Financial and Operational Impacts of Direct Cost Management on Organizational Efficiency: A Structural Equation Model in a Honduran CIF Logistics Firm

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***Abstract*—** *This study examines the financial and operational relationship between direct costs and organizational efficiency in a Honduran firm that markets and transports bulk cargo under the CIF (Cost, Insurance, and Freight) international trade term. The research was conducted in San Pedro Sula, Honduras, using a non-experimental, correlational, cross-sectional design. A self-administered questionnaire was applied to the entire logistics staff (N = 100); after removing straight-line response patterns, the final analytic sample comprised 82 participants. The model was estimated through structural equation modeling with maximum likelihood estimation, robust standard errors, and Yuan-Bentler correction, and included two latent variables: Direct Costs and Efficiency. Both constructs showed adequate reliability and convergent validity (α and ω > .80; AVE > .50), although the heterotrait-monotrait index (HTMT = .844) was very close to the strict .85 threshold. The structural model showed a satisfactory global fit (CFI = 1.000; RMSEA = .000; SRMR = .049) and a positive, strong, and statistically significant relationship between both constructs (β = .832, p < .001), explaining 69.3% of the variance in efficiency. Findings are interpreted as an association rather than a causal relationship, and provide novel empirical evidence with direct financial-management implications for the Central American logistics sector.*

***Index Terms*—** *direct costs; organizational efficiency; structural equation modeling; logistics sector; Honduras.*

I. INTRODUCTION

Cost management and the pursuit of organizational efficiency are two central concerns of contemporary management, particularly in sectors where operating margins depend on a precise allocation of resources, as occurs in the marketing and international transport of bulk cargo under CIF (Cost, Insurance, and Freight) terms. Understanding how costs that can be directly attributed to logistics operations relate to organizational efficiency is useful both for managerial decision-making and for the theoretical development of management accounting, with clear implications for firm-level financial performance.

The literature distinguishes direct from indirect costs based on their traceability to a specific cost object. Direct costs vary according to their use in a concrete activity —labor, materials, directly associated expenses— and can be economically attributed to that object; indirect costs, by contrast, are distributed through allocation formulas that do not always accurately reflect operating reality [1]. There is broad consensus that direct costs are easier to identify and quantify, precisely because of their direct relationship with the resources consumed, which makes them a more reliable indicator for efficiency analysis than indirect costs [1]. From the activity-based costing perspective, the cost object is the starting point of any measurement: direct costs are traced to it in an economically efficient way, whereas indirect costs require allocation formulas that do not always capture actual resource consumption well [2].

Organizational efficiency, in turn, is typically defined as the relationship between the inputs used and the outputs obtained: an organization is more efficient the lower the proportion of inputs it needs to achieve a given level of results [3]. This implies that efficiency ultimately refers to the optimal allocation of limited resources —time, capital, space, energy— to achieve organizational objectives [3]. In business practice this construct has been measured in very different ways: employee performance, the ratio between input costs and production value, or the key indicators used by continuous-improvement methodologies such as Six Sigma. Each organization adapts its own criteria, but the core of the concept remains anchored in optimizing the input-output ratio and reducing waste [4].

At least three theoretical frameworks help explain why better management of direct costs could translate into greater organizational efficiency. Theory of Constraints holds that every organization faces a limiting factor that conditions its performance, and that identifying and continuously improving that constraint —often linked to resource and cost allocation— is the main path toward gaining competitiveness [5]. Dynamic Capabilities Theory, in turn, explains that routines aimed at improving operating processes, including cost management, allow the firm to adapt to a changing environment and sustain its profitability [5]. Finally, the Resource-Based View (RBV) posits that an organization achieves sustained competitive advantage when it controls valuable, rare, hard-to-imitate, and non-substitutable resources, managed by a structure capable of leveraging them [6]; under this reading, a disciplined management of direct costs can be understood as an organizational capability that contributes to that advantage.

