	MANILA NORTH	215	578	218	380	321	260	629	486	696
THAILAND	BANGKOK	223	83	245	390	44	277	1.000	67	696
VIETNAM	CAT LAI	57	1.022	58	233	677	100	618	813	696
	HAI PHONG	270	658	270	300	378	350	940	554	1.441
	DA NANG	780	401	469	1.768	210	1.490	913	266	1.392

In the above tables, we can see how the ocean freight jumped higher from 2019 to 2020, which eventually led to higher financial expenses on the procurement side. It is certain that the effect caused by COVID-19 is affecting supply chain operations and even yet, financial expenses. It is shown that the increase rate generally happens to all the trade. Other than supply chain disruption caused by COVID-19 in the past, the blockade of the Suez Canal by one of the shipping lines (force majeure) had worsened the conditions for trade to the Middle East. On the other side, political issues have also played a huge deal in terms of logistics stability. Some of the goods are sent to the Middle East, in which the route is vulnerable due to Middle East conflict, which ends up in shortages of spaces from shipping lines, whereas they also implied General rate increases that may be multiplied 2 to 4 times higher than normal rate. From October 2023 to January 2024, the rate was relatively stable even though the geopolitics was taking place, but we can see how the rate jumped out to 50% increased rate from April 2024 to May 2024 as it is at the peak of the political issue, and yet again risen in July. As illustrated in Figure 1, alternative shipping routes were taken due to the Red Sea attack and rising geopolitical tensions in the region.

Fig.1 Alternatives Routes during the Red Sea Attack

From Figure 1, it can be seen that vessels rerouted via the Cape of Good Hope to avoid the Red Sea, significantly increasing lead time and freight cost. Aside from political issues, the external issues which is unavoidable, such as oil price

instability these days, have also affected the spending in the logistic cost. As for internal issues, some cases, such as stuffing activities delays at the warehouses, have caused claims from logistic partners (trucking layover fee) that, again, affect the spending on the procurement side. This, of course, became such a huge deal, for such an amount could have been avoided should the supply chain strategy in the distribution centre (factory) be well organized. Said costs may also be used for business expansion.

The study evaluates supply chain performance in terms of reliability and costs using the SCOR model as a diagnostic framework. To refine strategic decision-making, the SCOR framework is integrated with the five levers of supply chain cost optimization and strategic profit modelling. These methodologies allow the identification and prioritization of targeted interventions, ensuring a robust and systematic approach to addressing inefficiencies.

The five levers of supply chain cost optimization provide actionable pathways to reduce logistics costs by focusing on key areas such as demand planning, inventory management, network optimization, transportation efficiency, and supplier collaboration. Strategic profit modelling complements this by quantifying the financial impact of potential improvements linking operational performance with profitability outcomes. Together, these tools enable a comprehensive evaluation of supply chain strategies, ensuring alignment with broader business objectives.

The conceptual synergy between SCOR and the Five Levers is illustrated in Figure 2, which outlines how operational diagnostics, cost driver identification, and solution formulation interact to streamline logistics performance. This visual framework demonstrates how organizations can progress from identifying inefficiencies to executing targeted improvements that align operational actions with strategic supply chain goals.

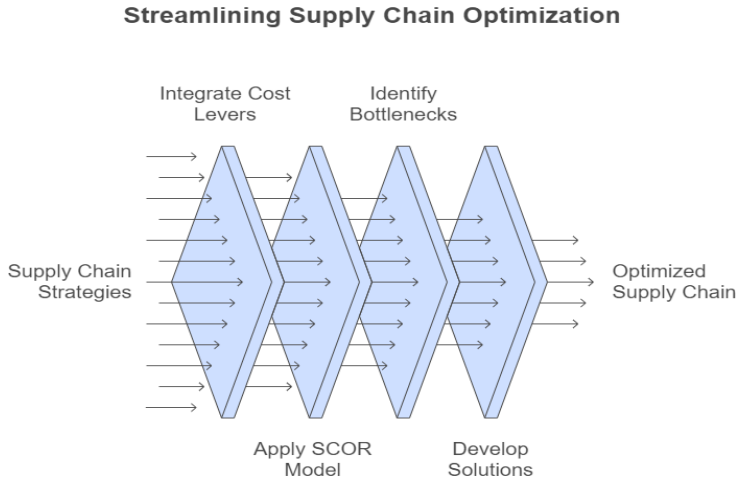

Fig.2 Optimized Supply Chain using SCOR Method and Five Levers of Supply Chain Optimization

Building on this framework, the next section applies this structured approach to PT. KSN's logistics network uses real operational data and qualitative inputs to diagnose cost inefficiencies, map them to actionable levers, and simulate financial outcomes. This integrated methodology forms the foundation of the ICEEF framework, as explored in the following empirical analysis.

This research focuses on evaluating PT. KSN's procurement performance and cost efficiency in supply chain logistics, particularly in response to external disruptions such as the COVID-19 pandemic, geopolitical tensions, and global market fluctuations. The study aims to identify and assess key cost drivers in PT. KSN's logistics and procurement processes while proposing actionable strategies for cost reduction, utilizing the SCOR (Supply Chain Operations Reference) framework, five levers of supply chain cost optimization and strategic profit modelling. The scope encompasses logistics-related costs, including freight rates, container handling, trucking fees, and rate approvals, with additional emphasis on vendor management and shipment consolidation. These metrics will be analyzed in the context of industry best practices and proven cost-reduction strategies. The research will evaluate 10 specific cost-reduction scenarios to shape its analysis and recommendations, focusing on their applicability to PT. KSN's logistics operations. This study will explore how these strategies can enhance operational efficiency and profitability.

