E-COMMERCE DELIVERY DELAY ANALYSIS AND PERFORMANCE OPTIMIZATION

A Business Intelligence Strategy For Transforming Logistics Data Into Actionable Insights

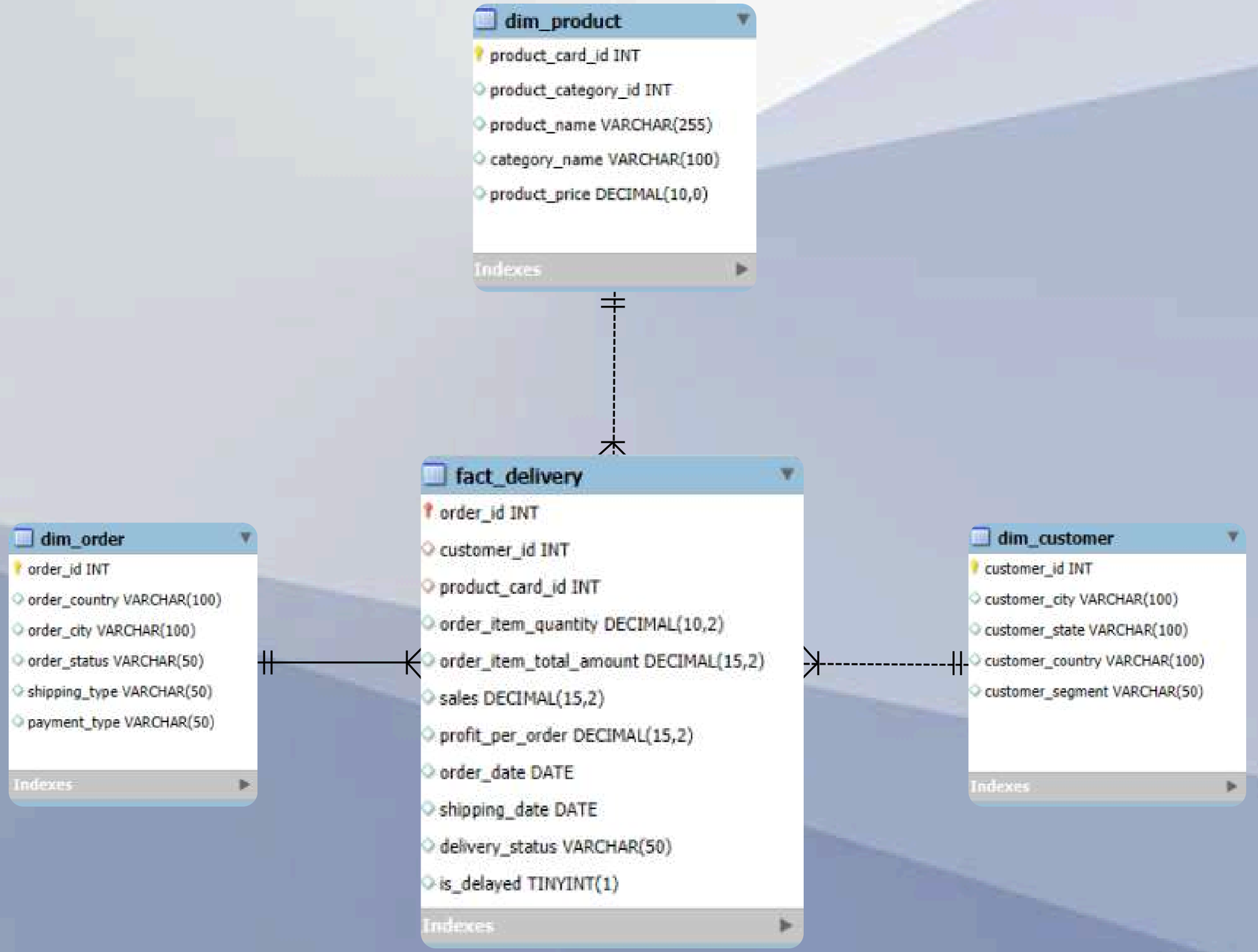
THE BUSINESS PROBLEM

High rates of delivery delays are directly impacting customer satisfaction, operational costs, and brand reputation, with a measurable negative effect on profit

MAIN OBJECTIVE OF THIS ANALYSIS

To use transactional data to monitor key performance indicators (KPIs), uncover the root causes of late deliveries, and provide data-driven recommendations for operational optimization.