Empirical evidence consistently, though not uniformly, supports a positive association between cost management and organizational efficiency across sectors and countries. In consumer-goods firms in Nigeria, a regression model showed that cost-control practices explained close to 71% of the variation in production efficiency, with standard costing as the strongest predictor [7]. In Vietnamese manufacturing, a

structural equation model found that applying Activity-Based Costing (ABC) had a standardized effect of β = .571 on operational efficiency, with good fit indices [8]; a later study of foreign direct investment firms in the same country confirmed that ABC use significantly influenced both financial and non-financial performance [9]. In Thailand, an SEM applied to 191 firms showed an even larger effect of ABC on operational performance (β = .80), which explained 64% of the variance in financial performance [10] —a proportion close to the 69.3% found in the present study—. Coefficients of this magnitude, between .57 and .80, also appear in research on lean accounting and continuous improvement, where direct effects range between .16 and .94 depending on the variable considered [11].

Other studies document this relationship from different angles. In the retail sector, a comparative analysis of operational and economic efficiency revealed considerable variation across stores, with larger stores obtaining the best results [12]. In finance, a regression found that firms that are less efficient in managing their costs pay a higher cost of capital [13]. In construction, a field study directly linked non-value-added activities with labor cost variance, quantifying losses of thousands of dollars per day per production line [14]. And material flow cost accounting (MFCA) has shown, across dozens of case studies, consistent positive financial effects derived from identifying and reducing waste-related costs [15]–[17].

This relationship is nevertheless not uniform across contexts. A study of territorial bio-based SMEs found that raw material cost did not destabilize worker productivity, contradicting earlier findings on the strategic role of that cost [18]. Similarly, evidence on personnel costs and labor productivity in European manufacturing has been described as inconclusive, with contradictory results across countries depending on their level of economic development [19]. And a study on rapeseed production in China documented an inverted-U relationship between operating scale and cost-efficiency loss [20]. These findings suggest that the magnitude and sign of the relationship between direct costs and efficiency depend on contextual, sectoral, and scale factors that have not yet been fully explored.

In Latin America, the evidence is scarcer. A study on internal and interorganizational cost management found that both dimensions contributed significantly to organizational performance (β = .378 and β = .341, respectively) [21]. In Honduras, available research has concentrated on the agricultural sector: a study of coffee producers reported technical efficiency levels close to 53-56%, partly influenced by access to credit [22]. In Mexican manufacturing, a data envelopment analysis (DEA) showed that more efficient firms had significantly higher sales and training-investment levels than low-efficiency firms [23]. No prior studies, however, were found that examined —through structural equation models— the relationship between direct costs and organizational efficiency in the logistics or international trade sector in Central America.

This review reveals at least three gaps. Theoretically, research on management control systems remains fragmented, without a framework that consistently explains how different cost-control mechanisms generate specific organizational outcomes [24]. Methodologically, much of the cost-management literature is still descriptive or exploratory rather than explanatory, with limited application of structural models that quantify the magnitude of relationships [25]. And geographically and sectorally, there remains a notable scarcity of recent quantitative studies on direct costs and productivity outside traditional manufacturing contexts [26], particularly in Central American logistics organizations operating under international trade schemes such as CIF.

Within this framework, the present study examines the structural relationship between direct costs and organizational efficiency in a firm that markets and transports bulk cargo under CIF terms, located in San Pedro Sula, Honduras, through a structural equation model estimated from cross-sectional data. Given the non-experimental nature of the design, the relationship is framed as a predictive association rather than a causal one, consistent with prior studies that have documented coefficients of comparable magnitude in other organizational contexts. These findings are expected to help narrow the geographic and sectoral gap identified above, providing new empirical evidence —with direct relevance for financial performance— on this relationship in the Honduran logistics sector.

II. METHODOLOGY

A. Design

The study followed a non-experimental, correlational, cross-sectional approach. A hypothesized measurement and structural model was estimated using structural equation modeling (SEM) from observations collected at a single point in time, with no manipulation of any variable; accordingly, the coefficients obtained are interpreted as associations rather than causal relationships.

