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From Third-Party to Fourth-Party Logistics: Vendor-Side Operational Challenges in 3PL as a Case for 4PL Integration

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Abstract: *Third-party logistics (3PL) has become the operational backbone of modern supply chains, especially as e-commerce and global trade expand the volume and complexity of order fulfilment. While a large body of research examines 3PL performance through the eyes of the customer, comparatively little work addresses the operational realities faced by the vendors who actually execute transportation, warehousing, and last-mile delivery — or asks what those realities imply for the next stage of logistics outsourcing evolution, Fourth-Party Logistics (4PL).*

This paper reports the findings of a descriptive field study conducted in Coimbatore, India, using a structured questionnaire administered to 150 respondents — 75 customers and 75 vendors selected through purposive sampling. Percentage and ranking analyses were used to identify and prioritise the operational challenges that affect service delivery. The results show that delivery delays, weak tracking systems, and high logistics costs are the most pressing problems on both sides of the relationship, while vendors additionally report cost pressure, manpower shortages, and limited technology adoption as recurring constraints, and more than half of vendors already coordinate with more than two 3PL providers at once.

The paper argues that these findings — persistent fragmentation, tracking gaps, and multi-provider coordination without a unifying layer — describe precisely the conditions that a 4PL integrator model is designed to resolve. It concludes by outlining a pathway through which firms currently relying on multiple, uncoordinated 3PL vendors can move toward a 4PL arrangement, in which a single strategic partner orchestrates technology, tracking, and multiple execution-level 3PL providers on the client's behalf.

Keywords: *Third-Party Logistics (3PL); Fourth-Party Logistics (4PL); supply chain outsourcing; vendor operations; customer fulfilment; logistics integration; e-commerce logistics.*

I. INTRODUCTION

Logistics efficiency has become a decisive factor in business competitiveness. As global trade expands and e-commerce reshapes retail, firms are under constant pressure to move goods faster, more cheaply, and more reliably than before. Building and maintaining an in-house logistics network — fleets, warehouses, technology platforms, and trained manpower — is capital-intensive, and many firms therefore choose to outsource these functions to specialised Third-Party Logistics (3PL) providers. A 3PL vendor typically manages transportation, warehousing, packaging, inventory control, distribution, and reverse logistics on behalf of a client, allowing the client to concentrate on production, marketing, and innovation.

The benefits of 3PL outsourcing are well documented from the client and customer side: cost savings through economies of scale, access to specialised expertise and technology, faster market entry, and improved delivery visibility. What is far less studied is the operational experience of the vendor itself. Vendors absorb rising fuel and labour costs, contend with inadequate road and warehouse infrastructure, struggle to recruit and retain skilled staff, and are expected to adopt tracking and automation systems that require significant upfront investment. At the same time, customers continue to demand shorter delivery windows, real-time visibility, and damage-free handling. When vendors are unable to meet these expectations, the result is delayed deliveries, damaged goods, higher costs, and ultimately customer dissatisfaction — a failure that is often attributed to the '3PL provider' as a category rather than traced to its underlying operational cause.

This paper addresses that gap by studying 3PL operations simultaneously from the vendor's and the customer's point of view. It asks three linked questions: what operational challenges do 3PL vendors actually face day to day; how do these challenges translate into fulfilment problems that customers notice; and what practical steps can narrow the distance between the two. The study is set in

Coimbatore, a mid-sized Indian industrial and commercial hub with an active e-commerce seller base, making it a useful microcosm of the pressures facing 3PL operations across emerging markets.

A further motivation for this paper is to read the 3PL-level findings as evidence for a broader industry question: when does it make sense for a firm to move beyond individual 3PL contracts toward a Fourth-Party Logistics (4PL) arrangement, in which a single integrator coordinates technology, tracking, and multiple execution-level 3PL providers on the client's behalf? Because the survey already shows vendors juggling multiple 3PL relationships and both sides reporting the same coordination and tracking gaps, the data collected here doubles as a diagnostic for whether — and why — 4PL integration is becoming operationally necessary. Section 8 returns to this question directly once the 3PL-level evidence has been presented.