II. LITERATURE REVIEW

A) Problem Exploration

The fast-moving consumer goods (FMCG) industry operates within a highly competitive environment where logistics performance and cost-efficiency are critical determinants of market success. Supply chains in this sector are under constant pressure to deliver high service levels while minimizing operational expenditures. However, firms often face persistent logistics inefficiencies, such as suboptimal shipment consolidation, inadequate coordination with third-party logistics (3PL) providers, and high inventory holding and demurrage costs. These inefficiencies directly erode profitability and create bottlenecks in fulfillment responsiveness, especially in geographically dispersed markets.

Recent developments in logistics research underscore a disconnect between operational visibility and financial impact analysis, which often limits companies' ability to translate logistics performance improvements into measurable financial gains. Many FMCG firms rely on siloed performance metrics—such as on-time delivery or cost per kilometer—without integrating these indicators into a broader strategic profitability model. Consequently, decision-making is fragmented and tends to prioritize short-term cost-cutting over systemic process optimization.

Moreover, public sector supply chain studies offer additional insights into procurement and logistics inefficiencies that mirror the private sector's challenges. For instance, Nakambale and Bangalee (2022) show how tender-based procurement systems in Namibia often favor the lowest-cost suppliers without adequate consideration of lifecycle cost, delivery reliability, or supply continuity. The result is higher total landed cost and reduced value-for-money despite initial price advantages.

In tandem with these inefficiencies, the dynamic nature of consumer demand, increased complexity in last-mile fulfillment, and heightened sustainability expectations further amplify the need for a more integrated approach to logistics cost control. Traditional methods focused solely on rate negotiation or supplier benchmarking are no longer sufficient. Instead, there is growing consensus on the need for holistic frameworks that connect operational drivers, cost levers, and profitability outcomes across the end-to-end supply chain.

This research addresses the identified gap by designing an Integrative Cost Optimization Framework, merging diagnostic, tactical, and financial layers through the combined application of the SCOR model, Five Levers of Cost Optimization, and Strategic Profit Modelling (SPM). The case study of PT. KSN exemplifies how this integrative approach enables more informed decision-making and aligns logistics execution with financial strategy.

B) Theoretical Foundation

To address the complexities of logistics cost inefficiencies in the FMCG sector, a solid theoretical foundation is essential. This study draws on three interrelated frameworks: the Supply Chain Operations Reference (SCOR) Model, the Five Levers of Cost Optimization, and the Strategic Profit Modelling (SPM) framework. Each offers a distinct but complementary perspective on performance measurement, operational leverage, and financial impact.

1. Supply Chain Operations Reference (SCOR) Model

The SCOR model, developed by the Supply Chain Council (now part of APICS), is a well-established process-based framework used to diagnose supply chain performance. It provides standardized metrics across five major processes: Plan, Source, Make, Deliver, and Return. In logistics-intensive environments, SCOR offers visibility into key performance indicators (KPIs) such as perfect order fulfillment, order cycle time, and cost of goods delivered.

However, despite its operational robustness, SCOR has been critiqued for its limited integration with financial evaluation models. The model focuses on process benchmarking but lacks built-in mechanisms to quantify the impact of process improvements on profitability. Studies like Liu et al. (2025) have emphasized this gap, pointing out that performance diagnostics alone do not inform strategic investment or vendor negotiation decisions unless paired with financial modelling.

2. Five Levers of Cost Optimization

The Five Levers framework, commonly referenced in industry by consulting practices like Gartner and McKinsey, identifies core operational areas where cost efficiencies can be realized:

1. Demand management,
2. Inventory optimization,
3. Network redesign,
4. Transportation management and
5. Supplier collaboration.

These levers are actionable and practical for identifying root causes of inefficiencies. For example, shipment consolidation, demurrage fee reduction, or vendor SLA reform fall within the transportation and supplier collaboration domains.

While useful, the Five Levers model tends to operate at the tactical level. It is not diagnostic by itself (unlike SCOR) and also lacks the capability to translate improvements into financial returns or shareholder value metrics, limiting its strategic relevance when used alone.

3. Strategic Profit Modelling (SPM)

The Strategic Profit Model (SPM) provides a financial lens to assess how operational changes affect a firm's profitability, traditionally through the relationship:

$$\text{ROA} = \text{Net Profit Margin} \times \text{Asset Turnover}$$

However, applying the full SPM model requires complete firm-level financial data, which is often unavailable in function-specific studies such as logistics. To address this, the current research adopts an adjusted metric called Operational Projection Saving (OPS):

$$\text{OPS (\%)} = (\text{Projected Operational Cost} / \text{Actual Operational Cost}) \times 100$$

This proxy maintains the spirit of SPM by linking cost optimization to financial outcomes. A value below 100% indicates saving potential and margin improvement. This approach enables scenario comparison even in the absence of full asset turnover data.

The use of such adapted financial indicators is supported by industry research. Studies by [4], [6], and [6] demonstrate that cost-to-serve and scenario-based projections are effective when full profitability metrics are impractical. Likewise, [3] emphasizes the need for contextualized performance metrics in Indonesian firms, advocating for frameworks that reflect operational reality rather than rigid, generalized KPIs.

In this study, the OPS-based SPM adaptation allows PT. KSN to prioritize cost optimization initiatives based on financial impact, bridging operational levers with strategic profitability.

C) Literature Gap & Positioning of the Study

Despite the abundance of research on logistics performance and cost reduction strategies, most existing works tend to examine these elements in isolation—focusing either on process efficiency, vendor alignment, or profitability—but rarely on the integration of all three dimensions in a cohesive framework. This fragmented approach leaves a significant gap in how logistics managers in the FMCG sector can translate performance indicators into financially measurable, actionable outcomes.

