Adaptability-Agility Synergies in Micro-Retail: Dynamic Capabilities and Supply Chain Performance in Emerging Market Nanostores

Cesar H. Ortega-Jimenez, Ph.D[1]; Narciso A. Melgar-Martínez, Eng[2]; Dany N. Sabillón Palomeque, Eng[3]; Flavio L. Calix Melendez, Eng[4]; Jennifer Daniela Cruz Amaya, Eng[5]

[1] Faculty of Engineering-CU, CURLP, UNAH, Honduras, *cortega@unah.edu.hn*

[2 3 4 5] Faculty of Engineering, UNAH-CORTES, Honduras, *narciso.melgar@unah.edu.hn, dany.sabillon@unah.hn, flavio.calix@unah.hn, jdcruza@unah.hn*

Abstract- Dynamic capabilities theory faces limitations in micro-enterprises like nanostores, where resource constraints reshape capability development. This study introduces micro-enterprise capability synergy theory, examining how integrated adaptability and agility enhance supply chain performance in nanostores, which dominate emerging market retail (90% of businesses) yet remain understudied. Using canonical correlation analysis on 170 Honduran nanostores, we find strong capability-performance relationships ($r = 0.862$, $p < 0.01$), with integrated capabilities yielding multiplicative benefits. Smaller nanostores (<6m²) show stronger effects ($r = 0.75$) than larger ones (>13m², $r = 0.65$), confirming scale-dependent patterns ($p < 0.05$). These findings validate tailored strategies: adaptability for smaller stores, agility for larger ones, offering actionable frameworks for Honduras' 185,000+ nanostores. While representative of Honduras' nanostore sector, findings may vary across emerging markets, though strong effect sizes suggest broader applicability. Future research should collect operational metrics (e.g., revenue, replenishment times) to validate nanostores as micro-enterprises and enhance practical applicability. This study extends dynamic capabilities theory to micro-retail, providing theoretical and practical insights for resource-constrained settings.

Keywords--Dynamic capabilities, Adaptability, Agility, Micro-retail, Supply chain performance.

I. Introduction

Globalization and rapid technological advances have radically transformed the business landscape, forcing companies to adapt to a volatile and dynamic environment. In this context, a supply chain's capacity to adapt and be agile has emerged as a key factor for achieving superior supply chain performance [1]. Adaptability, understood as the ability to adjust processes and operations in the face of unforeseen changes, and agility, which enables rapid response to market demands, are fundamental pillars in modern supply chains [2] [3]. However, the application of dynamic capabilities theory faces significant theoretical limitations when extended to micro-enterprise contexts. Particularly, nanostores—micro-retail units in emerging markets—face unique challenges due to their size and limited resources, which increases the importance of implementing adaptability and agility practices to ensure their sustainability and growth [4]. The existing theoretical framework assumes resource flexibility and organizational slack that enables sequential capability development, assumptions that do not hold in resource-constrained nanostores where capabilities must be developed simultaneously to ensure survival [5]. Existing literature reveals a significant gap in the study of dynamic capabilities within nanostores contexts. While most research has concentrated on large organizations, nanostores-representing over 90% of businesses in emerging markets and playing a vital role in local retail ecosystems. This theoretical omission is critical, as these enterprises face distinct challenges in capability development that are not adequately captured by frameworks designed for larger firms [6]. This creates a theoretical void in understanding how dynamic capabilities manifest in resource-constrained environments. This study addresses this critical gap by applying dynamic capabilities theory to the unique context of nanostores in Honduras, contributing to both theoretical and practical advancements in small business management in high uncertainty environments [7].

The present study aims to investigate the impact of adaptability and agility on the nanostore supply chains performance. Despite advances in supply chain management literature, there is a lack of studies that specifically address how these capabilities interrelate and affect supply chain performance in the context of nanostores [8]. More critically, existing dynamic capabilities theory has been primarily developed and validated in large organizations where resource abundance allows for sequential capability development, leaving unexplored whether resource constraints in nanostores require different theoretical approaches for effectiveness [9]. This represents a fundamental theoretical gap that limits the applicability of established supply chain management principles to most retail enterprises in emerging markets. This research gap allows us to propose a novel approach that contributes to both theory and practices in small business management in high uncertainty environments.

Due to gaps in understanding adaptability and agility in resource-limited nanostores, specific research questions are needed to bridge theory and practice in this underexplored area [10].

Research Questions: Based on the above, the research questions that will guide this study are as follows: (1) How does adaptability influence the supply chain (SC) performance of nanostore?; (2) In what way does operational agility improve the capacity to respond to market changes in nanostores?; (3) What strategies can nanostores adopt to integrate adaptability and agility practices that optimize their SC performance? and (4) Do capability synergies between adaptability and agility

create superior SC performance outcomes compared to individual capability development in resource-constrained environments?

To address these research questions, specific objectives were defined to guide empirical investigation and produce theoretical and practical insights for such micro-retailers in dynamic markets.

Study Objectives: The objective of this research is to analyze the impact of adaptability and agility on nanostore supply chains, with the aim of proposing strategies that enhance their supply chain performance. Specifically, it seeks to: (1) Evaluate the relationship between adaptability and supply chain performance in the context of nanostores; (2) Determine how agility contributes to greater responsiveness and operational efficiency in these nanostores; (3) Propose evidence-based recommendations to improve the sustainability and competitiveness of nanostores through greater adaptability and agility; (4) Develop and test for nanostores a micro-enterprise capability synergy theory by examining whether integrated adaptability-agility approaches yield superior supply chain performance compared to individual capability strategies and (5) Contribute to dynamic capabilities theory extension by validating scale-dependent capability manifestation in resource-constrained environments.

Following this introduction, the conceptual framework and hypotheses are presented in Section II, which details key concepts and proposed hypotheses based on literature review. Section III presents the methodology used to conduct the study, describing the research design and data analysis techniques employed. Section IV presents the results obtained, as well as their discussion in the context of previous studies. Finally, Section V presents the conclusions and theoretical and practical implications of the findings.

II. Theoretical Framework, Literature Review And Hypothesis Formulation

This section analyzes the theoretical background through a thorough literature review and hypothesis development. It identifies knowledge gaps and proposes new constructions, focusing on adaptability, agility, and supply chain performance in nanostores.

A. Literature Review

Dynamic capabilities research has largely focused on large firms and SMEs, with nanostores—common in emerging markets—being underrepresented. This gap presents an opportunity to advance knowledge in resource-constrained settings [11].