DATA MODEL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customer_id INT
product_card_id INT
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sales DECIMAL(15,2)
profit_per_order DECIMAL(15,2)
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shipping_date DATE
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is_delayed TINYINT(1)
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order_id INT
order_country VARCHAR(100)
order_city VARCHAR(100)
order_status VARCHAR(50)
shipping_type VARCHAR(50)
payment_type VARCHAR(50)
Indexes
dim_customer
customer_id INT
customer_city VARCHAR(100)
customer_state VARCHAR(100)
customer_country VARCHAR(100)
customer_segment VARCHAR(50)
Indexes

MORE THEN HALF OF ALL ORDERS ARE DELIVERED LATE

58%

DELIVERY DELAY RATE

19%
ON-TIME RATE

23%
EARLY-RATE

8,000+
TOTAL DELAYED ORDERS

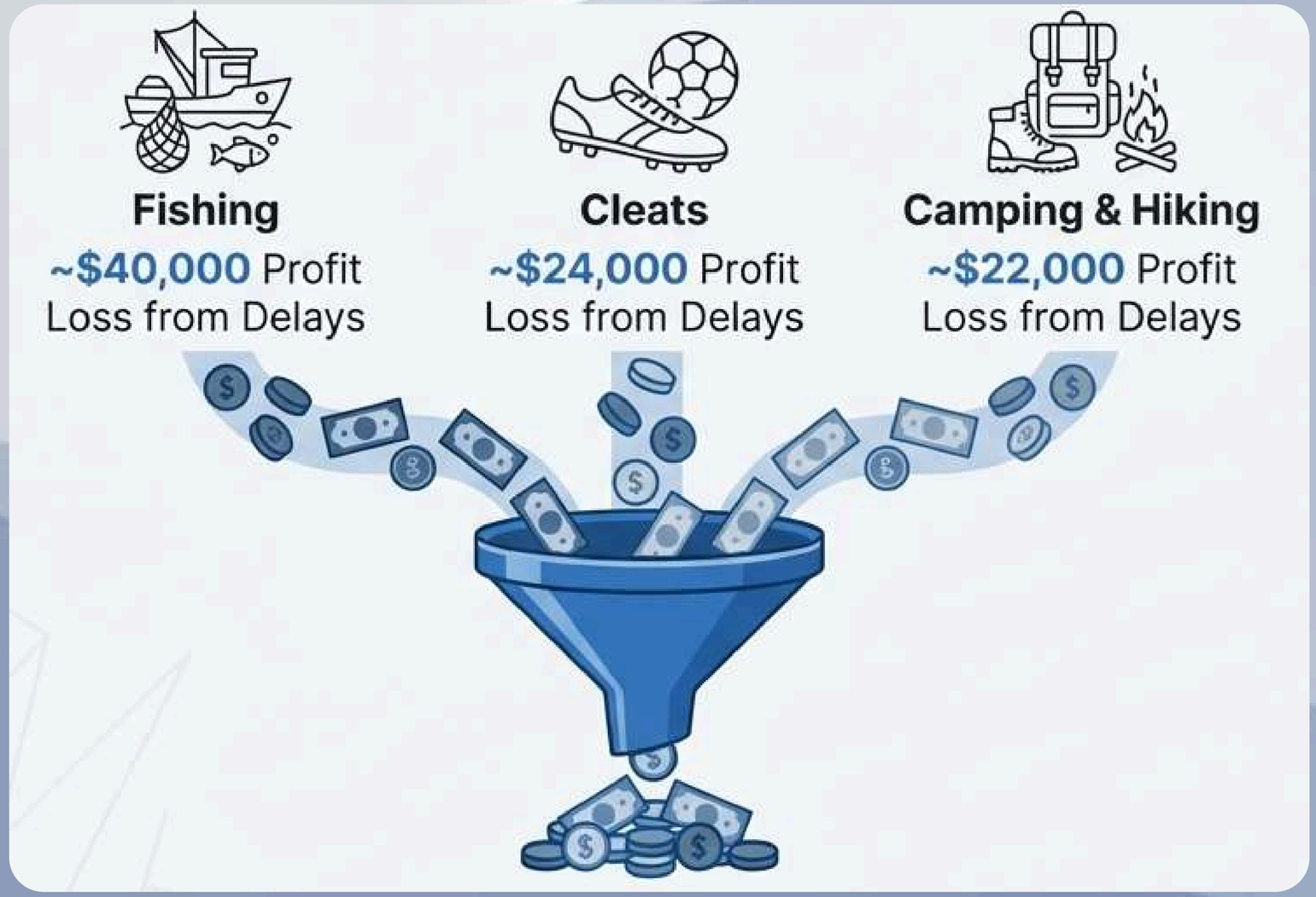
THIS ISN'T AN ISOLATED ISSUE; IT'S A SYSTEMIC FAILURE IN THE LOGISTICS CHAIN THAT IMPACTS THE MAJORITY OF CUSTOMERS