Many researchers have applied the SCOR model for performance diagnostics in manufacturing and distribution settings. However, as identified in the case of PT. KSN SCOR alone was not sufficient to guide cost-saving priorities. The thesis findings highlight that while SCOR helped identify poor perfect order rates and high cost per order, it lacked the ability to explain how such inefficiencies translated into lost margin or net profit impact. In parallel, studies on cost optimization levers, such as those grouped under demand planning, transportation, and supplier collaboration, have proven effective at the tactical level. Yet, there is limited empirical work that validates these interventions with structured diagnostics and profitability tracking.

For instance, [9] investigated how shippers can influence logistics service providers (LSPs) to behave sustainably through contractual and incentive mechanisms. Their taxonomy illustrates a spectrum of logistics vendor responses to shipper stimulus—but stops short of linking such actions to operational metrics or financial profitability.

Furthermore, while [8] explored the technological transformation of logistics under Industry 4.0, emphasizing how digital tools enhance logistics visibility and control, their study was primarily behavioral. They did not present a cost-optimization framework that integrates diagnostic and financial layers. Your thesis expands this by showing how digital monitoring tools (e.g., tracking demurrage time, route delays) when paired with SCOR and SPM, provide stronger justification for negotiation with 3PLs or investment in process improvement. On the public sector side, Nakambale and Bangalee (2022) conducted a cost comparison study on pharmaceutical procurement in Namibia. They found that local suppliers often offer higher prices than international ones, even after accounting for regulatory mandates. This mirrors PT. KSN's challenge was that "cheapest vendor" selection often concealed hidden inefficiencies, such as stuffing delays or standby charges, which inflated total cost-to-serve. Their recommendation for multi-criteria procurement models aligns with the profit-based vendor realignment proposed in your framework.

Based on the above, several specific research gaps emerge:

1. Lack of integrative frameworks that link logistics performance metrics (e.g., SCOR) with tactical cost levers and financial outcomes (e.g., SPM).
2. Limited real-world validation of how Five Levers interventions affect both operational KPIs and profitability in the FMCG logistics context.
3. Insufficient application of financial models (like SPM) to justify and prioritize logistics decisions such as route redesign or SLA negotiation.

4. Absence of a synthesis model that bridges diagnostic, tactical, and strategic layers in supply chain cost optimization.
   This study responds to those gaps by offering an Integrative Cost Optimization Framework, validated through a case study at PT. KSN. The framework uniquely combines:

- SCOR-based diagnostic insights (e.g., order cycle inefficiencies),
- Five Levers root-cause mapping (e.g., consolidated shipment planning and route optimization),
- and SPM-based financial justification (e.g., EBITDA uplift from vendor policy reform).

By doing so, it extends the literature from operational or behavioral models into a strategic cost-efficiency domain. It also supports practitioners in moving beyond reactive cost-cutting to a more structured, value-oriented decision-making approach in logistics.

D) Conceptual Framework and Research Methodology

This study adopts a qualitative-quantitative case study approach grounded in the real-world operations of PT. KSN is a major player in Indonesia's FMCG industry. The methodology is designed to iteratively apply, validate, and synthesize three key frameworks—SCOR, Five Levers of Cost Optimization, and Strategic Profit Modelling (SPM)—into an integrated diagnostic and decision-making tool.

To operationalize the integrative cost efficiency concept, this study synthesizes three established models—SCOR for performance diagnostics, the Five Levers framework for identifying operational cost drivers, and Strategic Profit Modelling (SPM) for financial impact analysis. The interaction among these frameworks forms the foundation of the proposed ICEEF model. The conceptual structure is outlined in Figure 3, illustrating how diagnostic, tactical, and financial layers are linked into a cohesive decision-support system.

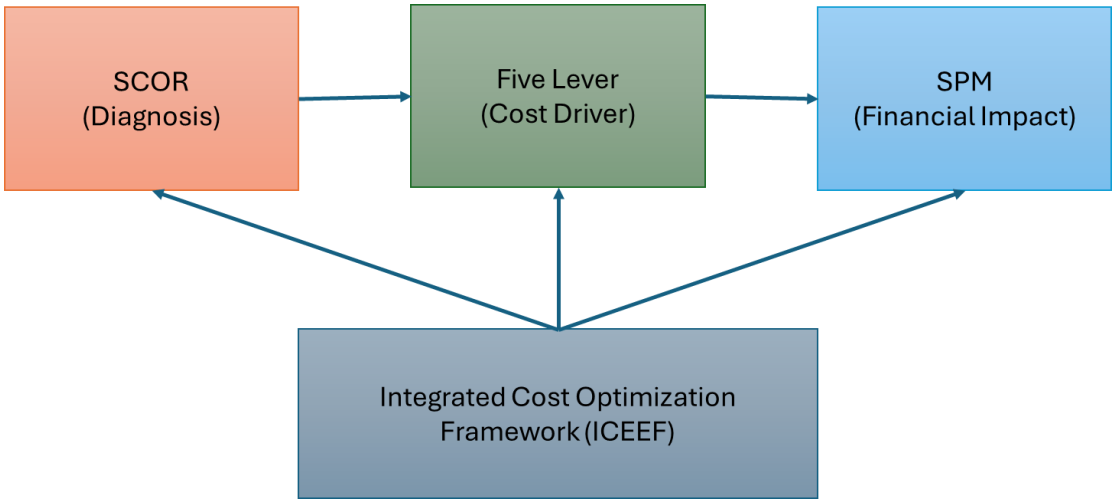

Fig 3: Conceptual Framework: Integration of SCOR, Five Levers and SPM

As shown in the framework, the methodology is implemented in three distinct but interconnected phases—beginning with SCOR-based diagnostics, followed by root-cause mapping through the Five Levers, and ending with cost-efficiency simulation using the SPM logic. The following section details each phase and the tools used to validate the ICEEF framework within the logistics context of PT. KSN. The methodology follows a three-phase structure:

