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# Logistics Management Practices of Selected Firms in Andhra Pradesh: An Empirical Study of Retail, Courier, and E-Commerce Sectors

**1.ABRAHAM GUTTULA**
Research Scholar
Acharya Nagarjuna University
Guntur, A.P.,India
Assistantprofessor
Aditya Degree and PG College for Women, Kakinada,

**2. Dr J. REVATHY** ,
PRINCIPAL,
V.R.S & Y.R.N COLLEGE
CHIRALA, A.P., India

***Abstract***
*This paper examines the logistics management practices adopted by selected organized firms operating in Andhra Pradesh, India. Drawing on a proportionate stratified sample of 250 respondents from three firm categories — Retail Stores (MORE, Reliance Smart, D-Mart), Courier Service Providers (DTDC, Blue Dart, Delhivery), and E-Commerce Companies (Amazon, Flipkart, Meesho) — the study investigates key logistics dimensions including inventory management, warehouse operations, transportation and routing, technology adoption, last-mile delivery, and returns management. Descriptive statistics, one-way ANOVA, and multiple regression analysis are employed to identify significant differences across firm types and to determine the predictors of logistical performance. Findings reveal that technology adoption, supplier coordination, and last-mile delivery practices differ significantly across firm categories, while inventory management and order fulfilment practices emerge as strong predictors of overall logistics performance. The study contributes to the body of knowledge on logistics management in emerging market contexts and offers actionable implications for industry practitioners and policy makers.*

***Keywords:*** *Logistics Management, Supply Chain, Retail, E-Commerce, Courier Services, Andhra Pradesh, ANOVA, Regression*

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## I. INTRODUCTION

Efficient logistics management has emerged as a strategic lever for competitive differentiation in the contemporary business environment. In rapidly growing economies such as India, the logistics sector underpins the seamless movement of goods across increasingly complex supply chains that span retail, courier, and e-commerce domains. The state of Andhra Pradesh, with its expanding industrial corridors and burgeoning consumer markets, presents a particularly fertile context in which to examine how firms organise and optimise their logistics functions.

The proliferation of organised retail chains, the exponential growth of e-commerce platforms, and the consolidation of third-party courier networks have collectively transformed logistics from a back-office operational concern to a front-line strategic priority. Yet, despite the economic significance of this transformation, empirical evidence documenting how different firm types practise logistics management in the Indian context remains sparse. Most existing studies are either sector-specific or focus predominantly on metropolitan supply chains, leaving the practices of firms in state-level markets relatively underexplored.

Against this backdrop, the present study aims to provide a systematic empirical assessment of logistics management practices across three categories of organised firms in selected districts of Andhra Pradesh. By drawing comparisons across retail stores, courier service providers, and e-commerce companies, the study seeks to illuminate commonalities, divergences, and determinants of logistics performance. The findings are expected to be of value to managers seeking to benchmark their practices, as well as to researchers and policy makers interested in strengthening the regional logistics ecosystem.

### 1.1 Research Objectives

- To assess the extent and quality of logistics management practices across retail, courier, and e-commerce firms in Andhra Pradesh.
- To determine whether significant differences exist in logistics management dimensions across the three categories of firms.
- To identify the key logistics practice dimensions that predict overall logistics performance.
- To offer evidence-based recommendations for improving logistics management in the selected firm categories.

### 1.2 Research Hypotheses

The following null hypotheses are tested in this study:

- H01: There is no significant difference in logistics management practices across retail stores, courier service providers, and e-commerce companies.
- H02: The selected logistics practice dimensions do not significantly predict overall logistics performance.

## II. LITERATURE REVIEW

The academic literature on logistics management has evolved considerably over the past three decades, transitioning from a narrow operational focus on transportation and warehousing to a broader strategic orientation encompassing supply chain integration, customer responsiveness, and digital transformation. Christopher (2016) defined logistics management as the process of strategically managing the procurement, movement, and storage of materials, parts, and finished inventory — and the related information flows — through the organisation and its marketing channels, in such a way that current and future profitability is maximised through cost-effective fulfilment of orders.

In the Indian context, a number of studies have highlighted the challenges and opportunities inherent in logistics management. Sahay and Mohan (2003) identified infrastructure deficits and fragmented supply chains as major constraints on logistics efficiency in India, while Narayanan (2019) documented the transformative impact of e-commerce on last-mile delivery networks. Kumar and Singh (2020) compared logistics practices in organised retail chains and found that larger chains demonstrated superior inventory management and technology adoption, partly as a result of scale economies and standardised operating procedures.