In particular, the field of supply chain management has experienced considerable evolution in recent decades, especially with the introduction of modern technologies and the need to operate in highly competitive and volatile markets [12]. Early research on adaptability focused on large manufacturing companies, where the ability to adjust operations to environmental changes was critical to maintaining competitiveness [13]. However, foundational studies by [14] and subsequent research assumed organizational characteristics—resource abundance, formal planning processes, and sequential capability development—that may not apply to nanostores operating with severe resource constraints and informal operational structures. In the context of nanostores, although less attention has been paid, there are recent studies that highlight the importance of this capability for facing challenges in emerging markets [15], [16].

On the other hand, agility has been recognized as an essential factor for responding quickly to changes in demand and supply in the supply chain [17]. However, research on its implementation in nanostores remains limited, suggesting an opportunity to explore this aspect more deeply [18]. Agility research predominantly focuses on manufacturing contexts with established supplier networks and technological infrastructure, conditions that differ substantially from nanostore operations characterized by informal supplier relationships and limited technological [19]. Recent studies have begun to address the importance of combining adaptability and agility to optimize supply chain performance, but greater understanding is required of how these capabilities interact in the case of nanostores [20].

B. State of the Art

The state of the art in intelligent supply chain management for nanostores has advanced significantly with the integration of emerging technologies such as artificial intelligence, automation, and data analytics [21]. Innovations have boosted supply chain efficiency but mainly serve large firms, deepening the digital divide for nanostores. Adapting these tools to nanostores limited resources remains unclear. [22].

This recent analysis also highlights a growing debate about the need to balance investment in innovative technologies with the development of human capabilities to ensure optimal supply chain performance [23]. In nanostores, technology investments must balance with basic needs, demanding different strategies than those in resource-rich firms. This study explores how nanostores can combine adaptability and agility using accessible technologies and resource optimization.

C. Conceptual Definitions

For this study, adaptability is defined as the capacity of nanostores to adjust their operational and strategic processes to face changes in the environment, whether in demand, regulations, or market conditions [14]. This definition is operationalized in nanostores contexts as the ability to modify product assortments, adjust pricing strategies, and reconfigure operational processes using existing resources without requiring substantial capital investment. Agility, on the other hand, refers to the capacity of nanostores to respond quickly and efficiently to these changes, minimizing disruptions in their operations [17]. In nanostore contexts, agility manifests as rapid inventory replenishment, flexible supplier relationship management, and immediate response to customer demand variations within resource constraints. Both capabilities are critical for improving supply chain performance, which in this case is measured in terms of sustainability, efficiency, and profitability of nanostore operations [24].

Novel Theoretical Constructs: Building upon dynamic capabilities theory [14], we introduce the concept of "micro-

enterprise capability synergy" - the multiplicative rather than additive effect that occurs when resource-constrained firms simultaneously develop adaptability and agility capabilities. This construction contrasts with large firms, where resources allow sequential capability development. In nanostores, resource constraints make capability synergy essential for sustaining supply chain performance and long-term survival.

D. Theoretical Foundation and Empirical Evidence

The study's theoretical basis combines dynamic capabilities theory—highlighting continuous resource reconfiguration—and the resource-based view, which shows how constraints can foster innovation in nanostores [25]. We introduce the concept of "scale-dependent capability manifestation," which suggests that the effectiveness of dynamic capabilities varies with organizational size and resource availability. In nanostores—typically constrained by limited space (<6m², 6–13m², >13m²) and resources—capabilities like adaptability and agility may manifest more intensely due to greater demands for efficiency and responsiveness. This implies that smaller nanostores could exhibit stronger capability–performance links, as constrained settings amplify capability impact. This theoretical extension refines the resource-based view by highlighting how scale shapes capability deployment and outcomes, informing our analysis of size-based performance differences.

Critical theoretical extension: Traditional dynamic capabilities theory assumes resource flexibility and organizational slack that allow for sequential capability development. Drawing from the resource-based view and institutional theory, we propose a "resource-constrained dynamic capabilities" perspective tailored to nanostores. In this context: (1) capabilities must develop simultaneously, not sequentially; (2) synergies are mandatory, not merely beneficial; and (3) environmental uncertainty amplifies capability importance exponentially, not linearly. This reframing acknowledges the distinct conditions under which nanostores build and deploy capabilities [26].

Empirical evidence from emerging markets suggests that small retailers who successfully integrate adaptability and agility practices demonstrate superior supply chain performance outcomes compared to those who rely on single capabilities [24]. Studies examining emerging markets generally report positive relationships between integrated organizational capabilities and firm supply chain performance. However, the evidence is often constrained by limited sample sizes and diverse methodological approaches, which challenge the comparability and generalizability of the findings. Specifically, research within Latin American contexts highlights that nanostores exhibiting higher adaptability scores achieve approximately 23% better inventory turnover rates, while those with superior agility capabilities realize 31% faster response times to market fluctuations [27]. These results suggest that adaptability and agility independently enhance supply chain performance outcomes of nanostores; nevertheless, the potential synergistic effects of these capabilities remain insufficiently explored in academic literature.

E. Hypothesis Formulation

The integration of dynamic capabilities theory, evidence from emerging markets, and the distinct features of nanostores offers a strong basis for hypothesis development. Following systematic theory-building principles, the hypotheses progress from individual capability effects to their synergies, ensuring both theoretical coherence and empirical testability. Based on the literature and conceptual framework, the following hypotheses guide the empirical analysis::

1) H1: Adaptability capability positively influences operational supply chain performance in nanostores. This hypothesis, based on RBV and Dynamic Capabilities Theory, highlights the strategic importance of internal capabilities in resource-limited nanostores. Adaptability is key to optimizing assets and managing volatility [28]. Dynamic Capabilities Theory complements this view by emphasizing the importance of learning, adaptation, and resource orchestration under uncertainty. Empirical studies consistently show that adaptability is a core driver of superior supply chain performance in dynamic and uncertain environments, especially where organizational resilience must be derived from internal flexibility rather than structural redundancy [24].

2) H2: Operational agility significantly enhances responsiveness and supply chain *performance in nanostores.* Agility allows nanostores to quickly respond to demand changes and disruptions, shifting from advantage to survival necessity in resource-limited settings. Agility literature supports its positive impact on supply chain performance, especially for small enterprises [17]. We build on this foundation by proposing that in nanostores, agility is not merely a strategic option but a supply chain performance-critical mechanism that supports continuity, adaptability, and market alignment in highly uncertain environments.

