

Innovations in Last-Mile Delivery: Transforming Urban Courier Logistics in India

N. Ilango¹, Hariharan S²

¹MBA, M.Sc., – Assistant Professor, Department of MBA, Sri Ramakrishna College of Arts & Science, Coimbatore, India

²Student, Department of MBA, Sri Ramakrishna College of Arts & Science, Coimbatore, India

Executive Summary-- Last-mile delivery has emerged as the most critical and challenging aspect of logistics operations in India's rapidly growing e-commerce ecosystem. This research explores how technological innovations and operational strategies are reshaping delivery efficiency, customer satisfaction, and sustainability in urban logistics. Through a comprehensive case study of Franch Express Courier Pvt. Ltd., involving 108 respondents across delivery executives, hub managers, and customers, we demonstrate that the integration of GPS tracking, Electronic Proof of Delivery (EPOD), and route optimization tools has significantly improved delivery performance. Our findings reveal that 76% of customers are satisfied or highly satisfied with delivery services, while strong correlations exist between technology adoption and reduced delivery delays. However, persistent challenges such as traffic congestion, customer unavailability, and address inaccuracies continue to impact efficiency. This article provides actionable insights for logistics firms pursuing digital transformation and sustainability in urban delivery networks.

Keywords-- Last-mile delivery, technological innovation, route optimization, customer satisfaction, urban logistics, sustainability

I. INTRODUCTION

The Indian courier and logistics industry has undergone transformative change over the past two decades, evolving from traditional mail and parcel systems into technologically sophisticated, customer-centric ecosystems. With India's projected logistics market growth at 10–12% CAGR driven by e-commerce expansion and urbanization, the pressure on courier companies to enhance delivery infrastructure has intensified.

Last-mile delivery—the final leg of the logistics journey from distribution centers to customers' doorsteps—represents the most complex and costly segment of supply chains. In urban areas, this challenge is amplified by traffic congestion, narrow delivery windows, parking restrictions, and rising customer expectations for same-day or next-day delivery. These factors have compelled logistics providers to adopt innovative solutions including route optimization, real-time tracking, Electronic Proof of Delivery systems, and green delivery models.

Franch Express Courier Pvt. Ltd., an established South Indian logistics player since 1987, exemplifies how technological integration and process innovation can create competitive advantage in urban delivery networks. Operating across 1,200 branches and 9,000 serviceable locations in Tamil Nadu, Kerala, Karnataka, Andhra Pradesh, Telangana, and Puducherry, the company has strategically invested in digital transformation to balance operational efficiency, cost-effectiveness, and customer satisfaction.

This research investigates how Franch Express's innovations influence delivery efficiency, technology adoption among staff, and customer satisfaction in major Indian cities. By analyzing responses from 80 customers, 18 delivery executives, and 10 hub managers, we identify key success factors and remaining challenges in urban last-mile logistics.

II. LITERATURE REVIEW: EMERGING TRENDS IN LAST-MILE DELIVERY

Recent scholarly research has highlighted several critical trends shaping India's logistics landscape:

Technology-Driven Optimization: Ferreira (2025) and Sharma (2025) demonstrate that AI-powered route optimization and real-time data analytics significantly reduce delivery times and operational costs. Studies by Srinivasan (2022) show 25% improvement in delivery accuracy through GPS and EPOD integration.

Sustainability Imperatives: Mishra & Kaur (2022) and Deloitte India (2021) underscore that electric vehicle adoption can reduce operational costs by 30% while addressing environmental concerns. NITI Aayog (2023) emphasizes government support for green logistics as essential for scalable adoption.

Human Capital: Tata Institute of Social Sciences (2023) and Nair (2021) highlight that workforce management, training, and employee motivation directly impact delivery reliability and customer satisfaction.

Infrastructure Challenges: Rao & Sinha (2018) and Kumar (2024) identify traffic congestion, parcel mismanagement, and inefficient address databases as persistent barriers to timely delivery in Indian metros.

Customer Expectations: Gupta et al. (2020) and EY India (2022) confirm that real-time tracking, digital engagement platforms, and transparent communication significantly enhance customer trust and repeat business.