With respect to courier and third-party logistics (3PL) providers, studies by Rajan et al. (2018) and Mehta and Bhatt (2021) have emphasised the centrality of route optimisation, delivery density, and real-time tracking in driving service quality and cost efficiency. The emergence of platform-based e-commerce models has further disrupted conventional courier operations by imposing new performance standards around delivery speed, returns management, and end-customer communication.

Technology adoption in logistics has received growing scholarly attention. Wang et al. (2022) demonstrated that implementation of Warehouse Management Systems (WMS) and Transport Management Systems (TMS) significantly enhanced order fulfilment accuracy and reduced operational costs in multi-channel retail environments. Despite these advances, Sharma and Rao (2021) cautioned that technology benefits are not uniformly realised across firm categories, and depend critically on organisational readiness, workforce capability, and integration with upstream supply chain partners.

A notable gap in the extant literature pertains to comparative empirical studies that span multiple firm categories within a single regional market. The present study addresses this gap by examining retail stores, courier firms, and e-commerce companies within a unified analytical framework, thereby enabling cross-sector comparisons grounded in a consistent measurement instrument.

## III. RESEARCH METHODOLOGY

### 3.1 Research Design

The study adopts a descriptive-cum-analytical research design. A structured questionnaire was employed to collect primary data from logistics and support staff employed by the selected firms. The questionnaire was developed drawing on established scales in the logistics and supply chain management literature, and was pre-tested with a pilot sample of 20 respondents before being finalised.

### 3.2 Sampling Design and Data Collection

The study population comprised the logistics and support staff of three categories of organised firms operating in selected regions of Andhra Pradesh. A proportionate stratified random sampling technique was employed to ensure adequate representation from each firm category. For the purpose of the present paper, a sub-sample of 250 respondents is drawn from the larger thesis sample, maintaining the proportionate distribution across firm types. Table 1 presents the sample composition.

**Table 1: Sample Composition by Firm Category**

| Type of Firm | Sample (n) | Percentage (%) |
|---|---|---|
| Retail Stores (MORE, Reliance Smart, D-Mart) | 73 | 30.8% |
| Courier Service Providers (DTDC, Blue Dart, Delhivery) | 96 | 38.4% |
| E-Commerce Companies (Amazon, Flipkart, Meesho) | 81 | 32.4% |
| **Total** | **250** | **100%** |

Source: Primary Data

Data were collected through personal visits to the firm branches during a period of three months. Respondents were assured of confidentiality, and completed questionnaires were screened for completeness before being included in the analysis.

### 3.3 Measurement Instrument

The questionnaire comprised two sections. Section A gathered demographic and firm-specific information, while Section B measured respondents' perceptions of ten logistics management practice dimensions on a five-point Likert scale (1 = Strongly Disagree to 5 = Strongly Agree). The dimensions assessed were: Inventory Management, Warehouse Operations, Transportation and Routing, Order Fulfilment Accuracy, Supplier Coordination, Technology Adoption (WMS/TMS), Last-Mile Delivery, Returns Management, Cost Efficiency, and Customer Satisfaction (Logistics). The overall reliability of the instrument, as measured by Cronbach's Alpha, was 0.87, indicating satisfactory internal consistency.

### 3.4 Data Analysis Techniques

Data were analysed using IBM SPSS Statistics (Version 26). Descriptive statistics (mean and standard deviation) were computed for each dimension. One-way Analysis of Variance (ANOVA) was used to test for significant differences in logistics practice scores across the three firm categories. Post-hoc Tukey's HSD tests were conducted where significant main effects were observed. Multiple linear regression analysis was employed to identify the significant predictors of overall logistics performance. Statistical significance was set at $p < 0.05$.

## IV. RESULTS AND DISCUSSION

### 4.1 Descriptive Statistics of Logistics Management Practices

Table 2 presents the mean scores and standard deviations for each of the ten logistics management practice dimensions across the combined sample. Mean scores are interpreted as follows: 1.00–2.49 = Low; 2.50–3.49 = Moderate; 3.50–5.00 = High.

**Table 2: Descriptive Statistics of Logistics Management Practice Dimensions (N = 250)**

| Logistics Practice Dimension | Mean | Std. Dev. | Level |
|---|---|---|---|
| Inventory Management | 3.84 | 0.71 | High |
| Warehouse Operations | 3.76 | 0.78 | High |
| Transportation & Routing | 3.69 | 0.82 | High |
| Order Fulfillment Accuracy | 3.91 | 0.66 | High |
| Supplier Coordination | 3.55 | 0.89 | Moderate |
| Technology Adoption (WMS/TMS) | 3.48 | 0.93 | Moderate |
| Last-Mile Delivery | 3.63 | 0.85 | High |

| | | | |
|---|---|---|---|
| Returns Management | 3.42 | 0.97 | Moderate |
| Cost Efficiency | 3.71 | 0.79 | High |
| Customer Satisfaction (Logistics) | 3.88 | 0.68 | High |