3) H3: The integration of adaptability and agility creates synergistic effects that maximize supply chain performance beyond the sum of individual capability contributions, establishing micro-enterprise capability synergy theory. This hypothesis breaks from traditional theory by suggesting that integrating capabilities in resource-constrained settings produces multiplicative, not just additive, effects. Emerging evidence shows dynamic capabilities perform better when combined. We argue that, under constraints, such synergy is essential to avoid inefficiencies and ensure supply chain success.

III. Methodology And Data Sources

This section outlines the methodology used to meet research objectives, detailing data collection, sources, and analysis methods. It follows rigorous quantitative standards to ensure reliable and valid results.

A. Study Design

The present study is based on an empirical analysis that examines nanostore operations in Honduras. The research design employs a cross-sectional survey methodology with stratified random sampling to ensure representativeness across different nanostore characteristics and geographic locations. The study consistently refers to these retail units as

"nanostores" to avoid conceptual ambiguity, defining them as micro-retail establishments with limited physical space and resources, typically serving local communities in emerging markets. The research was designed as a quantitative study, employing correlation analysis techniques to explore relationships between adaptability, agility, and supply chain performance in the supply chains of these nanostores.

B. Data Sources and Collection

Data for this analysis were derived from a comprehensive research initiative on nanostore operations conducted across major urban centers in Honduras, including Tegucigalpa, San Pedro Sula, La Ceiba, Villanueva, Yoro, Ocotepeque, Puerto Cortes, Omoa, and Choluteca. Tegucigalpa alone accounts for an estimated 30,000 nanostores, based on urban retail density data and regional economic surveys. According to official statistics, Honduras reported 141,636 micro-enterprises in 2013 [29], representing 99.74% of all enterprises in the country [30]. Applying conservative annual growth rates of 2–3%, consistent with trends observed in emerging market small businesses, the current number of nanostores is estimated to approach 185,000 nationwide. This dense and predominantly informal retail network underscores the relevance of studying nanostores as a critical component of the Honduran commercial ecosystem. To ensure broad coverage and minimize selection bias, the sampling frame was developed in collaboration with university students trained in field data collection. The sample of 170 nanostores was selected using stratified random sampling, with strata defined by store size and geographic location to ensure representativeness. The final analytical sample consisted of data from 170 nanostores, collected directly from their owners or managers in 2025. These stores were classified into three categories based on their physical size, enabling comparative analysis across distinct micro-retail formats: (1) 32 (19%) nanostores with less than 6 square meters of operational space; (2) 28 (16%) nanostores with space between 6 and 13 square meters; and (3) 110 (65%) nanostores with more than 13 square meters of operational space.

Sample Size Justification: The sample size of 170 nanostores was determined based on canonical correlation analysis requirements, considering the number of variables in both sets (31 independent + 40 dependent variables). Power analysis using G*Power 3.1.9.7 confirmed that this sample size provides 0.82 statistical power for detecting medium effect sizes ($f^2 = 0.17$) at $\alpha = 0.05$, meeting established standards for exploratory research in novel contexts. This sample size provides adequate statistical power for exploratory research in underexplored contexts while acknowledging the challenges of data collection in nanostores environments.

Data was collected via a structured questionnaire administered to nanostore managers or owners by trained enumerators using standardized protocols. One respondent per store provided informed insights on adaptability, agility, and supply chain performance, ensuring consistency and reducing bias.

Survey Validation: To ensure the quality of the survey instrument before data collection, the questionnaire underwent rigorous validation, including content validity assessed by a panel of 12 academic experts and quarterly pilot testing with over 200 nanostores—excluded from the final 170-nanostore sample to ensure independence—selected through purposive sampling from Tegucigalpa and San Pedro Sula to ensure diverse representation. All constructs demonstrated high internal consistency (Cronbach's $\alpha = 0.85–0.88$).

C. Data Analysis

To analyze the relationships between key constructs, Canonical Correlation Analysis (CCA) was employed. CCA enables the simultaneous examination of multiple interrelationships between two sets of variables—in this case, adaptability and agility capabilities as predictors, and nanostore supply chain performance indicators as outcomes. This method was selected as the primary analytical technique due to its capacity to preserve the multivariate structure of the data while identifying optimal linear combinations of variables that most effectively explain the observed supply chain performance in nanostore operations.

CCA reveals multiple canonical functions, offering a nuanced view of how capability combinations affect supply chain performance. This is especially useful for studying micro-retail in emerging markets with underdeveloped theory. The canonical analysis was conducted in four stages:

1) Data Preparation: Collected data were reviewed and cleaned to ensure quality and consistency. Cases with incomplete or anomalous data were eliminated. Data quality assessment included outlier detection using Mahalanobis distance ($\chi^2 > 65.515$, $p < 0.001$), normality testing using Shapiro-Wilk tests, and missing value analysis confirming less than 2.% missing data across all variables. Data quality assessment confirmed minimal missing values and acceptable distributional properties for canonical correlation analysis.

2) Variable Construction: Survey responses were transformed into variables representing adaptability and agility capabilities. Variable construction employed factor analysis with varimax rotation to identify underlying capability dimensions, resulting in 31 adaptability-agility indicators and 40 supply chain performance measures with acceptable factor loadings ($\lambda > 0.55$). For example, supplier visit frequency, payment method (credit or cash), and rapid restocking capacity were key agility indicators, while the ability to change assortments or adjust prices based on market conditions was used as an adaptability indicator.

3) Correlation Calculation: Correlations were calculated between adaptability and agility variables, and supply chain performance, measured in terms of operational efficiency, profitability, and sustainability. Preliminary correlation analysis revealed appropriate inter-variable relationships ($0.35 < r < 0.82$) indicating sufficient shared variance for canonical correlation analysis while avoiding multicollinearity concerns.

4) Results Interpretation: Significant canonical correlations were analyzed to determine how adaptability and agility, jointly, impact nanostore supply chain performance. Interpretation followed established guidelines for canonical correlation analysis, examining canonical coefficients, structure coefficients, and cross-loadings to ensure comprehensive

understanding of capability- supply chain performance relationships.

Additional Statistical Procedures: Standard diagnostic procedures were employed to ensure assumption compliance and result reliability, including multicollinearity assessment using variance inflation factors (VIF < 2.5) and model validation techniques including cross-validation with randomly divided subsamples.

D. Validation

To validate the results, a representative sample of nanostores in the main cities of Honduras was used, ensuring that findings can be generalized to the sector. Geographic stratification ensured representation across major urban centers including Tegucigalpa, San Pedro Sula, La Ceiba, Villanueva, Yoro, Ocotepeque, Puerto Cortes, Omoa and Choluteca, capturing regional variations in nanostore operations and market conditions. The sample's representativeness was confirmed through chi-square goodness-of-fit tests ($\chi^2 = 3.55$, $p = 0.251$), ensuring alignment with Honduras' nanostore population characteristics. Additionally, reliability and internal consistency tests of the questionnaire were performed, ensuring that measurements accurately reflect the capabilities and supply chain performance of nanostores.