B. Setting

The research was carried out in a firm engaged in the marketing and transport of bulk goods under the CIF (Cost, Insurance, and Freight) term, headquartered in San Pedro Sula, Cortés, Honduras. Data collection took place between February and May 2026.

C. Participants

The reference population consisted of the entire logistics staff of the firm (N = 100). Because all members of this population were invited to take part, data collection corresponded to a full census of the department rather than to a probabilistic or convenience sample; all 100 employees completed the initial questionnaire, yielding a 100% response rate to the census.

After applying a straight-line response-pattern filter —removing records in which a participant selected the same option in 80% or more of the 24 Likert-type items—, 18 records were excluded, resulting in a final analytic sample of n = 82.

This analytic sample therefore constitutes a data-cleaned subset of the census population rather than an independently drawn sample. Response-time filters and the implausible-age filter could not be applied, since Google Forms recorded only the submission timestamp and age was captured as categorical ranges. No missing data were recorded for any variable.

D. Ethical Considerations

Administration of the instrument was authorized by the firm. Participation was voluntary and anonymous, with no collection of direct respondent identifiers.

E. Variables and Instrument

The instrument used, the Direct Cost Management and Organizational Efficiency Questionnaire, was developed specifically for this study and reviewed for content by three experts —one in methodology and two in international trade and logistics— prior to its administration.

In addition to sociodemographic variables (gender, age range, educational attainment, and hierarchical position), used for descriptive purposes only, the instrument included 24 five-point Likert items (1 = Strongly disagree to 5 = Strongly agree), of which 10 formed the two constructs evaluated: Direct Costs (P13, P14, P15, P16, P18; P16 as marker item) and Efficiency (P19, P20, P21, P22, P23; P19 as marker item).

F. Procedure

Participants completed a self-administered questionnaire through Google Forms.

G. Data Analysis

The model was estimated in Jamovi 2.7 (SEMLj module, lavaan engine) using maximum likelihood estimation with robust standard errors and Yuan-Bentler scale correction (T2*). Reliability (Cronbach's alpha, McDonald's omega) and convergent validity (AVE) were assessed for each construct, and discriminant validity was evaluated using the HTMT index (conservative .85 criterion). Global fit was assessed using scaled chi-square, robust CFI and TLI, robust RMSEA, and SRMR. The structural relationship was estimated with standardized coefficients, standard errors, z values, p values, and 95% confidence intervals, together with explained variance (R^2).

III. RESULTS

A. Sociodemographic Characteristics of the Sample

The sample consisted of 82 participants, with no missing data on any sociodemographic variable (Table I).

TABLE I
DESCRIPTIVE STATISTICS OF SOCIODEMOGRAPHIC VARIABLES (N = 82)

Variable	M	Mdn	Mode	SD	Min–Max	W (p)
Gender	1.48	1.00	1.00	.502	1–2	.636 (<.001)
Age range	1.68	1.00	1.00	.873	1–4	.744 (<.001)
Education	2.54	2.00	2.00	.863	1–5	.848 (<.001)
Hierarch. pos.	1.96	1.00	1.00	1.30	1–5	.740 (<.001)

Shapiro-Wilk tests were significant for all four variables ($p < .001$), consistent with their categorical nature. Overall, the sample showed sufficient variability across the four sociodemographic dimensions assessed.

B. Measurement Model Assessment

The measurement model consisted of two latent variables: Direct Costs (P16, P13, P14, P15, P18) and Efficiency (P19, P22, P23, P20, P21), estimated using maximum likelihood with robust standard errors and Yuan–Bentler T2* correction (Table II).