These trends validate the importance of integrating technology, sustainability, and human development in logistics strategy.

III. FRANCH EXPRESS: OPERATIONAL OVERVIEW AND INNOVATION INITIATIVES

Franch Express Courier Pvt. Ltd. operates a hub-and-spoke distribution model across South India, managing domestic, e-commerce, international, and specialized logistics services. The company's technological ecosystem includes:

GPS-Based Real-Time Tracking: Customers monitor shipments throughout the delivery journey, reducing anxiety and enabling proactive problem-solving.

Electronic Proof of Delivery (EPOD): Digital confirmation systems eliminate manual paperwork, improve accountability, and reduce disputes between senders and receivers.

Route Optimization Tools: Data-driven algorithms plan efficient delivery sequences, minimize fuel consumption, and reduce transit times despite urban congestion.

Automated Label Printing and Barcode Scanning: Warehouse automation reduces sorting errors and accelerates parcel processing.

Digital Payment Systems: Seamless, contactless transactions improve operational fluidity and customer convenience.

IV. RESEARCH METHODOLOGY AND DATA PROFILE

Research Design: This study employed a mixed-methods descriptive approach combining qualitative insights from operational staff with quantitative customer satisfaction data.

Sample Composition: 108 respondents stratified as follows: 80 customers (74.1%), 18 delivery executives (16.7%), and 10 hub managers (9.3%).

Data Collection: Structured questionnaires via Google Forms distributed across WhatsApp, email, and in-person interviews, covering delivery practices, innovations, challenges, and satisfaction metrics.

Analytical Tools: Descriptive statistics, cross-tabulation, Chi-Square tests, correlation analysis, ANOVA, and Cronbach's Alpha reliability testing using Microsoft Excel and SPSS.

Geographic Focus: 87% of respondents from Coimbatore, with representation from eight other Tamil Nadu and Puducherry cities, ensuring urban logistics insights.

Demographics: 70.4% of respondents aged 18–34, indicating tech-savvy customer and employee bases receptive to digital solutions.

V. KEY FINDINGS: TECHNOLOGY IMPACT AND CUSTOMER SATISFACTION

5.1 High Customer Satisfaction Levels

Our analysis reveals that 76% of customers rated overall satisfaction as "satisfied" (rating 4) or "highly satisfied" (rating 5), with a mean satisfaction score of 4.06[1]. Only 10% expressed dissatisfaction, demonstrating strong service performance. Cross-tabulation shows no significant variation in satisfaction across locations, indicating consistent service quality across the company's operational region.

5.2 Technology Adoption and Effectiveness

Electronic Proof of Delivery (EPOD) adoption shows robust integration: 61% of delivery executives use EPOD consistently, with 31% utilizing it sometimes, indicating high organizational adoption. Hub managers similarly show strong EPOD usage (60% always, 40% sometimes). Chi-Square testing confirms statistically significant associations between technology adoption and improved accuracy perceptions ($p < 0.001$).

5.3 Route Optimization Impact

Strong negative correlation analysis ($r = -0.743$, $p < 0.001$) demonstrates that improved route optimization directly reduces delivery delays. Among respondents, 82% strongly agreed or agreed that route optimization significantly reduces delivery time, with only 5.6% expressing disagreement. This evidence validates technological investment in optimization algorithms.

5.4 Accuracy and Error Reduction

A majority (82.4%) strongly agreed that technology tools enhance accuracy and minimize human errors, compared to only 3.7% disagreeing. Chi-Square testing confirms statistically significant relationships between technology perception and overall satisfaction ($p = 0.012$). These results underscore that customer directly experience reliability improvements from digital systems.

VI. OPERATIONAL CHALLENGES: PERSISTENT BARRIERS TO LAST-MILE EFFICIENCY

Despite technological advances, significant challenges persist:

Traffic Congestion (7.4% of responses): The most frequently cited operational barrier, particularly affecting delivery executives in metropolitan areas. Urban congestion reduces vehicle utilization and extends delivery windows unpredictably.

Customer Unavailability (5.6% of responses): A critical coordination issue where customers are absent at scheduled delivery times, requiring rescheduling and increasing operational costs. This reflects the mismatch between narrow delivery slots and diverse customer availability patterns[2].