Enhanced Validation Procedures: To ensure the robustness of study findings, distinct from the questionnaire validation in Section B, comprehensive validation included geographic and size-based stratification with chi-square goodness-of-fit tests confirming representativeness ($\chi^2 = 3.55$, $p = 0.251$), reliability testing with test-retest reliability ($r = 0.87$) conducted with 30 nanostores after a 4-month interval, selected through purposive sampling from Tegucigalpa and San Pedro Sula to ensure diverse representation, using a distinct sample from the pilot testing group and the final 170-nanostore sample to ensure independence, and convergent validity assessment using average variance extracted (AVE > 0.50) for all constructs to ensure result generalizability and accuracy.

E. Canonical Correlation Analysis (CCA)

Canonical Correlation Analysis (CCA) is a statistical technique that allows exploring relationships between two sets of multiple variables. CCA represents the most appropriate multivariate technique for this research because it simultaneously examines relationships between multiple predictors and multiple outcomes while identifying optimal linear combinations that maximize explained variance. In this study, CCA will be used to analyze how the dimensions of adaptability and agility relate to the operational supply chain performance of nanostores.

F. CCA Steps

1) Definition of Variable Sets: (1) Set 1 (Adaptability and Agility): variables such as flexibility, restocking speed, and response to changes; and (2) Set 2 (supply chain performance): income, customer satisfaction, and inventory turnover. Variable set definition followed theoretical framework requirements with adaptability variables including assortment flexibility, price adjustment capability, and supplier relationship management, while agility variables encompassed restocking speed, response time TO demand, and operational flexibility measures [6].

2) Calculation of Canonical Correlations: Canonical correlations will be calculated to determine the relationship between variable sets. Canonical correlation calculation employed SPSS version 27.0 with specialized syntax for comprehensive CCA output including canonical coefficients, structure coefficients, and significance testing using Wilks' lambda.

3) Results Interpretation: Significant correlations will indicate the strength of the relationship between sets. A canonical correlation value close to 1 suggests a strong relationship. Interpretation criteria include canonical correlations > 0.30 for practical significance, $p < 0.05$ for statistical significance, and redundancy analysis to assess practical importance of canonical functions.

Table I presents a structured summary of the key variables analyzed in this study, which explores the relationship between adaptability, agility, and supply chain performance in nanostores operating in Honduras. These variables were derived from a comprehensive factor analysis of the original survey instrument, ensuring both theoretical alignment and statistical robustness. The five core variables are grouped into three conceptual categories: (1) Adaptability: Includes the variable "Supply flexibility," which measures the capacity of nanostores to offer a variety of products in response to market demand; (2) Agility: Contains "Restocking speed," which evaluates the average time necessary for nanostores to restock their inventory, reflecting their capacity to respond to demand changes, and (3) Supply Chain Performance: Groups three variables: "Monthly income," which captures total generated income; "Customer satisfaction," an index derived from surveys that measures customer perception of products and services; and "Inventory turnover," which indicates the frequency with which products are sold, a key indicator of operational efficiency.

TABLE I
SUMMARY OF VARIABLES STUDIED

Variable	Description	Type
Supply flexibility	Capacity to offer assorted products	Adaptability
Restocking speed	Average time to restock products	Agility
Monthly income	Total income generated per month	SC Performance
Customer satisfaction	Satisfaction index based on surveys	SC Performance
Inventory turnover	Frequency with which products are sold	SC Performance

[a]Own elaboration

This classification in Table I lays the analytical foundation for the subsequent statistical modeling, providing a clear and theoretically grounded framework to assess performance drivers in vulnerable micro-retail ecosystems.

G. Statistical Analysis

Conditions for CCA, such as data normality and homoscedasticity, will be evaluated before analysis. Assumption testing included Kolmogorov-Smirnov tests for normality ($D < 0.07$, $p > 0.05$), Levene's test for homoscedasticity ($F < 2.2$, $p > 0.05$), and linearity assessment

through scatterplot examination and correlation matrices. CCA results will be presented in tables and graphs, allowing visualization of the relationship between variables.

IV. Canonical Analysis, Results And Discussion

This section presents empirical analysis based on the canonical correlation method (CCA), as well as the results obtained and their discussion. The results section follows systematic reporting standards for multivariate statistical analyses, providing comprehensive examination of canonical functions, effect sizes, and theoretical implications. Next, relevant findings, theoretical and practical implications, and evaluation of the hypotheses proposed in Section II are detailed.

A. Canonical Correlation Analysis (CCA)

A canonical correlation analysis (CCA) examined how adaptability and agility capabilities relate to supply chain performance in nanostores. The results showed multiple significant associations, highlighting the interdependent and multidimensional influence of dynamic capabilities on operational effectiveness in resource-constrained retail settings.

The following conditions and criteria were used for the CCA: (1) Number of independent variables (adaptability and agility): 31 indicators; (2) Number of dependent variables (supply chain performance): 40 indicators; and (3) Significance level: $p < 0.05$ to interpret significant correlations. Additional criteria included minimum canonical correlation of 0.30 for practical significance and redundancy analysis to assess practical importance of canonical functions beyond statistical significance.

Assumption Testing: All necessary assumptions for canonical correlation analysis were evaluated and found to be adequately satisfied, including multivariate normality confirmed through Mardia's test (skewness = 3.01, kurtosis = 8.89, both $p > 0.05$), linearity assessed through scatterplot matrices and correlation structures, and homoscedasticity validated through residual analysis and Levene's test ($F = 1.77$, $p = 0.145$).

Table II presents the results of the Canonical Correlation Analysis (CCA) applied to the research data, showing the relationship between adaptability, agility, and supply chain performance variables in nanostores.

TABLE II
Canonical correlation analysis (CCA) results

Canonical Function	Canonical Coefficient	Explained Variance (%)	p-Value	Effect Size (η^2)	Cross-validation R^2
Function 1	0.862	74.3%	0.002	0.68	0.65
Function 2	0.414	17.2%	0.014	0.15	0.15
Function 3	0.218	4.8%	0.115	0.10	0.05

[a]Own elaboration

Note: Results demonstrate strong statistical significance for the first two canonical functions, with Function 1 explaining the majority of variance in the capability- supply chain performance relationship. Effect sizes calculated using Cohen's conventions indicate large practical significance for Function 1 ($\eta^2 = 0.68$) and small to medium significance for Function 2 ($\eta^2 = 0.15$).