Source: Primary Data

The results indicate that the majority of logistics management dimensions are rated at a high level by respondents. Order Fulfilment Accuracy recorded the highest mean score (M = 3.91, SD = 0.66), followed by Customer Satisfaction (M = 3.88, SD = 0.68) and Inventory Management (M = 3.84, SD = 0.71). These findings suggest that the selected firms have invested considerably in ensuring accurate and timely order processing and in maintaining customer-centric logistics services. Returns Management received the lowest mean score (M = 3.42, SD = 0.97), indicating that reverse logistics practices remain a relative weakness — a finding consistent with broader literature on the nascent state of returns management in Indian logistics contexts (Kumar and Singh, 2020).

Technology Adoption registered a mean score of 3.48 (SD = 0.93), placing it at the higher boundary of the moderate range, reflecting heterogeneous uptake of WMS and TMS solutions across the sampled firms. This variability is likely attributable to differences in organisational scale and digital readiness across firm types.

**4.2 One-Way ANOVA: Differences Across Firm Categories**

To test H01 — that there is no significant difference in logistics management practices across the three firm categories — one-way ANOVA was conducted for each dimension. The results are presented in Table 3.

**Table 3: One-Way ANOVA Results by Firm Category**

| Dimension | F-Value | p-Value | Result |
|---|---|---|---|
| Inventory Management | 4.21 | 0.038* | Significant |
| Warehouse Operations | 3.87 | 0.022* | Significant |
| Transportation & Routing | 5.14 | 0.006** | Highly Significant |
| Order Fulfillment Accuracy | 2.98 | 0.052 | Not Significant |
| Supplier Coordination | 6.33 | 0.002** | Highly Significant |
| Technology Adoption | 8.47 | 0.000** | Highly Significant |
| Last-Mile Delivery | 5.78 | 0.003** | Highly Significant |
| Returns Management | 4.56 | 0.011* | Significant |
| Cost Efficiency | 3.12 | 0.045* | Significant |
| Customer Satisfaction | 2.64 | 0.073 | Not Significant |

Note: * $p < 0.05$; ** $p < 0.01$. df between = 2; df within = 247.

Source: Primary Data (SPSS Output)

The ANOVA results reveal statistically significant differences across the three firm categories for eight of the ten dimensions. Technology Adoption yielded the highest F-value ($F = 8.47$, $p < 0.001$), indicating that e-commerce companies have substantially more advanced technology adoption compared to retail stores and courier firms — a finding consistent with the platform-driven digital imperatives of the e-commerce sector. Supplier Coordination ($F = 6.33$, $p = 0.002$) and Last-Mile Delivery ($F = 5.78$, $p = 0.003$) also showed highly significant differences, with courier firms and e-commerce companies demonstrating markedly stronger practices than retail stores.

Two dimensions — Order Fulfilment Accuracy ($p = 0.052$) and Customer Satisfaction ($p = 0.073$) — did not yield significant differences across firm categories, suggesting a degree of convergence in these outcome-oriented practices irrespective of firm type. H01 is therefore partially rejected: significant differences exist across the three categories for the majority of logistics management dimensions.

**4.3 Multiple Regression Analysis: Predictors of Logistics Performance**

To test H02, a multiple linear regression analysis was conducted with the composite logistics performance score as the dependent variable and the ten logistics practice dimensions as independent variables. Following assessment of multicollinearity (all VIF values < 3.5), six predictors were retained in the final model. The model explained 67.4% of the variance in logistics performance ($R^2 = 0.674$, Adjusted $R^2 = 0.661$, $F(6,243) = 83.76$, $p < 0.001$). Table 4 presents the regression coefficients.

**Table 4: Multiple Regression Analysis — Predictors of Logistics Performance**

| Predictor Variable | β | Std. Error | t-Value | p-Value |
|---|---|---|---|---|
| **Constant** | 0.812 | 0.143 | 5.683 | 0.000** |
| Inventory Management | 0.234 | 0.062 | 3.774 | 0.001** |
| Warehouse Operations | 0.189 | 0.071 | 2.662 | 0.009** |
| Technology Adoption | 0.298 | 0.058 | 5.138 | 0.000** |
| Last-Mile Delivery | 0.211 | 0.066 | 3.197 | 0.002** |
| Returns Management | 0.143 | 0.074 | 1.932 | 0.055 |
| Supplier Coordination | 0.176 | 0.069 | 2.551 | 0.012* |

Note: * $p < 0.05$; ** $p < 0.01$. Dependent variable: Composite Logistics Performance Score.
Source: Primary Data (SPSS Output). $R^2 = 0.674$; Adjusted $R^2 = 0.661$; $F = 83.76$, $p < 0.001$.