II. REVIEW OF LITERATURE

- 1) A consistent theme across two decades of 3PL research is that coordination and communication failures between vendors and their clients erode service quality; strengthening contract clarity and performance measurement systems has repeatedly been shown to improve outcomes for both sides of the relationship. Large-scale industry surveys of 3PL providers have similarly found that cost pressure, the need for continuous technology investment, and rising customer service expectations are the central adaptive challenges vendors face, with digital transformation and strategic partnerships offered as the standard remedy.
- 2) Country-specific work on Indian 3PL operations points to infrastructural constraints — inadequate road networks, traffic congestion, and regulatory friction — as major sources of delivery delay and reduced reliability, suggesting that policy support and infrastructure investment would meaningfully improve fulfilment outcomes. Parallel studies on technology adoption report that the absence of integrated warehouse and transportation management systems produces poor tracking and inventory inaccuracy, which in turn damages customer trust; conversely, vendors who adopt such systems see measurable gains in operational accuracy.
- 3) Several studies isolate specific operational sub-systems. Work on warehousing and transport operations traces bottlenecks to poor layout design, labour shortages, and vehicle capacity limits, recommending process reengineering and workforce planning. Studies of service quality highlight inconsistency and communication gaps as recurring sources of customer dissatisfaction, arguing for structured service-level agreements and regular performance review. Research focused on e-commerce logistics specifically finds that high order volumes and last-mile delivery pressure are a distinct source of operational stress, calling for route optimisation and more realistic delivery scheduling.
- 4) A second cluster of studies examines the human and cost dimensions of 3PL operations. Labour-focused research links shortages of trained manpower to higher error rates and lower productivity, while cost-focused studies show that thin margins and rising fuel prices frequently force vendors to trade off service quality against cost control. Studies of customer fulfilment performance find that operational reliability is the strongest single predictor of customer satisfaction, and training-focused research confirms that structured employee training programmes reduce handling errors and delays.
- 5) More recent work extends the discussion to risk management, transparency, and future readiness. Risk and disruption studies argue that weak contingency planning amplifies the impact of vehicle breakdowns, strikes, and system failures, while complaint-analysis studies trace most customer complaints back to delivery delay and poor communication, recommending proactive, real-time updates. Industry reports from 2025 converge on resilience, scalability, and customer-centric automation as the defining future challenges for the sector, echoing the operational themes — cost, technology, manpower, and coordination — that recur throughout the academic literature. Taken together, the literature establishes that vendor-side operational performance is the proximate cause of most customer-facing fulfilment problems, which justifies a research design that captures both perspectives directly, as this study does.
- 6) A smaller but relevant strand of the literature distinguishes 3PL from Fourth-Party Logistics (4PL), a model in which an integrator — often asset-light itself — takes strategic responsibility for a client's entire supply chain and subcontracts execution to one or more 3PL providers, coordinating them through a shared technology and information layer. Where a 3PL vendor is judged on its own transportation, warehousing, or delivery performance, a 4PL provider is judged on how well it orchestrates multiple such vendors into a single, transparent, accountable service. This distinction becomes directly relevant once the present study's findings are examined: several of the problems reported by both customers and vendors — fragmented tracking, inconsistent service across providers, and coordination gaps — are precisely the structural issues that the 4PL model was designed to solve.

III. RESEARCH METHODOLOGY

The study statement of the problem centres on a gap in the literature: most existing 3PL research is written from the customer or industry vantage point, with very little Indian-context research connecting vendor-side operational challenges to customer fulfilment outcomes directly. This study was designed to close that gap.

A. Objectives

- To identify the key operational challenges faced by 3PL vendors in day-to-day logistics operations.
- To analyse the impact of these operational challenges on vendors' ability to fulfil customer needs.
- To explore the relationship between vendor operational efficiency and customer satisfaction levels.
- To suggest strategies for overcoming operational challenges and enhancing customer fulfilment in the 3PL sector.

B. Design and Data Collection

A descriptive research design was adopted. Primary data were collected through a structured, self-administered questionnaire; secondary data were drawn from published articles, industry reports, and websites. Respondents were selected using purposive (non-probability) sampling from within Coimbatore city. The total sample comprised 150 respondents, split evenly between 75 customers and 75 vendors, each group completing a separate questionnaire tailored to its perspective. Percentage analysis and ranking analysis were the principal statistical tools used to interpret the responses.

C. Limitations

The findings should be read with several limitations in mind: the study is geographically confined to one city and cannot be generalised to other regions; the sample of 150 respondents, while adequate for descriptive analysis, is modest relative to the scale of the logistics sector; data collection took place within a short time frame; responses depend on participants' self-reported perceptions and may carry personal bias; and the logistics industry itself is evolving quickly, which may shorten the shelf life of some findings.