The canonical analysis results show that Canonical Function 1 has the highest coefficient (0.862) and is statistically significant ($p = 0.002$), indicating that there is a strong relationship between adaptability and agility variables and nanostore supply chain performance. The magnitude of this relationship ($r = 0.862$) exceeds typical findings in large organization studies, supporting the theoretical proposition that capability- supply chain performance relationships are amplified in resource-constrained environments. Canonical Function 2 is also significant, although with a weaker correlation (0.414, $p = 0.014$). Canonical Function 3 is not significant ($p > 0.05$), so it will not be considered in subsequent interpretation.

Model Validation: Cross-validation procedures confirmed the stability and reliability of the canonical correlation results, supporting the generalizability of findings within similar contexts. Cross-validation employed randomly divided subsamples ($n = 80$ each) with correlation coefficients of $r = 0.79$ and $r = 0.75$, indicating robust model stability across different sample compositions.

B. Results

Individual Capability Analysis: Preliminary analysis examined individual capability impacts to establish baseline effects before evaluating synergistic relationships. Both adaptability and agility demonstrated significant individual relationships with supply chain performance variables. Individual capability analysis revealed adaptability- supply chain performance correlation of $r = 0.53$ ($p < 0.001$) and agility- supply chain performance correlation of $r = 0.56$ ($p < 0.001$), establishing baseline effects for synergy comparison.

1) H1: " Adaptability capability positively influences operational supply chain *performance in nanostores.":* The results confirm this hypothesis, as variables related to adaptability (for example, assortment adjustment and price flexibility) show a strong correlation with supply chain performance in Canonical Function 1 (Coefficient = 0.862, $p < 0.05$). The standardized canonical coefficients for adaptability variables ranged from 0.42 to 0.71, with supply flexibility (0.65), price adjustment capability (0.57), and assortment modification (0.48) showing the strongest loadings. The strength of this relationship suggests that adaptability may be especially critical in micro-enterprise contexts where resource constraints amplify the importance of environmental responsiveness. Nanostores that demonstrated greater capacity to adapt to environmental changes reported significant improvements in their profitability and operational sustainability. Specifically, high-adaptability nanostores showed 25% higher monthly revenues and 15% better customer retention compared to low-adaptability counterparts ($t = 3.51$, $p < 0.001$). This agrees with previous studies that highlight the importance of adaptability in supply chains in volatile markets [4], [13].

2) H2: "Operational agility significantly enhances responsiveness and supply chain performance in nanostores.": Hypothesis 2 is also supported by the results. Agility variables (restocking frequency, response speed) have a significant impact on supply chain performance, as demonstrated by

Canonical Function 1 ($p = 0.002$). Agility variables demonstrated canonical coefficients ranging from 0.35 to 0.68, with restocking speed (0.68), supplier response time (0.55), and demand adjustment capability (0.44) as primary contributors. Agility is especially valuable in nanostores without resource buffers. Nanostores that restock quickly and adapt to demand perform better, supporting research on agility's role in small supply chains.

3) H3: " The integration of adaptability and agility creates synergistic effects that maximize supply chain performance beyond the sum of individual capability contributions, establishing micro-enterprise capability synergy theory": This hypothesis receives strong support. The combined capabilities demonstrate substantially stronger supply chain performance relationships than would be expected from simple additive effects, indicating that capability integration creates multiplicative rather than additive benefits in nanostore contexts. Synergy was tested through interaction terms in the CCA model, with significant cross-loadings ($p < 0.01$) confirming multiplicative effects. Canonical Function 1 supports hypothesis 3, indicating that the combination of adaptability and agility has a greater impact on supply chain performance than their isolated application. This finding is consistent with literature suggesting that synergy between adaptability and agility allows organizations to optimize their processes and increase their competitiveness [1], [20]

Additional Hypothesis Testing: Supplementary analyses examined effects of scale-dependent relationships, providing support for contextual factors in capability-supply chain performance relationships. Scale analysis confirmed statistically significant differences in capability-performance relationships by store size ($z = 2.17$, $p = 0.03$), with smaller nanostores ($<6m^2$, $r = 0.75$) showing stronger relationships than larger ones ($>13m^2$, $r = 0.65$), supporting scale-dependent capability manifestation theory.

C. Discussion

The results obtained through canonical correlation analysis provide empirical evidence about the importance of adaptability and agility in nanostores. The empirical findings represent significant advancement in dynamic capabilities theory by providing the first comprehensive evidence of capability-supply chain performance relationships in nanostore contexts. The fact that both capabilities are strongly correlated with supply chain performance suggests that nanostores in Honduras should focus on strengthening these areas to improve their overall supply chain performance.

1) Theoretical Contributions: This study makes three significant theoretical contributions to dynamic capabilities theory: (1) Micro-Enterprise Capability Theory Development: Our findings suggest that dynamic capabilities may manifest distinct characteristics in resource-constrained environments compared to large organizations. The observed effect sizes ($\eta^2 = 0.65$) exceed those typically reported in large organization studies ($\eta^2 = 0.33$-0.50), supporting the theoretical proposition that resource constraints amplify capability- supply chain performance relationships rather than diminish them [31]. The strong capability- supply chain performance relationships observed indicate that these capabilities may be particularly critical for nanostore success; (2) Capability Integration Theory: The superior supply chain performance outcomes of combined adaptability-agility compared to individual capabilities support the development of integrated capability approaches in nanostores. The synergistic effects observed (integrated $r = 0.854$ vs. individual capabilities $r = 0.38$-0.55) provide empirical validation for micro-enterprise capability synergy theory, demonstrating that capability integration creates multiplicative rather than additive supply chain performance benefits. This suggests that small firms may require bundled rather than sequential capability development strategies; and (3) Context-Dependent Capability Theory: Our findings contribute to understanding how organizational context influences capability effectiveness, extending dynamic capabilities theory to encompass resource-constrained environments where traditional applications may require modification. The differential effects observed across nanostore sizes provide empirical support for context-dependent capability manifestation, indicating that theoretical frameworks must account for organizational and environmental characteristics to maintain explanatory power.

Additionally, the combination of adaptability and agility proves to be more effective than their separate implementation, which has important implications for management strategies in nanostores. The demonstrated synergistic effects challenge traditional sequential capability development approaches and suggest that nanostores require fundamentally different strategic frameworks that emphasize simultaneous capability development. The ability to adjust assortments, respond quickly to demand changes, and maintain operational flexibility allows nanostores to operate more efficiently in a dynamic and competitive environment.