1. Diagnostic Phase (SCOR-based)
   PT. KSN's logistics performance was evaluated using selected SCOR v12.0 metrics (e.g., Perfect Order Fulfillment, Order Cycle Time, and Cost to Serve). Data was gathered from internal operational reports (2023–2024) and validated through internal workshops with key stakeholders in procurement, distribution, and commercial teams.
2. Root Cause and Lever Identification (Five Levers-based)
   Identified bottlenecks were analyzed through the Five Levers framework:
   - Shipment and route consolidation (transportation lever),
   - Re-allocation of inventory placement (inventory lever),
   - SLA renegotiation with freight vendors (supplier collaboration lever).

   Focus Group Discussions (FGDs) were held with internal users, logistics planners, and external forwarders to validate pain points and design corrective levers.

3. Financial Modelling Phase (SPM-based)
   Each intervention was mapped to a Strategic Profit Model using data on sales, cost of goods sold (COGS), operating expenses, and net profit margins. This enabled PT. KSN to visualize and justify logistics decisions in financial terms.

This study utilized both primary and secondary data sources to support a comprehensive and triangulated analysis. Primary data was obtained through in-depth interviews and focused group discussions (FGDs) with key personnel at PT. KSN, particularly those involved in logistics operations, procurement, commercial planning, and finance. These sessions were essential for validating real-world logistics issues, identifying cost pressure points, and capturing practical constraints related to execution and coordination with external logistics service providers.

Operational data served as the cornerstone for SCOR and SPM applications. This included detailed records of transport expenditures (e.g., freight charges, overnight/demurrage fees), warehouse rental costs, order cycle durations, and cost per shipment. These data points were instrumental in diagnosing performance gaps using SCOR metrics such as Perfect Order Fulfillment and Order Cycle Time. Additionally, the study reviewed historical vendor contracts and SLAs to identify areas where misalignment with service expectations contributed to excess costs—especially regarding stuffing delays, free-time allowances, and standby charges.

Secondary data was sourced from corporate financial reports, which provided contextual insight into PT. KSN's cost structure, gross margins, and net profitability. These were used to calibrate the Strategic Profit Model, linking operational cost changes to overall financial performance. Furthermore, SCOR benchmarking datasets and logistics best practice indicators from public domain reports helped in establishing realistic performance baselines.

A combination of analytical tools and modelling techniques was applied in order to construct and validate the proposed integrative framework. In the diagnostic phase, SCOR v12.0 metrics were deployed to quantify logistics performance across core processes, including delivery reliability, order fulfillment rates, and total logistics cost per unit. These metrics allowed for an objective assessment of where performance gaps existed and how they deviated from standard industry benchmarks.

Following this, a root cause analysis was conducted using structured problem trees and brainstorming during FGDs. Identified issues—such as unoptimized shipment consolidation, inconsistent route planning, and non-standardized stuffing lead times—were mapped onto the Five Levers of Cost Optimization, namely transportation, network, supplier collaboration, inventory management, and demand planning. This step provided tactical clarity on what levers could be pulled to reduce cost leakage and improve service levels.

For financial evaluation, the Strategic Profit Model (SPM) was customized to account for logistics-specific interventions. The model traced cost savings from interventions (e.g., free demurrage window negotiation or consolidated dispatching) through to their impact on operating profit and net margin. The SPM served as a decision support tool that allowed PT. KSN to prioritize initiatives not only based on operational feasibility but also based on expected contribution to financial outcomes. This holistic approach ensured alignment between operational decisions and corporate financial goals. To operationalize the ICEEF framework, a structured research design was developed to guide the sequential application of diagnostic, tactical, and financial tools. As illustrated in Figure 4, the research process unfolds across six key stages—from problem identification to simulation and validation—ensuring methodological rigour and alignment between operational analysis and strategic cost optimization.

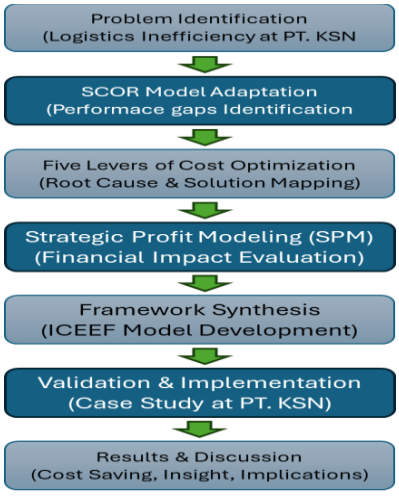

Fig 4. Research Design Flowchart: ICEEF Framework Development

This structured flow ensured that each step—starting from SCOR-based gap identification, through Five Levers-based intervention mapping, and culminating in SPM-driven financial modeling—contributed incrementally toward a robust, empirically validated framework. The integration of stakeholder validation and cost simulation provided the necessary foundation for actionable and finance-aligned decision-making within PT. KSN's logistics operations.

III. RESULTS AND DISCUSSION

This section presents the results of the ICEEF framework implementation at PT. KSN combines SCOR-based diagnostics, Five Levers analysis, and Strategic Profit Modelling (SPM) to deliver a comprehensive view of logistics inefficiencies, root causes, and profitability outcomes. The findings are supported by field validation through stakeholder interviews and focus group discussions (FGDs), ensuring both analytical and contextual robustness.