Technology Adoption emerged as the strongest predictor of logistics performance ($\beta = 0.298$, $p < 0.001$), underscoring the critical role of digital systems in driving operational efficiency across all firm categories. Inventory Management ($\beta = 0.234$, $p = 0.001$) and Last-Mile Delivery ($\beta = 0.211$, $p = 0.002$) were the next most influential predictors. Warehouse Operations ($\beta = 0.189$, $p = 0.009$) and Supplier Coordination ($\beta = 0.176$, $p = 0.012$) also contributed significantly to the model. Returns Management, while not achieving statistical significance at the 5% level ($\beta = 0.143$, $p = 0.055$), exhibited a trend suggesting that improvements in reverse logistics could yield meaningful performance gains.

The regression findings lead to partial rejection of H02: the majority of logistics practice dimensions — particularly Technology Adoption, Inventory Management, and Last-Mile Delivery — are significant predictors of overall logistics performance. Firms that invest in these practices are better positioned to achieve superior logistical outcomes.

## V. DISCUSSION

The findings of this study carry several important implications for both theory and practice. From a theoretical standpoint, the results affirm the multi-dimensional nature of logistics management and corroborate the proposition that firm-type characteristics shape the configuration and intensity of logistics practices (Christopher, 2016). The superior technology adoption scores observed among e-commerce firms align with platform economics theory, wherein digital-first business models necessitate robust technological infrastructure to manage the velocity and variability of customer demand.

The significance of last-mile delivery as both a differentiator across firm categories and a predictor of performance is particularly noteworthy given the geographical diversity and infrastructure constraints of the Andhra Pradesh market. Courier firms, which serve as the primary executors of last-mile delivery across all three firm categories, may find it strategically beneficial to invest in route optimisation technologies, dynamic scheduling tools, and granular delivery analytics.

The convergence observed in Order Fulfilment Accuracy and Customer Satisfaction across firm types suggests that competitive pressures in the market have compelled firms to attain a baseline standard of performance in these outcome dimensions, irrespective of their organisational form or scale. This finding has implications for logistics benchmarking: firms may need to look beyond these widely adopted practices and focus on the differentiating dimensions — namely technology adoption, supplier coordination, and last-mile delivery — to achieve competitive advantage.

The relatively lower scores for Returns Management across all firm categories suggest a systemic gap in reverse logistics infrastructure in the region. This finding is especially pertinent for e-commerce firms, where product returns are integral to the customer experience and their management directly impacts profitability and brand equity.

## VI. CONCLUSION AND IMPLICATIONS

This study provides an empirical assessment of logistics management practices among 250 respondents drawn from three categories of organised firms in Andhra Pradesh. The findings demonstrate that logistics management is practised at a generally high level, with Order Fulfilment Accuracy and Customer Satisfaction recording the highest scores, and Returns Management representing the most significant area for improvement.

One-way ANOVA results confirm that significant differences exist across retail stores, courier service providers, and e-commerce companies in the majority of logistics dimensions, with technology adoption showing the greatest inter-category variation. Multiple regression analysis identifies Technology Adoption, Inventory Management, and Last-Mile Delivery as the key predictors of logistics performance, collectively explaining a substantial proportion of performance variance.

### 6.1 Managerial Implications

- Firm managers should prioritise investments in WMS and TMS platforms to enhance technology adoption and thereby improve overall logistics performance.
- Retail stores, which lag behind e-commerce companies on technology adoption and last-mile delivery, should explore digital upskilling and partnerships with technology vendors.
- All firm categories should develop structured returns management protocols, including reverse logistics networks and clear customer return policies, to address the identified performance gap.
- Supplier coordination practices should be formalised through collaborative planning and information-sharing agreements to reduce supply chain variability.

### 6.2 Policy Implications

- State and district-level logistics policy frameworks in Andhra Pradesh should incorporate provisions for technology infrastructure subsidies for small and medium logistics operators.
- Industry associations should facilitate knowledge-sharing platforms where best practices in last-mile delivery and returns management can be disseminated across firm categories.

### 6.3 Limitations and Future Research

This study is limited to selected districts of Andhra Pradesh, which may constrain the generalisability of the findings to other regions of India. The cross-sectional design precludes causal inferences. Future research may employ longitudinal designs to trace changes in logistics practices over time, and may extend the comparative framework to include 3PL and omni-channel retail firms. Qualitative case studies exploring the organisational and cultural determinants of logistics performance would complement the quantitative insights presented here.

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