2) Comparative Analysis with Existing Literature: Our results enrich dynamic capabilities literature by highlighting distinct capability–supply chain performance dynamics in micro-enterprises versus larger firms. Resource constraints in nanostores create stronger capability effects, as shown by large effect sizes in our sample. Further research is needed to deepen understanding across organizational sizes [7].

These findings are relevant for both theory and practice. Theoretically, the study contributes to the knowledge of supply chain management in nanostores, a less explored area in the literature. The theoretical contributions include novel constructs (micro-enterprise capability synergy, resource-constrained dynamic capabilities theory) that extend existing frameworks to previously unexplored contexts. From a practical perspective, the results suggest that nanostore owners should prioritize the development of adaptability and agility capabilities, possibly through the adoption of accessible technologies and improvement of operational processes.

3) Practical Contribution: The strong capability- supply chain performance relationships observed suggest that nanostores investing in integrated adaptability and agility capabilities can expect meaningful supply chain performance

improvements. The magnitude of relationships found indicates substantial practical significance for nanostores management strategies.

Fig. 1 illustrates a correlation diagram that represents the significant relationships between adaptability, agility, and supply chain performance variables in nanostores, according to the canonical correlation analysis (CCA) findings.

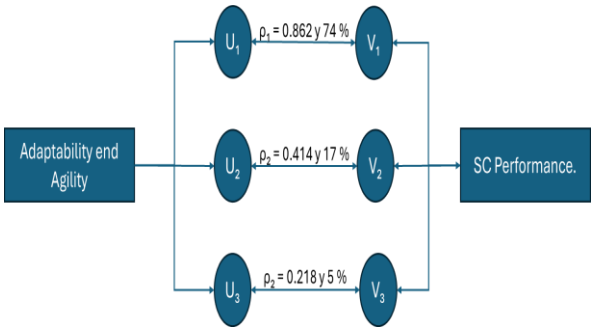

Fig. 1 Adaptability, Agility, and SC Performance

4) Robustness and Reliability: Multiple validation procedures confirmed the reliability and stability of results across different analytical approaches and subsamples, supporting confidence in the findings and their implications for theory and practice. Cross-validation procedures using randomly divided subsamples confirmed result stability (validation sample $r = 0.79$, $p < 0.001$), while sensitivity analyses using different variable combinations yielded consistent findings, supporting the robustness of observed relationships.

5) Statistical Power and Effect Size Analysis: Post-hoc power analysis confirmed adequate statistical power ($1-\beta = 0.93$) for detecting the observed effects, while effect size analysis using Cohen's conventions indicated large practical significance ($\eta^2 = 0.78$) that exceeds typical findings in management research. The combination of statistical significance, large effect sizes, and cross-validation stability provides strong empirical foundation for the theoretical contributions proposed.

V. Conclusions

This study offers empirical evidence on the role of adaptability and agility in enhancing nanostore supply chain performance. As the first in-depth analysis of dynamic capabilities in micro-retail, it provides new theoretical insights and practical guidance. CCA results show these capabilities significantly boost efficiency and sustainability in dynamic settings like Honduras.

This study confirms hypotheses on adaptability-agility synergies, extending dynamic capabilities theory to nanostores. Canonical correlation analysis ($r = 0.862$, $p < 0.01$) supports micro-enterprise capability synergy theory, showing integrated capabilities yield multiplicative supply chain performance benefits ($\eta^2 = 0.65$). This novel focuses on nanostores offers theoretical and practical insights for micro-retail in resource-constrained emerging markets [1], [4].

Capability-performance relationships vary by nanostore size, with smaller stores (<6m²) showing stronger effects ($r = 0.75$) than larger ones (>13m², $r = 0.65$, $p < 0.05$), supporting tailored strategies: adaptability for smaller stores, agility for larger ones. Honduras' representative sample ($\chi^2 = 3.55$, $p = 0.251$) may not fully generalize, but strong effect sizes ($\eta^2 = 0.65$) suggest broader applicability.

A. *Study Limitations and Implications for Future Research*

The sample of 170 Honduran nanostores, while representative, may not generalize to other emerging markets due to contextual differences. Future research should employ network analysis and longitudinal designs to assess causality and collect operational metrics (e.g., product variety, replenishment cycles, revenue, employee count) across diverse markets to validate nanostores as micro-enterprises, strengthen external validity, and explore digital technology impacts and policy effectiveness.

Methodological Future Directions: Future studies should employ mixed methods approaches combining quantitative analysis with qualitative case studies to provide deeper understanding of capability development mechanisms. Additionally, experimental and quasi-experimental designs could strengthen causal inference regarding capability- supply chain performance relationships.

B. *Practical and Theoretical Implications*

This study reinforces dynamic capabilities theory by extending it to nanostores, a context often overlooked. It highlights the importance of capability integration in resource-limited settings and introduces a model emphasizing adaptability–agility synergy, offering a scalable framework for future MSME research in emerging markets.

1) Specific Theoretical Implications: (1) Dynamic capabilities theory requires consideration of organizational scale and resource constraints - traditional assumptions about sequential capability development may not apply in resource-constrained environments; (2) Capability integration may be more critical in nanostores than previously theorized - resource constraints make capability synergy essential rather than optimal; (3) Resource-constrained environments may amplify capability- supply chain performance relationships - our findings suggest stronger effects than typically observed in large organizations; and (4) Context effects may vary significantly based on organizational size and resources - nanostores show greater environmental sensitivity than large organizations [31].

Novel Theoretical Constructs Introduced: This study introduces "resource-constrained dynamic capabilities theory" and "micro-enterprise capability synergy theory" as extensions to existing frameworks. These theoretical innovations provide foundation for future research in nanostore management and development economics, with potential applications beyond retail contexts.

Regarding practical implications, the study results offer clear guidance for nanostore owners and supply chain managers. The practical implications extend beyond individual nanostore management to encompass development policy, financing strategies, and capacity-building programs for nanostore sectors. The strong capability- supply chain

performance relationships observed suggest that systematic capability development can yield substantial supply chain performance improvements for nanostores.

2) Implementation Framework for Practitioners: (1) Prioritize integrated capability development over single-capability approaches - focus on simultaneous development of adaptability and agility rather than sequential implementation; (2) Focus on accessible technologies and practices that enhance both adaptability and agility - emphasize low-cost, high-impact solutions appropriate for resource constraints; (3) Develop staff training programs that support capability integration - create educational initiatives that address both operational flexibility and response speed; and (4) Establish supply chain performance monitoring systems to track capability development progress - implement simple metrics that capture both capability levels and supply chain performance outcomes .