A) Diagnostic Insights from SCOR Metrics

The application of the SCOR model enabled a structured diagnosis of PT. KSN's logistics performance across three key dimensions: Planning Cost Index (PCI), Operational Projection Saving (OPS), and Cost per Order (CO 1.1). These metrics served as early indicators of systemic inefficiencies and progress tracking over time. To support the SCOR-based diagnostic evaluation, PT. KSN's export performance from 2021 to 2023 was analyzed using operational financial records. **Table 2** summarizes export budget allocations, actual expenditures, and resulting cost efficiency percentages across key destination countries. This multi-year, multi-country breakdown provides a quantitative basis for assessing fluctuations in Operational Projection Saving (OPS) over time.

Table 2. Summary of Export Budget, Actual Costs, and Cost Efficiency Percentage of PT. KSN (2021–2023)

	2021			2022			2023		
Provinsi	Budget/Plan	Actual	%	Budget/Plan	Actual	%	Budget/Plan	Actual	%
BAHRAIN	57.369.732	49.693.365	87%	192.150.847	54.763.282	29%	192.150.847	77.211.034	40%
BATANGAS	2.200.667.207	868.806.113	39%	1.387.834.578	1.398.378.705	101%	1.387.834.578	1.709.270.070	123%
BRUNEI DARUSSALAM	207.319.819	390.198.935	188%	229.042.297	499.286.049	218%	229.042.297	301.575.152	132%
CAGAYAN DE ORO	1.102.048.962	1.099.538.351	100%	3.206.800.699	2.134.101.329	67%	3.206.800.699	2.534.280.148	79%
CAMBODIA	5.333.021.488	1.762.227.972	33%	3.519.760.703	4.028.798.873	114%	3.519.760.703	2.672.190.704	76%
CEBU	877.922.461	1.495.477.588	170%	4.858.786.217	3.580.052.070	74%	4.858.786.217	2.931.998.368	60%
CHINA	104.019.204.721	93.974.327.928	90%	100.875.605.873	80.416.666.077	80%	100.875.605.873	53.484.765.469	53%
EAST MALAYSIA	13.021.987.100	10.380.648.725	80%	16.411.209.567	14.224.304.520	87%	16.411.209.567	8.126.895.899	50%
INDIA	12.566.482.345	3.549.126.439	28%	4.633.449.232	8.648.646.989	187%	4.633.449.232	1.581.569.585	34%
JORDAN	220.148.566	10.769.704	5%	18.977.663	-	0%	18.977.663	105.287.475	555%
KUWAIT	395.114.092	115.072.525	29%	312.484.949	702.933.740	225%	312.484.949	191.550.170	61%
MANILA	15.593.251.253	6.375.270.539	41%	12.675.656.964	9.403.709.834	74%	12.675.656.964	1.077.643.968	9%
MARSHALL ISLANDS	5.547.639	-	0%	51.547.452	4.883.669	9%	51.547.452	8.449.762	16%
MICRONESIA	86.162.521	69.362.105	81%	112.659.882	29.937.834	27%	112.659.882	44.566.988	40%
MYANMAR	58.768.875.652	60.963.872.253	104%	40.796.917.090	51.268.973.482	126%	40.796.917.090	26.091.905.942	64%
PALESTINE	-	44.957.447	0%	146.239.931	(456.710.511)	-312%	146.239.931	19.128.165	13%
SAUDI ARABIA	927.084.978	303.477.625	33%	1.255.621.231	695.109.629	55%	1.255.621.231	2.176.212.036	173%
SEYCHELLES	-	-	0%	5.630.792	4.975.163	88%	5.630.792	5.661.354	101%
SOLOMON ISLANDS	26.433.688	18.906.690	72%	52.544.054	12.543.925	24%	52.544.054	9.400.122	18%
SUBIC	3.940.526.760	2.621.710.890	67%	6.020.881.115	5.854.386.963	97%	6.020.881.115	3.555.571.504	59%
TAIWAN	1.874.059.480	2.099.269.089	112%	1.960.507.531	2.858.483.329	146%	1.960.507.531	2.057.728.642	105%
THAILAND	4.362.356.142	2.040.367.078	47%	9.632.678.323	6.444.220.601	67%	9.632.678.323	6.210.518.288	64%
UNITED ARAB EMIRATES	-	107.413.872	0%	2.091.088.704	394.005.637	19%	2.091.088.704	671.411.173	32%
VIETNAM	31.920.945.551	28.323.474.754	89%	33.478.734.823	32.400.251.540	97%	33.478.734.823	18.637.820.722	56%
WEST MALAYSIA	11.898.302.527	9.311.878.893	78%	9.537.709.852	10.239.236.442	107%	9.537.709.852	7.556.295.017	79%
Grand Total	269.404.832.684	225.975.848.880	84%	253.464.520.369	234.841.939.171	93%	253.464.520.369	143.523.628.338	57%

The data reveal meaningful trends in cost efficiency, highlighting periods of underperformance as well as strategic recovery. These variations serve as empirical validation of the SCOR model's utility in tracking systemic inefficiencies and identifying cost-saving opportunities when paired with deeper root-cause analysis and targeted interventions, as discussed in the following sections. Between 2021 and 2023, the OPS indicator, which reflects the variance between actual and optimal logistics costs, exhibited a downward trend in efficiency. In 2021, the OPS value stood at 92.93%, suggesting an estimated 7.07% saving potential from optimization. However, in 2022, the OPS increased marginally to 97.94%, indicating deteriorating savings performance and nearing operational saturation. According to internal reviews, this was attributed to the rigid vendor schemes and unplanned vessel schedules, particularly during the post-pandemic rate volatility.