The total profit loss across all categories is $173.02K.

Delay Impact on Profit

0.56

This score confirms a strong, negative statistical relationship between delays and profitability, driven by refunds, reshipping costs, and customer support overhead.



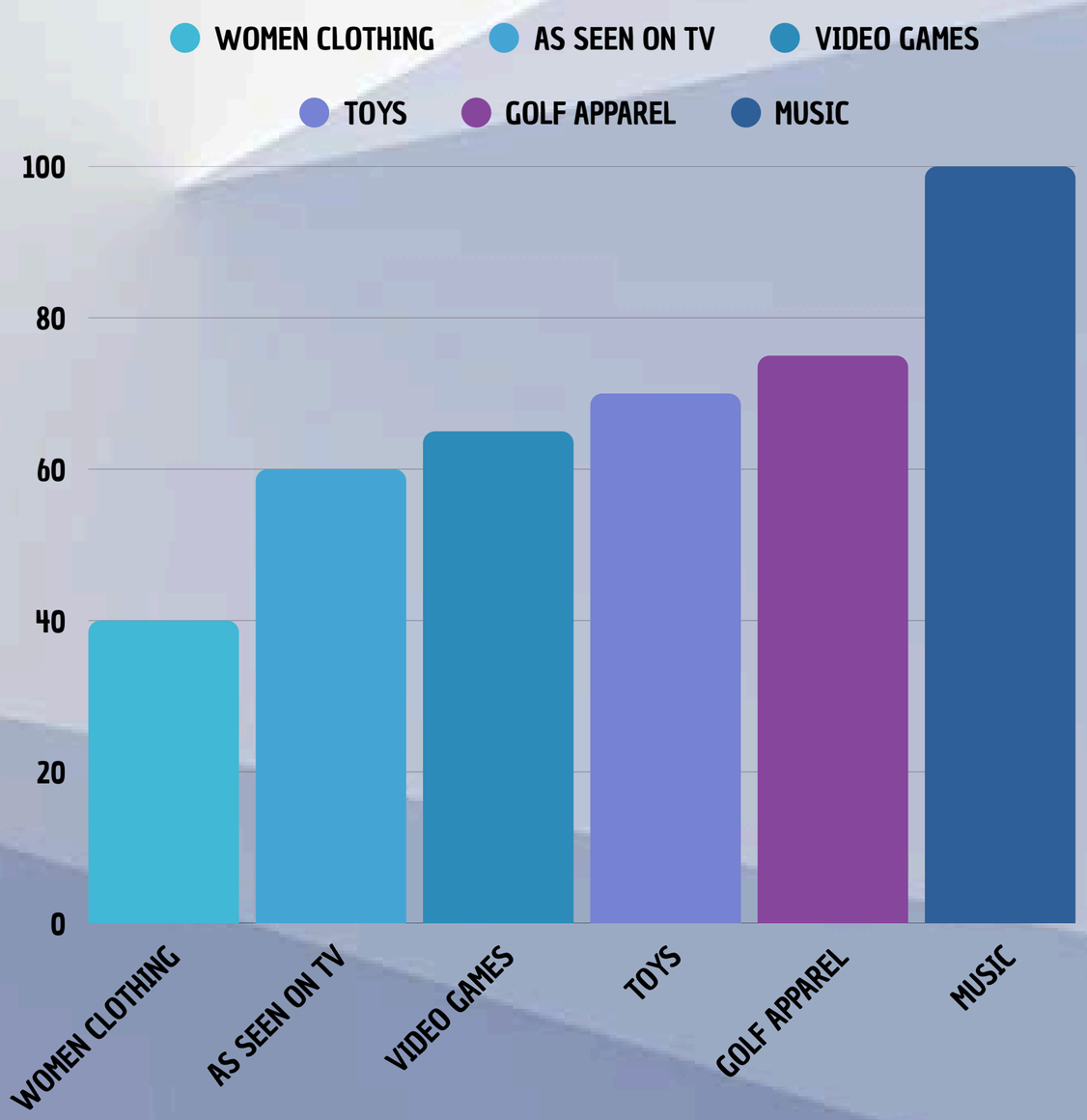
REGIONAL IMPACT

This concentration points to specific regional issues: local carrier performance, cross-border complexity, or infrastructure gaps.

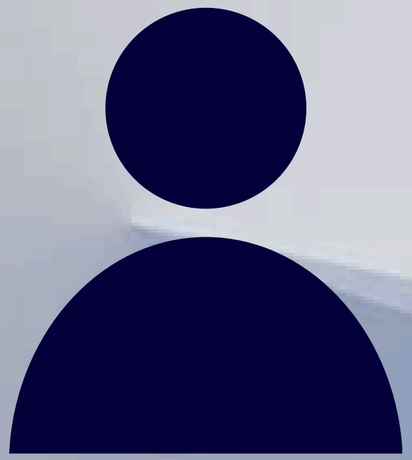
MOST CATEGORIES AFFECTED BY THE DELAY RATE

Bulky items, seasonal products, or specialized equipment often require more complex handling.

Without categoryspecific logistics strategies, delays, losses, and costs accumulate rapidly.