IV. PROFILE OF 3PL OPERATIONS: CONTEXT FOR THE FINDINGS

Before turning to the survey results, it is useful to summarise the operating environment in which vendors work, since this frames why particular challenges surface as they do. 3PL vendors typically perform ten interlinked functions: transportation management, warehousing and storage, inventory management, order processing and fulfilment, packaging and material handling, last-mile delivery, reverse logistics, technology and information management, documentation and compliance, and customer relationship management. Each function is shaped by its own set of operational pressures — cost pressure from fuel, wages and rent; infrastructure limitations in roads, ports and warehouse space; manpower and skill shortages; the cost and complexity of adopting Warehouse and Transportation Management Systems; strict service-level expectations from customers; regulatory compliance burdens; intense market competition; seasonal demand variability; the need for close coordination with client firms; and exposure to unplanned disruptions.

These pressures explain the trade-offs vendors report in the survey: outsourcing brings clients cost efficiency, access to expertise, scalability, and risk-sharing, but it also creates a loss of direct control, dependency on the vendor's own resilience, communication friction, hidden costs, data-security exposure, and variability in service quality. Documentation such as service-level agreements, purchase orders, goods receipt notes, bills of lading, e-way bills, and proof-of-delivery records both enable and constrain vendor operations, since every additional compliance requirement adds processing time even as it protects accountability.

V. DATA ANALYSIS AND DISCUSSION

A. Respondent Profile

Among the 75 customer respondents, 54.7% were male and 45.3% female; 52% were aged 21–30, and 40% held a postgraduate qualification, indicating that the typical 3PL customer in this sample is a young, well-educated adult. Occupationally, students (40%) and salaried employees (33.3%) dominated, and 38.7% reported a monthly income below ₹20,000, pointing to a price-sensitive customer base. E-commerce platforms such as Amazon and Flipkart were the primary channel through which 58.7% of customers first learned about 3PL services, and most respondents (38.7%) use such services only monthly rather than daily or weekly.

Among the 75 vendor respondents, 60% were male and 40% female, with a fairly even age spread (32% below 30, and the remaining respondents distributed across older brackets). Vendors were educationally diverse, with postgraduates the largest single group (25.3%). E-commerce sellers formed the largest business-type category (25.3%), and vendor experience was well distributed across less-than-1-year, 1–5-year, 6–10-year, and above-10-year bands, suggesting the sample captured both new entrants and established operators. Notably, 52% of vendors work with more than two 3PL providers simultaneously, indicating that multi-sourcing rather than single-provider dependency is now the norm.

B. Ranking of Customer-Reported Challenges

When asked to identify the challenges they had personally experienced with 3PL services, customers ranked delay in delivery as the most significant problem (46.7%), followed by lack of proper tracking (44%) and high delivery charges (41.1%); damaged products (37.3%) and poor customer service (20%) were reported as comparatively less frequent. When customers ranked the factors that most influence their overall satisfaction, cost of delivery emerged as the single most influential factor (54%), ahead of tracking facility (50%), product safety and packaging (42%), and delivery speed and customer service response (41% each).

Factor (customer-reported)	Score (%)	Rank
Delay in delivery	46.7	1
Lack of proper tracking	44.0	2
High delivery charges	41.1	3
Damaged products	37.3	4
Poor customer service	20.0	5

On a five-point agreement scale, customers most strongly endorsed the statement that '3PL services are reliable', followed by 'good value for money'; willingness to pay more for faster delivery ranked third, while confidence in delivery-staff professionalism and in vendors' ability to handle fragile items ranked lowest. This pattern suggests that customers already trust the basic reliability of 3PL delivery but remain unconvinced about the human and handling dimensions of the service.

C. Ranking of Vendor-Reported Challenges

From the vendor side, transportation (25.3%) and inventory management (22.7%) were the most heavily used 3PL service categories, ahead of last-mile delivery (18.7%), warehousing (17.3%), and reverse logistics (16%). When selecting a 3PL partner, vendors ranked cost efficiency first, followed by delivery speed, network coverage, reliability and trust, and — ranked last — technology and tracking support, a finding that suggests price and speed still dominate vendor decision-making even as digital capability lags in perceived importance.

Challenge (vendor-reported)	Score (%)	Rank
Delayed deliveries	31.0 (41.3% of respondents)	1
Poor customer service	30.0 (40.0%)	2
High logistics cost	29.0 (38.7%)	3 (tie)
Lack of transparency / tracking	29.0 (38.7%)	3 (tie)
Damaged goods	29.0 (38.7%)	3 (tie)
Limited coverage in remote areas	26.0 (34.7%)	6

On the agreement statements, vendors strongly agreed that 3PL support reduces their company's operational burden — the single most endorsed statement — followed by agreement that logistics costs charged are reasonable and that available tracking technology is broadly sufficient. Agreement was more moderate on whether goods are properly handled, and lowest — though still notable — on whether delays directly damage customer retention, indicating that vendors are aware of, but do not treat as decisive, the link between operational delay and lost customers.