A significant turnaround was observed in 2023, where OPS declined to 87.09%, indicating a new 12.91% cost-saving opportunity—the most favorable shift across the three-year analysis. This inflection was achieved due to two main interventions: (1) vendor rationalization—reducing the number of forwarders while introducing performance-based SLAs, and (2) shipment consolidation—which improved container utilization and port clearance predictability. These interventions were aligned with insights from the Five Levers framework and confirmed through stakeholder engagement.

In parallel, the Planning Cost Index (PCI) showed fluctuating inefficiency. Initially recorded at 6.7% in 2021, PCI spiked to 9.4% in 2022, reflecting resource drain due to manual planning processes and last-minute booking adjustments. This instability stabilized again in 2023, with PCI reverting back to 6.7%, attributed to the adoption of synchronized planning tools and the alignment of production-logistics calendars.

Table 2. Combined SCOR-Based Metrics Summary

Year	CO 1.1 (%)	PCI (%)	OPS (%)
2021	16.12%	6.74%	92.93%
2022	7.35%	8.24%	97.94%
2023	43.38%	9.38%	87.09%

The third performance metric, CO 1.1 (Cost per Order), was used to assess the proportional cost burden of each delivery transaction. While PCI and OPS captured strategic gaps, CO 1.1 served as an exceptional indicator. The company achieved the most efficient CO 1.1 value in 2023, which dropped significantly due to improved shipment scheduling and vendor responsiveness, affirming that tactical-level changes had measurable operational impact.

Table 3. Export Cost Efficiency Performance (CO 1.1)

Year	Budget (IDR)	Actual (IDR)	Saving (IDR)	CO 1.1 (%) → (Budget - Actual)/Budget x100
2021	269,404,832,624	225,975,848,880	43,428,983,744	(43,428,983,744 / 269,404,832,624) ×100 ≈ **16%**
2022	253,464,520,369	234,841,939,171	18,622,581,198	(18,622,581,198 / 253,464,520,369) ×100 ≈ **7%**
2023	253,464,520,369	143,523,628,338	109,940,892,031	(109,940,892,031 / 253,464,520,369) ×100 ≈ **43%**

Collectively, these metrics provided an integrated view of PT. KSN's logistics system maturity was instrumental in identifying where cost savings could be realized without compromising service levels.

B) Diagnosis Insight from Operational Cost Driver Analysis via Five Levers Framework

Following the diagnostic findings from the SCOR model, the Five Levers of Cost Optimization framework was applied to map operational inefficiencies at PT. KSN to specific root causes and improvement levers. The five levers—demand planning, inventory management, network optimization, transportation efficiency, and supplier collaboration—provided a structured lens to identify where cost-saving interventions would have the highest impact.

Analysis of planning data and qualitative inputs revealed that the most critical levers for PT. KSN were transportation and supplier collaboration. The Planning Cost Index (PCI), which rose to 9.4% in 2022, signaled inefficiencies in coordination between production schedules and transport booking. Further investigation through interviews and FGDs revealed a high incidence of manual rescheduling, misaligned stuffing timelines, and idle transport costs. These issues were mapped under the demand and transportation levers, pointing to poor schedule alignment and uncoordinated vessel booking as primary cost drivers.

The supplier collaboration lever revealed structural flaws in vendor selection and contract structure. Stakeholder interviews highlighted that forwarder performance was evaluated largely on base rate rather than service reliability, leading to hidden costs such as unanticipated demurrage fees and stuffing penalties. Furthermore, inconsistent lead-time adherence was frequently observed, particularly during peak demand cycles.

Through this framework, three priority intervention areas were identified:

- Shipment consolidation planning to reduce LCL (less-than-container load) usage and improve asset utilization.
- Contractual restructuring with forwarders, including implementation of free-time grace periods (1×24 hour stuffing) and two-way penalty clauses for SLA non-compliance.
- Cross-functional planning coordination involving demand forecast synchronization between logistics, production, and commercial teams.

To address the performance inefficiencies identified in the SCOR analysis, operational bottlenecks were mapped to relevant cost levers using the Five Levers of Cost Optimization framework. This mapping allowed the research to isolate the most critical areas for intervention and assign targeted strategies for cost reduction and performance improvement. Table 4 summarizes the alignment between each lever, its corresponding issue, and the proposed intervention.

Table 4. Mapping of Operational Issues to Five Levers of Cost Optimization

Lever	Key Issue Identified	Proposed Intervention
Demand Planning	Booking mismatch with production	Cross-functional forecast alignment
Transportation	High idle time, LCL usage, delayed dispatch	Route optimization and shipment consolidation
Supplier Collaboration	No penalty clause, poor SLA control	Vendor reclassification and SLA redesign
Inventory Management	Not a primary issue in the current case	—
Network Optimization	Over-reliance on high-traffic ports	Explore alternate port routing and dispatching

This mapping exercise established the tactical foundation for intervention planning and enabled focused simulation of cost-saving impacts. The next section presents the results of this simulation using the adapted Strategic Profit Model (SPM) approach, which leverages the Operational Projection Saving (OPS) metric to evaluate profitability implications.

C) Financial Impact Simulation Using SPM

To assess the financial implications of the operational interventions proposed through the Five Levers analysis, the study applied a modified version of the Strategic Profit Model (SPM), using Operational Projection Saving (OPS) as a proxy for profitability evaluation. Given that complete data for Return on Assets (ROA) and Net Profit Margin was not accessible at the functional level, OPS was used to evaluate the efficiency of logistics interventions:

OPS (%) = (Projected Operational Cost / Actual Operational Cost) × 100

This metric enabled a scenario-based financial simulation for three main strategies implemented at PT. KSN in 2023:

1. Shipment consolidation and route optimization,
2. SLA reformation, vendor reclassification, and
3. Cross-functional planning alignment.