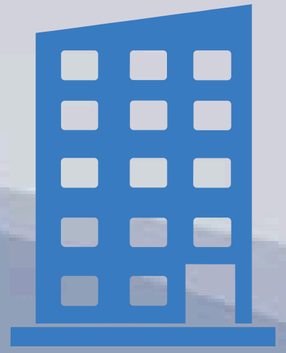


Consumer' Segment is Most Affected



Consumer

4K delayed orders



Corporate

2K delayed orders

Home-Office

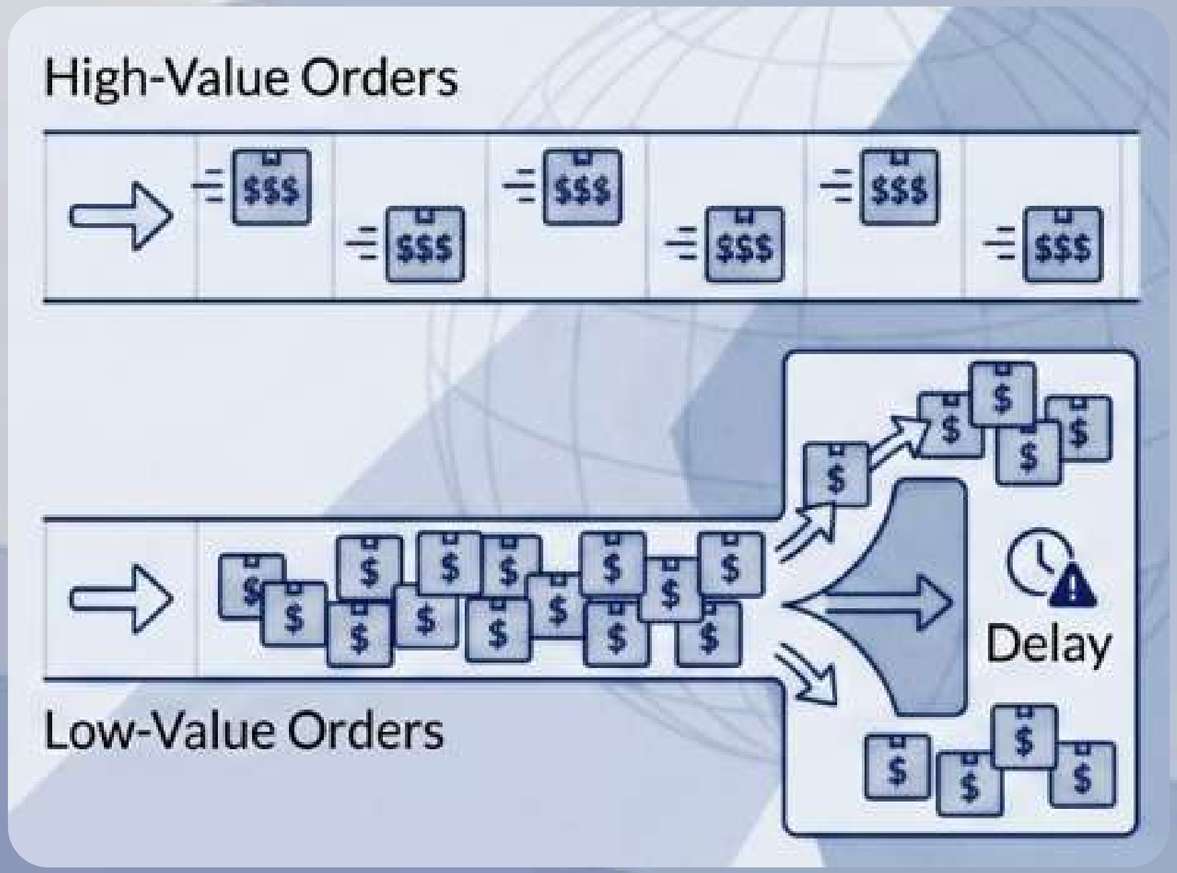
1K delayed orders

Consumer customers are more price-sensitive and less tolerant of repeated service failures. Persistent delays in this segment significantly increase the risk of customer churn and negative word-of-mouth.

Order Value Drives Fulfillment Priority and Delay Risk