TABLE II
FACTOR LOADINGS OF THE MEASUREMENT MODEL

Construct	Ind.	B	SE	β	z	p
Direct Costs	P16	1.000	—	.803	—	—
Direct Costs	P13	1.071	.114	.735	9.38	<.001
Direct Costs	P14	1.017	.134	.765	7.59	<.001
Direct Costs	P15	1.059	.092	.827	11.53	<.001
Direct Costs	P18	0.897	.141	.725	6.36	<.001
Efficiency	P19	1.000	—	.565	—	—
Efficiency	P22	1.163	.370	.624	3.14	.002
Efficiency	P23	1.577	.432	.820	3.65	<.001
Efficiency	P20	1.292	.342	.834	3.78	<.001
Efficiency	P21	1.339	.385	.795	3.48	<.001

Note. P16 and P19 were fixed as marker items. All loadings were significant ($p \leq .002$); P20 showed the highest loading within Efficiency and P15 within Direct Costs.

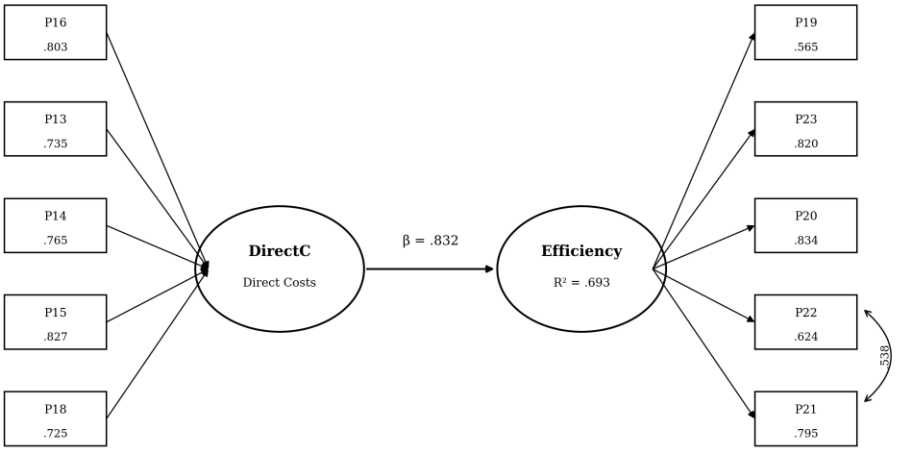


Fig. 1. Structural model of direct costs and efficiency. Standardized coefficients are shown; all loadings and the structural relationship were statistically significant.

C. Reliability and Convergent Validity

TABLE III
RELIABILITY AND CONVERGENT VALIDITY BY CONSTRUCT

Construct	α	ω	AVE
Direct Costs	.877	.879	.593
Efficiency	.856	.821	.534

Alpha and omega coefficients exceeded .80, and AVE exceeded .50 in both cases, supporting internal consistency and convergent validity. The HTMT index between Direct Costs and Efficiency was .844, below the flexible .90 criterion but very close to the strict .85 criterion, so the empirical differentiation between both constructs should be interpreted with caution.

D. Global Fit of the SEM Model

TABLE IV
STRUCTURAL MODEL FIT INDICES

Indicator	Result
χ^2 (df = 33)	29.300 (scaled)
Scaled p	.650
Robust CFI	1.000
Robust TLI	1.017
RMSEA [95% CI]	.000 [.000, .082]
SRMR	.049

The model converged after 30 iterations. The scaled chi-square was not statistically significant, $\chi^2(33) = 29.300$, $p = .650$, and the remaining indicators supported a satisfactory global fit.

E. Structural Relationship Assessment

TABLE V
ESTIMATION OF THE STRUCTURAL RELATIONSHIP

Dep. var.	Predictor	B	SE	95% CI	β	z	p
Efficiency	Direct Costs	.619	.163	[.30, .94]	.832	3.79	<.001

Direct Costs showed a positive, strong, and statistically significant relationship with Efficiency ($\beta = .832$, $p < .001$); the 95% CI did not include zero. This relationship is interpreted as a predictive, not causal, association given the cross-sectional design.

F. Explained Variance

The model yielded $R^2 = .693$ for Efficiency: Direct Costs explained 69.3% of its variance, while the remaining 30.7% was associated with factors not included in the model.