The simulations revealed the following:

- Scenario 1: Shipment consolidation resulted in an OPS of 91.04%, indicating a cost-saving opportunity of 8.96%. This was achieved by reducing LCL usage and optimizing dispatch sequences.
- Scenario 2: SLA reformation and vendor tiering achieved the most significant gain, reducing OPS to 78.94%, reflecting a 21.06% efficiency uplift. The key driver was the waiver of stuffing demurrage charges for the first 24 hours and performance-based vendor penalties.
- Scenario 3: Cross-functional planning delivered a moderate but strategic impact with an OPS of 90.5%, enhancing planning accuracy and reducing last-minute adjustments.

The comparative simulation outcomes are summarized in Table X, providing clear financial justification for prioritizing logistics interventions that not only improve operations but also protect margin contributions.

Each intervention scenario was evaluated using the OPS metric to simulate the projected cost-saving potential of distinct strategies. As outlined in Table 5, the simulation results highlight the varying degrees of financial impact, helping PT. KSN prioritize logistics improvements not only based on operational feasibility but also on expected cost-efficiency return.

Table 5. Financial Impact Simulation using OPS

Scenario Description	OPS (%)	Cost Saving (%)	Key Driver
Scenario 1: Shipment consolidation	91.04	8.96%	Route planning, container optimization
Scenario 2: Vendor SLA reform	78.94	21.06%	Free demurrage, two-way penalty clause
Scenario 3: Cross-functional planning alignment	90.50	9.50%	Forecast integration between production and logistics

These results underscore the importance of strategic selection and sequencing of logistics interventions. Notably, the scenario involving vendor SLA reform demonstrated the highest efficiency gain, validating the critical role of contractual restructuring in logistics cost management. To validate the feasibility and accuracy of these projections, the next section presents stakeholder perspectives gathered from cross-functional engagements within PT. KSN.

D) Stakeholder Validation and Field Alignment

To strengthen the credibility of the analytical findings, the proposed cost optimization framework was validated through four semi-structured interviews and one cross-departmental Focus Group Discussion (FGD) conducted in April 2025. Participants included representatives from PT. KSN's logistics, procurement, commercial, and finance departments, as well as one regional freight forwarder.

The validation aimed to assess the following:

- Whether the SCOR-based metrics (OPS, PCI, CO 1.1) accurately reflected operational bottlenecks.
- If the proposed interventions from the Five Levers mapping were considered feasible and aligned with current pain points.
- How the SPM (OPS) projections were perceived in terms of financial relevance and strategic decision-making support.

The logistics team confirmed that the performance issues captured by SCOR—especially shipment delays and coordination failures—were consistent with their daily operational struggles. They particularly highlighted the value of transitioning from reactive dispatching to planned consolidation schedules, which not only reduced idle time but also improved truck and container utilization.

Procurement staff acknowledged that previous vendor selection practices were rate-focused, often overlooking service-level compliance and stuffing punctuality. They expressed strong support for the new tiered vendor model and the implementation of performance-based SLAs, citing that clear penalty and reward clauses would enhance accountability and reduce unplanned charges such as demurrage.

The commercial team echoed these concerns, especially noting that forecast volatility and last-minute changes in order priorities disrupted transportation planning. This validated the recommendation to implement cross-functional planning tools and synchronize shipment timelines with commercial launches and seasonal demand cycles.

From the financial perspective, there was an appreciation for the introduction of OPS as a proxy metric. While full ROA calculations were unavailable due to the confidentiality of broader corporate asset data, finance managers acknowledged that OPS provided a meaningful indicator of cost-to-serve and a practical method for ranking logistics interventions based on financial return potential.

A freight forwarder representative supported the vendor SLA reform, stating that clear service expectations—combined with fair grace periods (e.g., 1×24-hour stuffing allowance)—would reduce friction and improve performance on both sides.

These validations confirm that the proposed framework is not only analytically sound but also contextually grounded, operationally feasible, and strategically aligned with PT. KSN's business priorities. The feedback gathered from stakeholders not only reinforced the analytical findings but also confirmed the operational feasibility of the proposed interventions. Table 6 summarizes key stakeholder inputs and links them directly to the relevant dimensions of the ICEEF framework, demonstrating broad cross-functional alignment within PT. KSN.

Table 6. Summary of Stakeholder Validation and Framework Alignment

Stakeholder Group	Key Feedback Highlight	Framework Link
Logistics	Confirmed delays, support for planned shipment cycles	SCOR & Transportation Lever
Procurement	Supported vendor tiering, SLA penalty-reward structure	Supplier Collaboration Lever
Commercial	Agreed on forecast mismatch, supported cross-dept planning	Demand Planning Lever
Finance	Approved use of OPS for financial evaluation	SPM (Modified)
Freight Vendor	Endorsed SLA clarity, stuffing time agreement	Vendor Performance & SLA Reform

This multi-perspective validation illustrates that the ICEEF framework is both actionable and accepted across core logistics, procurement, commercial, and finance functions. With this organizational alignment established, the study next consolidates its theoretical and practical implications—presented in the synthesis that follows.

E) Synthesis and Managerial Implications

The integration of SCOR, Five Levers, and Strategic Profit Modelling (SPM) within the Integrative Cost Efficiency Evaluation Framework (ICEEF) provided by PT. KSN with a structured approach to logistics cost optimization—one that transcended isolated metric tracking or tactical cost-cutting. Each component contributed distinct yet complementary insights, which, when synthesized, enabled more strategic and financially informed decision-making.

The SCOR model delivered a robust diagnostic platform to identify performance inefficiencies, such as high Planning Cost Index (PCI), low-cost predictability (CO 1.1), and reduced Operational Projection Saving (OPS). These indicators helped isolate areas where logistics processes were underperforming relative to cost-efficiency goals.