D. Reading the Two Perspectives Together

The customer and vendor datasets converge on the same two leading problems: delivery delay and inadequate tracking or transparency. This convergence is the study's central empirical finding — it shows that the fulfilment gap customers experience is not a perception problem but a direct mirror of the operational constraints vendors themselves report. Where the two perspectives diverge is on cost: customers rank cost of delivery as their single most decisive satisfaction factor, while vendors, though also cost-conscious in partner selection, are more preoccupied with delay and service consistency. This suggests that cost and speed cannot be optimised independently; a vendor that cuts costs by understaffing or under-investing in tracking technology will most likely reproduce the very delay and transparency problems that customers rank highest.

VI. KEY FINDINGS

A. Customer Findings

- Delay in delivery is the most serious and most frequently experienced problem, ahead of tracking gaps and high delivery charges.
- Cost of delivery is the strongest single driver of overall satisfaction with 3PL services, ahead of tracking, packaging, delivery speed, and customer service.
- Customers generally view 3PL services as reliable and reasonably priced, but have comparatively low confidence in the professionalism of delivery staff and in the safe handling of fragile items.
- E-commerce platforms are the dominant channel through which customers first encounter 3PL services, reflecting the sector's deep integration with online retail.

B. Vendor Findings

- Delivery delay is also the top-ranked challenge from the vendor's own side, followed closely by perceived weaknesses in customer service.
- Cost efficiency is the dominant criterion vendors use when choosing which 3PL partner to work with, ahead of delivery speed and network coverage.
- More than half of vendors now work with more than two 3PL providers, indicating a shift away from single-provider dependency toward deliberate multi-sourcing to manage risk.
- Vendors broadly agree that 3PL arrangements reduce their operational burden and that current logistics costs and tracking technology are reasonably adequate, but they are less convinced that goods handling is consistently proper.

C. Cross-Cutting Finding

The single most important cross-cutting finding is that delivery delay and weak tracking are simultaneously the top vendor-side operational challenge and the top customer-side satisfaction problem. This alignment indicates that interventions aimed at the vendor's operational core — route planning, fleet capacity, and real-time tracking infrastructure — will have the most direct and measurable effect on customer satisfaction, more so than interventions aimed only at the customer-facing layer of the service (such as complaint handling or communication scripts).

VII. SUGGESTIONS FOR STRENGTHENING 3PL OPERATIONS

- 1) Improve on-time delivery performance through better route planning, load consolidation, and closer coordination between vendors and client firms.
- 2) Introduce or upgrade real-time tracking systems with regular customer-facing status updates to close the transparency gap identified on both sides of the survey.

- 3) Control and reduce logistics costs through operational efficiency and selective automation, rather than through cuts that compromise service quality, since cost and delay are shown to move together rather than as a simple trade-off.
- 4) Invest in packaging quality and material-handling practice to reduce damage rates, particularly for fragile items, where customer confidence is currently weakest.
- 5) Provide structured training for delivery and warehouse staff to improve professionalism, handling accuracy, and consistency of service.
- 6) Strengthen customer-service response capacity, including faster complaint resolution, since poor customer service is the second-ranked vendor-side challenge.
- 7) Adopt Warehouse Management Systems, Transportation Management Systems, and data analytics tools in a phased manner suited to vendor scale, to close the technology gap without requiring prohibitive upfront investment.
- 8) Formalise communication channels and service-level agreements between vendors, client firms, and customers regarding delivery status and exceptions.
- 9) Expand network coverage into remote and semi-urban areas, which vendors and customers both flag as an underserved area.
- 10) Establish routine performance monitoring against agreed service-level benchmarks to sustain consistency over time rather than treating improvements as one-off fixes.

VIII. TOWARD FOURTH-PARTY LOGISTICS (4PL): READING THE FINDINGS AS A CASE FOR INTEGRATION

The suggestions in Section 7 improve 3PL performance within the existing structure of the relationship — one client, one or more independent 3PL vendors, each managed separately. But three findings from this study point past incremental fixes toward a structural question: is the 3PL model itself, as currently organised, reaching its limits for these vendors and their clients?