G. Residual Covariance

A residual covariance was estimated between P22 and P21 (B = .242, SE = .098, 95% CI [.050, .434]; $\beta = .538$, $z = 2.47$, $p = .013$), indicating that both indicators share additional specific variance not explained by the Efficiency construct.

H. Structural Model Synthesis

Overall, the results show an adequate representation of both constructs, with satisfactory reliability, convergent validity, and global fit. The relationship between Direct Costs and Efficiency was positive and significant, with a considerable explanatory capacity, although the proximity of the HTMT (.844) requires

caution when interpreting the empirical differentiation between both constructs.

IV. DISCUSSION

A. Interpretation of the Main Findings

The objective of this study was to examine the structural relationship between direct costs and organizational efficiency in a firm that markets and transports bulk cargo under CIF terms, in San Pedro Sula, Honduras. Results showed a positive, strong, and significant relationship between both constructs ($\beta = .832$, $p < .001$), with a considerable explanatory capacity of Direct Costs over Efficiency ($R^2 = .693$). These findings are consistent with the proposed hypothesis and confirm that studying direct-cost management as an antecedent of perceived efficiency in logistics organizations is a worthwhile line of inquiry —one with direct implications for firm-level financial performance.

Given that the design is non-experimental, correlational, and cross-sectional, this relationship should be read as an association estimated at a single point in time, not as evidence of causality. Even so, the magnitude of the structural coefficient and the proportion of explained variance suggest that, in the context studied, clearer management of costs directly attributable to operations —labor, materials, direct expenses— is consistently associated with higher perceived efficiency, in line with the classic definition of efficiency as the optimal relationship between inputs and outputs [3].

B. Theoretical Integration

The findings can also be read in light of the theoretical frameworks reviewed earlier. From Theory of Constraints, direct-cost management can be understood as part of the process of identifying and continuously improving the factors that limit organizational performance [5]: to the extent that a logistics firm can visualize and precisely control these costs, it reduces operational uncertainty and frees up capacity for improvement in other areas of the process. From Dynamic Capabilities Theory, systematic management of direct costs can be seen as a higher-order routine that helps the firm adapt to and sustain its performance over time [5]. And from the RBV, the ability to efficiently manage direct costs constitutes, in itself, a valuable and hard-to-imitate organizational resource [6]. The structural coefficient found ($\beta = .832$) is consistent with these readings: it suggests that the Direct Costs variable captures substantive information about the efficient functioning of the organization studied.

C. Comparison with the Empirical Literature

The magnitude of this coefficient is comparable to, and even higher than, that reported in prior studies on the relationship between cost management and organizational performance or efficiency. In Vietnamese manufacturing, ABC showed an effect of $\beta = .571$ on efficiency [8]; in Thailand, that effect reached $\beta = .80$ on operational performance, explaining 64% of its variance [10] —a figure close to the 69.3% obtained here— . In Latin America, internal cost management showed more modest effects on organizational performance ($\beta = .378$) [21], suggesting that this relationship may be particularly strong in operations where direct costs represent a critical share of total value, as occurs in bulk cargo transport under CIF schemes.

This pattern also coincides with findings across diverse sectors, such as cost control and production efficiency in consumer goods [7], lean accounting [11], and material flow cost accounting as a mechanism for identifying inefficiencies [15], [17]. However, the literature also documents weaker or even contradictory relationships in other contexts —forestry SMEs [18], personnel costs and productivity in European manufacturing [19]—, making clear that the strength of this association is not universal but depends on the sector, the type of cost analyzed, and the institutional context. That the relationship found here is particularly strong could be explained by the direct-cost-intensive nature of the CIF bulk-cargo sector, where transport, insurance, and documentation constitute the very core of the operation, unlike sectors where these costs represent a smaller fraction of the value-creation process.