Using the Five Levers of Cost Optimization, these inefficiencies were then deconstructed into actionable interventions across core logistics levers—specifically in transportation and supplier collaboration. This step was critical in converting diagnostics into practical, targeted initiatives such as consolidated shipment planning, vendor SLA reform, and demand synchronization.

Finally, the SPM adaptation using the OPS metric enabled simulation of the financial impact of each intervention scenario. This provided PT. KSN has a mechanism to prioritize initiatives not only based on feasibility but also on projected return in the form of cost-to-serve reduction. This synthesis demonstrated that true cost efficiency in FMCG logistics requires an iterative, cross-functional approach—starting from data-backed diagnostics (SCOR), moving through lever-based interventions (Five Levers), and ending with scenario-based financial justification (SPM). The OPS-based financial lens proved especially valuable in environments where traditional ROA data is not accessible, yet financial discipline remains crucial. From a managerial standpoint, the ICEEF framework produced several key implications:

- Vendor strategy should move beyond rate-based selection toward performance-tiered partnerships with dynamic SLAs and built-in accountability mechanisms.
- Cross-functional planning tools and SOP alignment are essential to eliminate inefficiencies stemming from siloed decisions.
- Cost-saving initiatives must be linked to margin outcomes, not just to operational KPIs, to ensure long-term value creation and stakeholder buy-in.

The successful validation of this framework at PT. KSN affirms its potential for broader application across FMCG firms facing similar cost-service trade-offs in logistics. The integrative nature of the ICEEF framework is illustrated in Figure 6, which outlines the comprehensive synthesis process, from operational diagnostics to financial simulation and managerial decision-making. It demonstrates how SCOR, Five Levers, and SPM interact sequentially to support a structured and financially aligned cost optimization strategy within logistics operations.

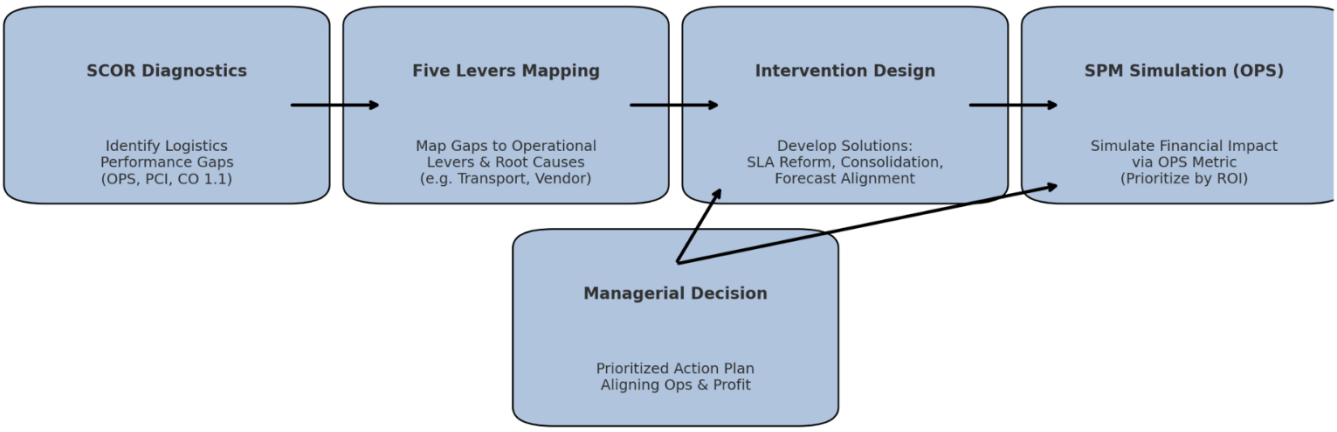

Fig 6. Synthesis Flow of ICEEF Framework (SCOR + Five Levers + SPM)

This visual synthesis affirms that true logistics cost efficiency arises not from isolated improvements but from coordinated diagnostics, intervention planning, and outcome modeling, with successful validation in PT. KSN, the ICEEF framework offers a replicable model for other firms aiming to align operational performance with financial discipline—particularly in complex FMCG environments.

IV. CONCLUSION

This study proposed and validated an Integrative Cost Efficiency Evaluation Framework (ICEEF) that synthesizes the SCOR model, Five Levers of Cost Optimization, and a modified Strategic Profit Modelling (SPM) approach to improve logistics performance and financial decision-making in the FMCG sector. The framework was tested through a case study at PT. Kaldusari Nabati Indonesia (KSN), where logistics inefficiencies—particularly related to transportation coordination, vendor performance, and planning alignment—were identified as key cost drivers.

The use of SCOR provided structured diagnostics using metrics such as OPS, PCI, and CO 1.1, highlighting operational bottlenecks. These were then mapped through the Five Levers to pinpoint root causes and guide intervention design. To bridge operations with profitability, the study introduced an adjusted SPM metric—Operational Projection Saving (OPS)—allowing the firm to simulate and prioritize interventions based on projected cost-efficiency returns.

The application of ICEEF at PT. KSN led to actionable insights, including:

- Shipment consolidation and SLA reformation, which reduced OPS values and revealed up to 21% cost-saving potential.
- Implementation of vendor tiering strategies and cross-functional planning alignment, which were validated through interviews and FGDs.
- Strategic use of OPS to evaluate logistics interventions where traditional ROA metrics were unavailable.

This integrative approach demonstrates that cost optimization in logistics is not solely a tactical exercise but requires cross-functional coordination and financial accountability. The ICEEF framework offers a practical and scalable model for other FMCG firms seeking to navigate logistics complexity while ensuring margin resilience.

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