Lower-value orders experience higher delivery delay rates, indicating that fulfillment processes implicitly prioritize high-value orders.

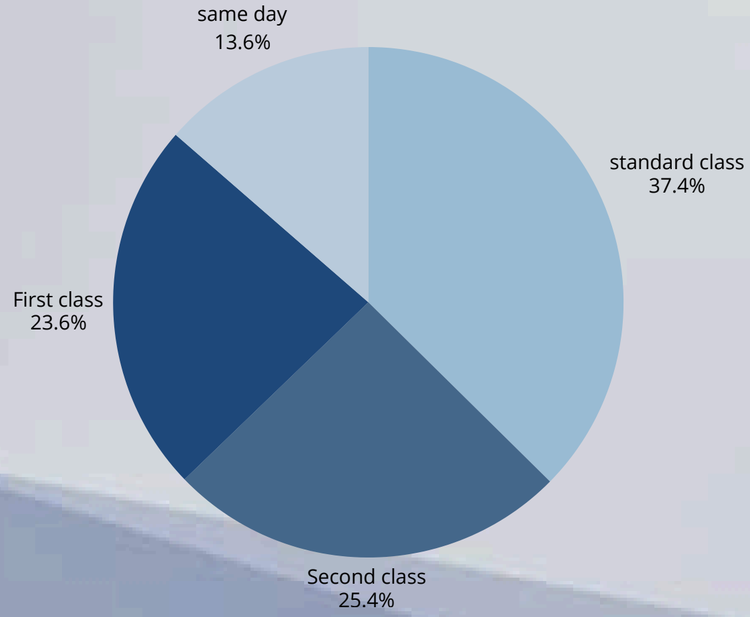
While this approach protects revenue at the order level, it leaves lower-value orders waiting longer in fulfillment queues, increasing their exposure to operational bottlenecks. Over time, this leads to a higher overall volume of delayed shipments and disproportionately impacts price-sensitive customer segments.