Incorrect Addresses (5.6% of responses): Address data quality issues, often stemming from incomplete customer information or informal local addressing systems, cause failed delivery attempts and customer frustration.

Parking Restrictions (5.6% of responses): Urban parking constraints, particularly in congested areas, force drivers to park illegally or at distances from delivery points, wasting time and effort.

Weather Conditions (1.9% of responses): Seasonal monsoons and extreme temperatures affect staff safety and delivery speed, though cited less frequently than infrastructure challenges.

Workforce Training Gaps: While not extensively quantified, qualitative feedback indicated that some delivery personnel lack adequate training in customer communication, technology usage, and problem-solving.

Cross-tabulation analysis reveals role-specific challenges: delivery executives primarily face physical barriers (traffic, parking), while hub managers deal more with coordination issues (incorrect addresses, customer communication). This differentiation suggests targeted interventions by role.

VII. GREEN LOGISTICS AND FUTURE INNOVATION ADOPTION

Current E-Vehicle Usage: Only 10.2% of respondents reported currently using e-vehicles, reflecting the early adoption stage of green logistics in India.

Willingness to Adopt: Importantly, 13.9% expressed openness to e-vehicle adoption, while only 1.9% dismissed this option, indicating emerging momentum toward sustainable logistics. Among delivery executives specifically, 83% showed willingness or openness to e-vehicle use, demonstrating strong staff readiness for green transition.

Additional Innovation Interest: 14.8% of respondents actively suggested further innovations, despite 74.1% overall satisfaction with current systems, reflecting a culture of continuous improvement.

These findings align with national sustainability imperatives and suggest that Franch Express has a supportive organizational foundation for transitioning to green logistics. The gradual fleet electrification could reduce operational costs by 20–30% while aligning with environmental goals.

VIII. STATISTICAL VALIDATION AND RELIABILITY

Chi-Square Significance: Multiple Chi-Square tests confirmed statistically significant associations between variables:

- *Role vs. challenges faced:* $\chi^2 = 171.200$, $p < 0.001$, indicating that operational barriers vary meaningfully by employee role.
- *Role vs. technology perception:* $\chi^2 = 119.467$, $p < 0.001$, showing different technology adoption perspectives.
- *Satisfaction vs. technology usefulness:* $\chi^2 = 19.553$, $p = 0.012$, demonstrating clear links between technology experience and customer satisfaction.
- *Delivery timeliness vs. satisfaction:* $\chi^2 = 20.241$, $p < 0.001$, confirming on-time delivery as a primary satisfaction driver.

Reliability Testing: Cronbach's Alpha (0.666) for customer satisfaction measures indicates acceptable internal consistency, validating survey instrument reliability.

Correlation Strength: Route optimization to delay reduction showed strong negative correlation ($r = -0.743$), one of the strongest relationships in the study, confirming technology effectiveness.

IX. STRATEGIC RECOMMENDATIONS FOR ENHANCED PERFORMANCE

1. *Advanced Address Verification:* Implement AI-assisted address validation and customer pre-confirmation via SMS or WhatsApp to reduce failed deliveries and improve first-attempt success rates.
2. *Real-Time Traffic Integration:* Upgrade route optimization software to incorporate live traffic feeds and weather data, enabling dynamic route adjustments and better delivery window predictions.
3. *Green Fleet Transition:* Establish phased electric vehicle adoption targets, beginning with 20% of fleet electrification by 2026, leveraging government incentives and environmental credentials to enhance brand positioning.
4. *Workforce Development Programs:* Establish continuous digital literacy training for delivery personnel and customer communication soft skills development, addressing identified training gaps.
5. *Customer Communication Enhancement:* Deploy proactive SMS/WhatsApp alerts for delivery scheduling, reducing customer unavailability and improving coordination between service providers and recipients.
6. *Data Integration Platform:* Develop centralized logistics dashboards integrating EPOD, GPS, inventory, and performance analytics for enhanced managerial decision-making and real-time operational visibility.
7. *Innovation Ecosystem:* Establish internal suggestion programs and innovation drives collecting improvement ideas from field staff and customers, formalizing the continuous improvement culture indicated by survey responses.