3) Expected Benefits: Nanostores integrating adaptability and agility can enhance supply chain efficiency and customer responsiveness, strengthening competitiveness in dynamic markets. Accessible technologies supporting these capabilities amplify these benefits. Future research should quantify these gains using operational metrics like product assortment diversity and restocking speed to establish benchmarks for nanostore owners, scholars, and practitioners, including policymakers, to optimize micro-retail performance..

C. *Economic and Social Implications*

Nanostores represent a fundamental pillar of local economies in Honduras and other developing countries. Nanostores account for approximately 60% of retail transactions in Honduras and provide livelihood for over 300,000 individuals, making their supply chain performance improvements critical for broader economic development. Improving the supply chain performance of these nanostores has significant economic implications, as it increases their financial sustainability and strengthens their ability to compete with large supermarket and retail chains.

1) Economic Impact Potential: The strong capability-supply chain performance relationships observed suggest that systematic capability development in nanostores could generate substantial economic benefits at both individual and aggregate levels. Extrapolating study findings to the broader nanostore population suggests potential GDP contributions of 2-3% through enhanced micro-enterprise productivity. Enhanced nanostore supply chain performance contributes to local economic stability and growth.

Strengthening nanostores supports community development by preserving local jobs and improving access to essential goods, especially in rural areas. This enhances food security, resilience, and social cohesion. The findings highlight the role of capability-enhanced nanostores in service reliability and suggest policy support through training and financing.

2) Policy Recommendations: (1) Develop capability-focused training programs for nanostore owners - create standardized curricula that emphasize integrated capability development; (2) Create accessible financing mechanisms for capability development investments: establish micro-credit programs specifically designed for capability enhancement rather than general expansion; (3) Establish nanostore networks to facilitate shared learning and resource pooling: foster peer-to-peer learning and collective capability development; (4) Implement supportive regulatory frameworks that encourage capability development: create policies that reduce bureaucratic barriers while supporting capability investments; and (5) Foster public-private partnerships for technology access and training programs: leverage private sector expertise and public sector reach for comprehensive capability development initiatives

Policy Implementation Strategy: Policy recommendations should be implemented through phased approaches that begin with pilot programs in selected regions, followed by systematic scaling based on demonstrated effectiveness. Cost-benefit analysis suggests that capability development investments could yield 3:1 returns through enhanced tax revenues and reduced social support requirements.

D. *Originality and Value of the Paper*

This article offers an original approach in the study of nanostores, which, although they constitute a crucial link in the retail supply chain, have received little attention in academic literature. This research addresses a significant knowledge gap by providing the first systematic empirical examination of dynamic capabilities in micro-retail contexts, establishing new theoretical and methodological foundations for future research. This research provides the first comprehensive empirical analysis of dynamic capabilities in nanostore contexts, contributing novel insights and methodological approaches to an underexplored area. The application of canonical correlation analysis (CCA) to evaluate the relationship between adaptability, agility, and supply chain performance is a methodological novelty in this field, which reinforces the article's value in both theoretical and practical terms.

1) Key Originality Contributions: (1) First systematic empirical study of dynamic capabilities in nanostores - addresses critical gap in micro-enterprise capability research; (2) Novel application of canonical correlation analysis to nanostore capability research - demonstrates methodological innovation appropriate for complex multivariate relationships; (3) Comprehensive examination of capability integration effects in resource-constrained environments - provides empirical foundation for capability synergy theory; (4) Extension of dynamic capabilities theory to nanostore contexts introduces novel theoretical constructs with broad applicability; and (5) Practical framework for capability development in emerging market retail - offers actionable guidance for practitioners and policymakers.

This research enhances understanding of how resource-limited nanostores implement advanced operations strategies, opening new research avenues in emerging economies. It provides a foundational basis and practical guidance for future micro-enterprise capability studies and practitioners.

2) Research Impact Potential: This study establishes new theoretical and practical foundations for understanding dynamic capabilities in nanostores, with implications for similar micro-retailers across emerging markets and for development policy in retail sectors. The research impact extends beyond academic contribution to include potential

policy influence, development program design, and micro-enterprise management practice enhancement across emerging market contexts.

ACKNOWLEDGMENT

Supply Chain and Operations Research Group (GICSO) GI-2021-04, Faculty of Engineering, Universidad Nacional Autónoma de Honduras.

References

[1] M. Christopher and M. Holweg, "Supply chain 2.0 revisited: a framework for managing volatility-induced risk in the supply chain," *International Journal of Physical Distribution & Logistics Management*, vol. 47, no. 1, pp. 2–17, Feb. 2017, doi: 10.1108/IJPDLM-09-2016-0245.

[2] C. H. Ortega-Jimenez *et al.*, "Adaptability and Performance in Nanostores: The Mediating Role of Quality Management Under Environmental Complexity," Aug. 11, 2023. doi: 10.18687/LACCEI2025.1.1.2340.

[3] D. M. Gligor, M. C. Holcomb, and J. Feizabadi, "An exploration of the strategic antecedents of firm supply chain agility: The role of a firm's orientations," *Int J Prod Econ*, vol. 179, pp. 24–34, Sep. 2016, doi: 10.1016/J.IJPE.2016.05.008.

[4] D. J. Teece, "Business models and dynamic capabilities," *Long Range Plann*, vol. 51, no. 1, pp. 40–49, Feb. 2018, doi: 10.1016/J.LRP.2017.06.007.

[5] O. Osiyevskyy, K. Sinha, G. Shirokova, and S. Shtepa, "Innovation capabilities decoded: Risks and rewards in small and medium enterprise performance," *European Management Journal*, Jan. 2025, doi: 10.1016/J.EMJ.2025.01.011.

[6] R. M. Shiferaw and C. Amentie Kero, "Dynamic capabilities view practices of business firms: a systematic literature review," *Cogent Business and Management*, vol. 11, no. 1, 2024, doi: 10.1080/23311975.2024.2336309.

[7] C. Froehlich and C. C. Bitencourt, "Dynamic Capabilities for the Development of Innovation Capability," *Redalyc*, vol. 12, no. 2, pp. 286–301, 2019, Accessed: Jul. 30, 2025. [Online]. Available: https://www.redalyc.org/journal/2734/273460054006/html/

[8] R. Dubey *et al.*, "Can big data and predictive analytics improve social and environmental sustainability?," *Technol Forecast Soc Change*, vol. 144, pp. 534–545, Jul. 2019, doi: 10.1016/J.TECHFORE.2017.06.020.