A. *Why the Data Points Toward 4PL*

- 1) Multi-provider fragmentation without integration: 52% of vendors already work with more than two 3PL providers, yet the survey shows no corresponding technology or coordination layer tying those providers together. Each relationship is managed on its own, which is consistent with a 4PL diagnosis rather than a single-vendor performance problem.
- 2) Tracking and transparency as the shared bottleneck: lack of proper tracking is the second-ranked customer complaint and ties for third among vendor-reported challenges. A 4PL integrator's core function is precisely to unify tracking and information flow across multiple execution partners into one interface, addressing this gap structurally rather than provider-by-provider.
- 3) Cost pressure that cuts across providers: customers rank cost of delivery as their top satisfaction driver, and vendors rank cost efficiency as their top partner-selection criterion. A 4PL model can pool volume and negotiate across several 3PL vendors on the client's behalf, converting fragmented, provider-by-provider cost pressure into a single consolidated negotiation.
- 4) Accountability gaps: when service is inconsistent across more than two providers, customers and client firms have no single point of accountability for an end-to-end failure. A 4PL integrator assumes exactly that accountability, contractually and operationally, on behalf of the client.

B. *What Would Change Under a 4PL Model*

Under a 4PL arrangement, the client firm would no longer directly manage each 3PL relationship. Instead, a single integrator would take strategic responsibility for the whole logistics function: selecting and monitoring the underlying 3PL vendors (including, potentially, the same vendors surveyed in this study), operating a unified tracking and reporting platform across all of them, consolidating cost negotiation and service-level enforcement, and absorbing the coordination burden that currently falls, unevenly, on the vendors themselves. The vendor-side findings reported here — cost pressure, manpower shortages, and limited technology adoption — would not disappear under 4PL, but responsibility for resolving them at the technology and coordination layer would shift from each individual vendor to the integrator, freeing vendors to focus on execution (transportation, warehousing, last-mile delivery) rather than on cross-provider coordination and client-facing reporting.

C. *A Practical Pathway*

- 1) Short term: client firms already working with more than two 3PL providers should prioritise a shared tracking dashboard across those providers before considering a full 4PL transition, since this directly targets the highest-ranked complaint on both sides of the survey.

- 2) Medium term: firms should pilot a 4PL-style arrangement on a single product line or region, using an integrator (in-house or third-party) to coordinate two or three existing 3PL vendors, to test whether consolidation reduces delay and cost variance before committing to a full-scale transition.
- 3) Long term: as order volumes and provider counts grow, firms should formally transition strategic logistics ownership to a 4PL integrator, retaining the best-performing existing 3PL vendors as execution partners under the new coordinating layer rather than replacing them outright.
- 4) This pathway treats 4PL not as a replacement for the 3PL vendors studied here, but as the coordinating layer that the survey data suggests is currently missing — the structural response to problems (tracking fragmentation, multi-provider cost pressure, and accountability gaps) that this study finds are already visible at the 3PL level.

IX. CONCLUSION

This study set out to examine the operational challenges of Third-Party Logistics from the vendor's point of view and to connect those challenges to customer fulfilment outcomes — a link that existing research, particularly in the Indian context, has only partially explored. The evidence gathered from 150 respondents in Coimbatore shows that customers and vendors largely agree on where the problems lie: delivery delay, weak or inconsistent tracking, and cost pressure dominate both perspectives, even though customers foreground cost as the driver of satisfaction while vendors foreground delay and service consistency as the drivers of operational strain.

The practical implication is that 3PL service improvement cannot be pursued as a customer-facing exercise alone. Because the same set of problems — delay, tracking, and cost — surfaces independently in both datasets, the most effective interventions are the ones that address the vendor's underlying operating conditions: route and fleet planning, staff training, packaging standards, and phased technology adoption. Vendors who work on these fundamentals are likely to see improvements in customer satisfaction as a direct consequence, rather than needing to manage customer perception separately from operational reality.

Given the geographic and sample-size limitations of this study, future research could usefully replicate the vendor-customer paired design across multiple cities, incorporate objective performance data (such as actual delivery-time records) alongside self-reported perceptions, and — most directly relevant to the argument developed in Section 8 — empirically compare fulfilment outcomes for client firms operating under traditional multi-3PL arrangements against those that have transitioned to a 4PL integrator model. As e-commerce continues to expand the scale and complexity of logistics demand, and as vendors increasingly work across more than two 3PL providers at once, closing the coordination and tracking gap identified in this study — whether through better-managed 3PL relationships or through a move to 4PL integration — will remain a central determinant of competitiveness in the sector.

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