D. Model Validity and Psychometric Considerations

The measurement model showed satisfactory fit indices and adequate reliability and convergent validity. However, the HTMT (.844) came very close to the strict .85 criterion, requiring caution when interpreting the empirical differentiation between Direct Costs and Efficiency. This could be explained by the fact that both constructs share a common conceptual origin within the firm's operating process —the management of resources linked to cargo transport and insurance—, which may generate some overlap in how participants perceive and respond to the items of both scales. The residual covariance between P22 and P21 within Efficiency reinforces this reading: both items appear to share a content component not fully explained by the latent construct.

This does not invalidate the structural results, but it does qualify their interpretation: part of the elevated $\beta = .832$ could stem from the conceptual proximity between both constructs, not solely from a substantive mechanism linking cost management and perceived efficiency. Future research could examine the item content of both scales in greater depth, or incorporate additional indicators that help delimit the boundaries between both constructs more clearly.

E. Contribution to the Geographic and Sectoral Gap

As noted in the Introduction, no prior studies were found that examined, through structural equation models, the relationship between direct costs and organizational efficiency in the logistics or international trade sector in Central America. Regional evidence has concentrated on the Honduran agricultural sector [22] and on general cost-management studies in other Latin American countries [21]. This study therefore contributes new empirical evidence —with financial-management relevance— on this relationship in a Honduran logistics organization operating under the CIF term, helping to close the geographic and sectoral gap identified.

F. Limitations

These findings should be interpreted in light of several limitations. The cross-sectional design precludes establishing causality or temporal sequence between direct costs and efficiency; reported coefficients reflect associations estimated at a single point in time. Although data collection corresponded to a full census of the logistics department (N = 100, n = 82 after data cleaning), the results come from a single organization, which limits generalization to other firms or international-trade contexts. The instrument, moreover, was developed specifically for this study and, although reviewed by three experts, lacks prior validation evidence in other populations. Because the data are self-reported and were collected through a self-administered questionnaire, common method variance cannot be ruled out, which could inflate the magnitude of the relationships observed —including the proximity of the HTMT to the strict threshold discussed above. Finally, the absence of a response-start timestamp prevented applying additional response-time-based cleaning criteria.

G. Practical Implications

From a practical standpoint, the findings suggest that strengthening the processes for identifying, recording, and controlling the direct costs linked to the transport and insurance of bulk cargo under CIF terms could be a relevant path toward improving the efficiency perceived by logistics staff —with a direct bearing on the firm's financial performance. Indicator P15 showed the highest factor loading within Direct Costs (β = .827) and P20 the highest within Efficiency (β = .834); both items could serve as reference points for designing internal monitoring indicators, although their specific content should be reviewed against the original instrument before deriving more detailed operational recommendations.

H. Future Research Directions

Future research should replicate this model in other logistics and international-trade firms in Honduras and Central America, to assess whether the relationship found holds outside a single organization. It would also be worthwhile to incorporate longitudinal designs that better approximate the temporal direction of the association, as well as instruments already validated in the international literature to facilitate comparison of results. And given that the HTMT was close to the strict discrimination threshold, future studies could explore alternative models that more precisely delimit the conceptual boundaries between both constructs.

V. CONCLUSIONS

The objective of this study was to examine the structural relationship between direct costs and organizational efficiency in a firm that markets and transports bulk cargo under CIF terms, in San Pedro Sula, Honduras. Based on a structural equation model estimated on a census-derived analytic sample of 82 logistics employees, Direct Costs was positively, strongly, and significantly associated with Efficiency (β = .832, $p < .001$), explaining 69.3% of its variance, with satisfactory reliability, convergent validity, and global model fit. These results support the proposed relationship and provide novel empirical evidence, with direct financial-management implications, for a Central American logistics sector in which prior structural evidence on this relationship was previously lacking. Given the cross-sectional, correlational design and its limitation to a single organization, however, the relationship should be interpreted as an association rather than a causal effect, bearing in mind as well the conceptual proximity between both constructs suggested by the HTMT index (.844).

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