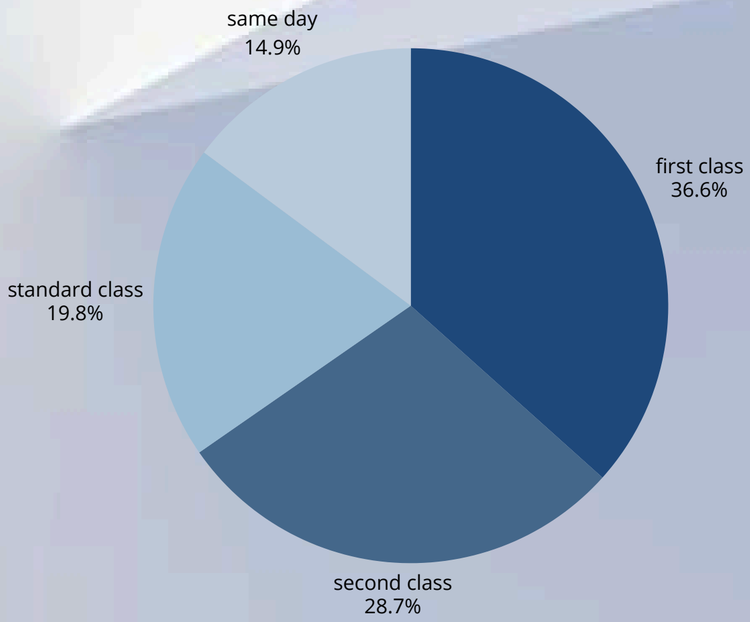
The Logistics Network Is Overwhelmed by Predictable Seasonal Peaks Every Year

The current logistics capacity is insufficient to handle this predictable surge, leading to a collapse in service levels. This is a planning failure, not a random event.

Shipping Delays: A System-Wide Reliability Problem



Standard Class 40.7% Delay Rate



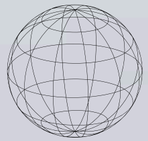
First Class 98.4% Delay Rate

Standard Class generates the largest number of delayed orders due to its high volume

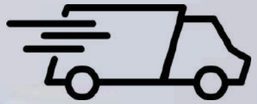
However, First Class show the highest delay rate. This suggests that premium options are not reliably meeting expectations and may require carrier/route redesign.

MAIN CAUSES OF DELIVERY DELAYS

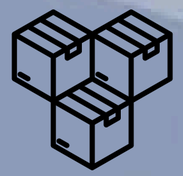
1. REGIONAL & INFRASTRUCTURE ISSUES



2. SHIPPING MODE INEFFICIENCIES



3. PRODUCT CATEGORY CONSTRAINTS

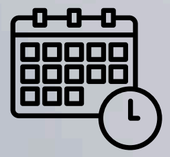


4. ORDER VALUE PRIORITIZATION

5. SEASONAL CAPACITY OVERLOAD

6. POOR DELIVERY TIME ESTIMATION

A COMPREHENSIVE PLAN TO RESTORE DELIVERY RELIABILITY AND PERFORMANCE



1. ALIGN DELIVERY STRATEGY єт CUSTOMER PROMISE

Redesign delivery time promises to reflect realistic shipping performance, regularly review and update estimated delivery dates, update estimated delivery dates, and introduce flexible, region-based delivery windows.

2. OPTIMIZE REGIONAL єт LAST-MILE OPERATIONS

Prioritize operational improvements in high-delay cities, evaluate and replace underperforming local delivery partners, and introduce region-specific logistics standards and SLAs.

3. STRENGTHEN SHIPPING MODES

Reassess the viability of premium shipping options by evaluating their actual delivery performance against their customer promise.

4. ENHANCE PRODUCT CATEGORY LOGIST

Develop category-specific fulfillment and shipping strategies, pre-position inventory for bulky/high-risk products, and adjust packaging/handling processes f

5. REINFORCE CUSTOMER EXPERIENCE ₹ RETENTION

Implement proactive communication for delayed orders, introduce standardized compensation for repeat delays, and track delivery performance at the individual customer level.

6. IMPROVE ORDER PRIORITIZATION ₹ FULFILLMENT

Establish minimum delivery service levels for all orders, improve fulfillment prioritization logic beyond order value alone, and balance speed optimization across both low- and high-value orders.

7. PREPARE FOR SEASONAL DEMAND ₹ CAPACI

Increase logistics capacity ahead of peak demand periods, align promotional campaigns with fulfillment capacity, and implement demand forecasting to anticipate seasonal spikes.

LIMITATIONS OF THIS ANALYSIS

- Historical data only, may miss recent operational changes.
- No external factors (weather, strikes, traffic).
- Lacks granular delay root causes.
- No direct customer feedback data integrated (e.g., NPS).

RECOMMENDED FUTURE IMPROVEMENTS

- Add real-time logistics and tracking data.
- Incorporate extral data sources.
- Link delivery performance with customer feedback.
- Build predictive models to forecast delays.
- Analyze upstream supplier/warehouse performance.

THANK YOU !