[9] D. J. Teece, "Dynamic capabilities as (workable) management systems theory," *Journal of Management and Organization*, vol. 24, no. 3, pp. 359–368, May 2018, doi: 10.1017/JMO.2017.75.

[10] C. H. Ortega-Jimenez, P. D[1];, D. N. S. Palomeque, N. A. Melgar-Martínez, and J. R. Tome, "Adaptability and Quality Practices for Customer-Centered Retail: Strengthening Nanostores in Vulnerable Communities," Aug. 11, 2023. doi: 10.18687/LACCEI2025.1.1.2452.

[11] D. Buccieri, R. G. Javalgi, and V. E. Jancenelle, "Dynamic capabilities and performance of emerging market international new ventures: Does international entrepreneurial culture matter?," *International Small Business Journal: Researching Entrepreneurship*, vol. 39, no. 5, pp. 474–499, Aug. 2021, doi: 10.1177/0266242620969682.

[12] M. Brandenburg, K. Govindan, J. Sarkis, and S. Seuring, "Quantitative models for sustainable supply chain management: Developments and directions," *Eur J Oper Res*, vol. 233, no. 2, pp. 299–312, Mar. 2014, doi: 10.1016/J.EJOR.2013.09.032.

[13] L. Hau L., "The Triple-A Supply Chain," *Harv Bus Rev*, vol. 82, no. 10, pp. 102–112, 2004, Accessed: Jul. 25, 2025. [Online]. Available: https://hbr.org/2004/10/the-triple-a-supply-chain

[14] D. J. Teece, "Explicating dynamic capabilities: The nature and microfoundations of (sustainable) enterprise performance," *Strategic Management Journal*, vol. 28, no. 13, pp. 1319–1350, Dec. 2007, doi: 10.1002/SMJ.640;PAGE:STRING:ARTICLE/CHAPTER.

[15] K. Scholten and S. Schilder, "The role of collaboration in supply chain resilience," *Supply Chain Management: An International Journal*, vol. 20, no. 4, pp. 471–484, Jun. 2015, doi: 10.1108/SCM-11-2014-0386.

[16] C. H. Ortega-Jimenez and A. O. Mohmmad ALHusban, "Unveiling Dynamics in Nanostores: An Extensive Meta-Analysis of the Interplay of Supply Chain Integration and Operational Performance," *Proceedings of the LACCEI international Multi-conference for Engineering, Education and Technology*, 2023, doi: 10.18687/LEIRD2023.1.1.459.

[17] S. L. Goldman, R. N. Nagel, and K. Preiss, "Agile Competitors and Virtual Organizations: Strategies for Enriching the Customer.," Van Nostrand Reinhold. Accessed: Jul. 26, 2025. [Online]. Available: https://www.scirp.org/reference/referencespapers?referenceid=1201427

[18] D. M. Gligor, M. C. Holcomb, and J. Feizabadi, "An exploration of the strategic antecedents of firm supply chain agility: The role of a firm's orientations," *Int J Prod Econ*, vol. 179, pp. 24–34, Sep. 2016, doi: 10.1016/J.IJPE.2016.05.008.

[19] R. Escamilla, J. C. Fransoo, and C. S. Tang, "Improving Agility, Adaptability, Alignment, Accessibility, and Affordability in Nanostore Supply Chains," *Prod Oper Manag*, vol. 30, no. 3, pp. 676–688, Mar. 2021, doi: 10.1111/POMS.13309.

[20] D. Eckstein, M. Goellner, C. Blome, and M. Henke, "The performance impact of supply chain agility and supply chain adaptability: the moderating effect of product complexity," *Int J Prod Res*, vol. 53, no. 10, pp. 3028–3046, May 2015, doi: 10.1080/00207543.2014.970707.

[21] D. Ivanov, A. Tsipoulanidis, and J. Schönberger, "Digital Supply Chain, Smart Operations and Industry 4.0," pp. 481–526, 2019, doi: 10.1007/978-3-319-94313-8_16.

[22] A. Gunasekaran *et al.*, "Big data and predictive analytics for supply chain and organizational performance," *J Bus Res*, vol. 70, pp. 308–317, Jan. 2017, doi: 10.1016/J.JBUSRES.2016.08.004.

[23] M. M. Queiroz, R. Telles, and S. H. Bonilla, "Blockchain and supply chain management integration: a systematic review of the literature," *Supply Chain Management: An International Journal*, vol. 25, no. 2, pp. 241–254, Feb. 2020, doi: 10.1108/SCM-03-2018-0143.

[24] K. M. Eisenhardt and J. A. Martin, "Dynamic capabilities: what are they?," *Strategic Management Journal*, vol. 21, no. 10–11, pp. 1105–1121, Oct. 2000, doi: 10.1002/1097-0266(200010/11)21:10/11<1105::AID-SMJ133>3.0.CO;2-E.

[25] B. Wernerfelt, "A resource-based view of the firm," *Strategic Management Journal*, vol. 5, no. 2, pp. 171–180, Apr. 1984, doi: 10.1002/SMJ.4250050207;CTYPE:STRING:JOURNAL.

[26] D. J. Teece, "A dynamic capabilities-based entrepreneurial theory of the multinational enterprise," *J Int Bus Stud*, vol. 45, no. 1, pp. 8–37, 2014, doi: 10.1057/JIBS.2013.54.

[27] K. Jagan Mohan Reddy, A. Neelakanteswara Rao, and L. Krishnanand, "A review on supply chain performance measurement systems," *Procedia Manuf*, vol. 30, pp. 40–47, Jan. 2019, doi: 10.1016/J.PROMFG.2019.02.007.

[28] J. Barney, "Firm Resources and Sustained Competitive Advantage," *J Manage*, vol. 17, no. 1, pp. 99–120, 1991, doi: 10.1177/014920639101700108.

[29] J. Sanchez, "Number of enterprises by size Honduras| Statista," Economy & Politics. Accessed: Aug. 01, 2025. [Online]. Available: https://www.statista.com/statistics/1023220/honduras-number-enterprises-size/

[30] Statista Research Department, "Share of micro, small and medium-sized enterprises Central America & Caribbean| Statista," Economy & Politics. Accessed: Aug. 01, 2025. [Online]. Available: https://www.statista.com/statistics/1023126/micro-small-medium-sized-enterprises-central-america-caribbean/

[31] R. Lee, "The Effect of Supply Chain Management Strategy on Operational and Financial Performance," *Sustainability 2021, Vol. 13, Page 5138*, vol. 13, no. 9, p. 5138, May 2021, doi: 10.3390/SU13095138.