X. CONCLUSION

This research demonstrates that technological innovation, when integrated strategically with operational excellence and workforce development, fundamentally transforms last-mile delivery performance. Franch Express Courier Pvt. Ltd. has successfully leveraged GPS tracking, EPOD systems, and route optimization to achieve 76% customer satisfaction while establishing efficiency benchmarks in South Indian urban logistics.

However, persistent infrastructure challenges—traffic congestion, customer unavailability, and address inaccuracies—underscore that technology alone cannot resolve all delivery inefficiencies. Success requires balanced investments in:

- *Digital Infrastructure:* Continued enhancement of tracking, optimization, and communication systems
- *Workforce Capability:* Training, motivation, and role-appropriate problem-solving skills
- *Sustainability Transition:* Gradual fleet electrification and eco-conscious operations
- *Customer Engagement:* Proactive communication and flexible delivery options

The emerging interest in green logistics (13.9% willingness to adopt e-vehicles) and continuous innovation (14.8% suggesting improvements) positions Franch Express favorably for long-term competitive advantage. By balancing digital transformation, human adaptability, and environmental responsibility, the company can contribute to India's evolving logistics ecosystem while maintaining service excellence.

As e-commerce continues expanding and urbanization accelerates, last-mile delivery will remain a critical competitive frontier. Organizations integrating AI-driven optimization, sustainable practices, and customer-centric innovations will lead India's logistics transformation through 2030 and beyond.

REFERENCES

- [1] Franch Express Courier Pvt. Ltd. (2024). Company operations and service portfolio. Retrieved from <https://www.franchexpress.com>
- [2] Ferreira, J. C. (2025). Enhancing sustainable last-mile delivery: The impact of electric vehicles and artificial intelligence. *Sustainability*, 16(5), 242. <https://doi.org/10.3390/su16050242>
- [3] Sharma, V. P. (2025). Strategic insights into last-mile delivery: Modelling the industry with Industry 4.0 enablers. *RAUSP Management Journal*, 60(1), 1–16. <https://doi.org/10.1108/RAUSP-07-2024-0146>
- [4] Ojha, R. (2025). Examining environmental sustainability in last-mile delivery. *Total Quality Management & Business Excellence*, 36(1–2), 123–138. <https://doi.org/10.1108/tqm-07-2024-0249>
- [5] Deloitte India. (2021). Electric mobility in urban courier fleets: Cost and sustainability analysis. *Deloitte Reports*, 2021, 5–18.
- [6] NITI Aayog. (2023). Sustainable logistics infrastructure in India: Policy perspectives. Government of India Publication.
- [7] Tata Institute of Social Sciences. (2023). Workforce challenges in urban last-mile logistics. *TISS Research Reports*, 5(2), 21–38.
- [8] Nair, P. (2021). Workload, motivation, and performance in urban courier operations. *Journal of Human Resource in Logistics*, 6(2), 40–52.
- [9] Rao, P., & Sinha, A. (2018). Urban delivery inefficiencies in Indian metro cities. *Indian Journal of Transport and Logistics*, 2(1), 23–36.
- [10] Kumar, I. (2024). A systematic literature review and bibliometric analysis of e-commerce's impact on urban last-mile distribution. *International Journal of Logistics Management*, 35(3), 456–478. <https://doi.org/10.1108/IJLM-05-2024-0316>



International Journal of Recent Development in Engineering and Technology
Website: www.ijrdet.com (ISSN 2347-6435(Online) Volume 15, Issue 02, February 2026)

- [11] Gupta, A., Sharma, R., & Verma, P. (2020). Customer expectations and courier service performance in India. *International Journal of Supply Chain Management*, 5(3), 33–45.
- [12] EY India. (2022). Digital engagement platforms in courier services: Impact on customer retention. EY Research Publications, 2022, 14–27.
- [13] Srinivasan, R. (2022). Impact of GPS and ePOD systems on courier operations in India. *International Journal of Logistics Management*, 8(1), 22–35.
- [14] Mishra, A., & Kaur, P. (2022). Sustainable practices in last-mile delivery in India. *International Journal of Logistics and Supply Chain Management*, 7(2), 55–68.