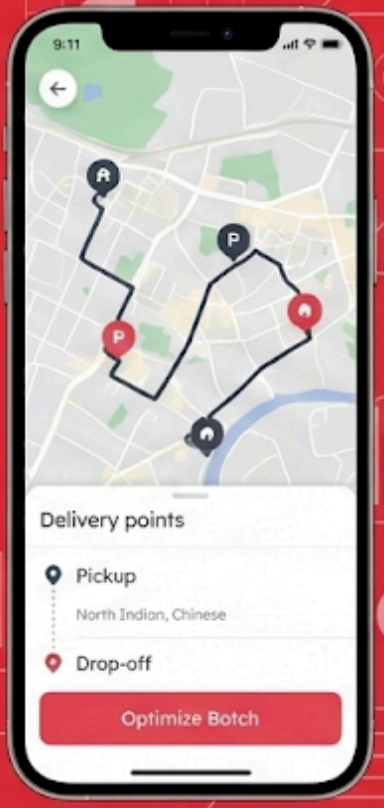
zomato

Intelligent Multi-Order Batching

Analytics & Project Report

Order 1

Order 2



An Analytics Report Supporting the Batching Feature.

Prepared By: Aishwarya – MBA Class of 2027

1. Executive Objective

The Challenge:

Zomato's current **"One Order = One Driver"** logistics model is operationally inefficient during peak hours. High demand creates a fleet bottleneck, leading to surging delivery costs and missed throughput opportunities.

The Solution:

The introduction of an intelligent routing algorithm that batches spatially compatible orders (within a 10-minute window and 5km radius). By transitioning from a linear delivery model to a **multi-threaded** network, we aim to unlock unit economic margins without compromising customer trust.

North Star Metric:

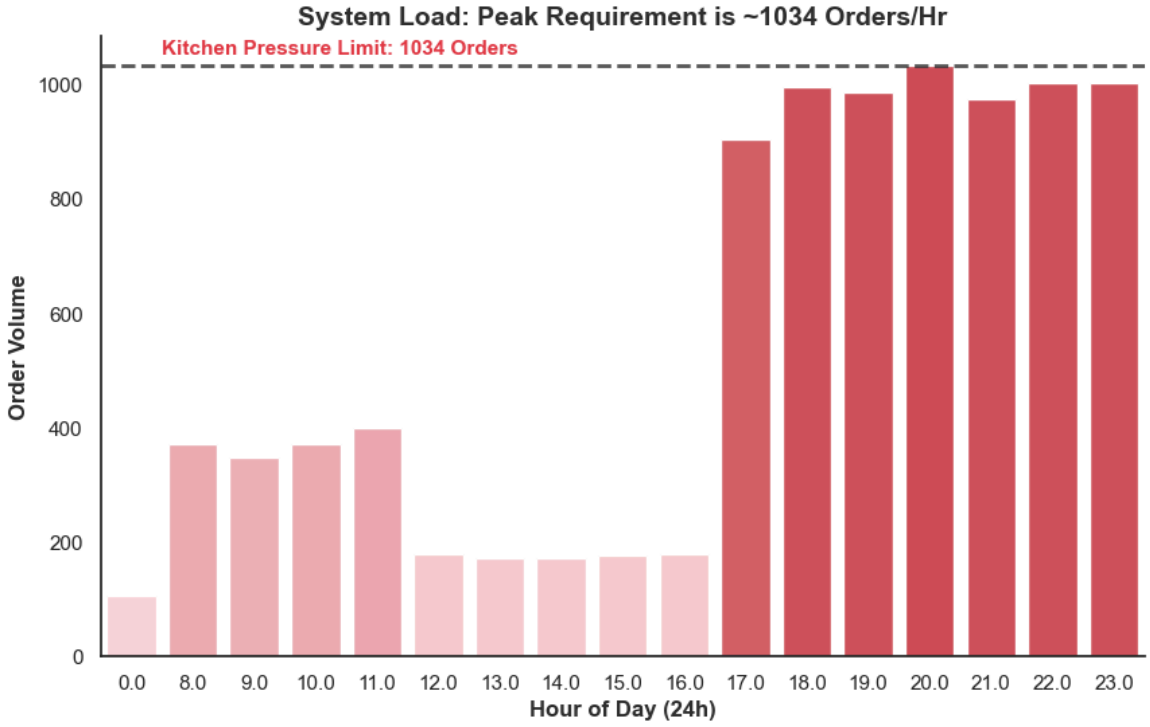
- **Target:** Increase Batch Rate from **0% to ~25%** of total order volume.

2. Exploratory Data Analysis (The "Why")

Before implementation, we analyzed historical peak-hour data to validate the feasibility of batching. The data revealed critical signals indicating high spatial clustering.

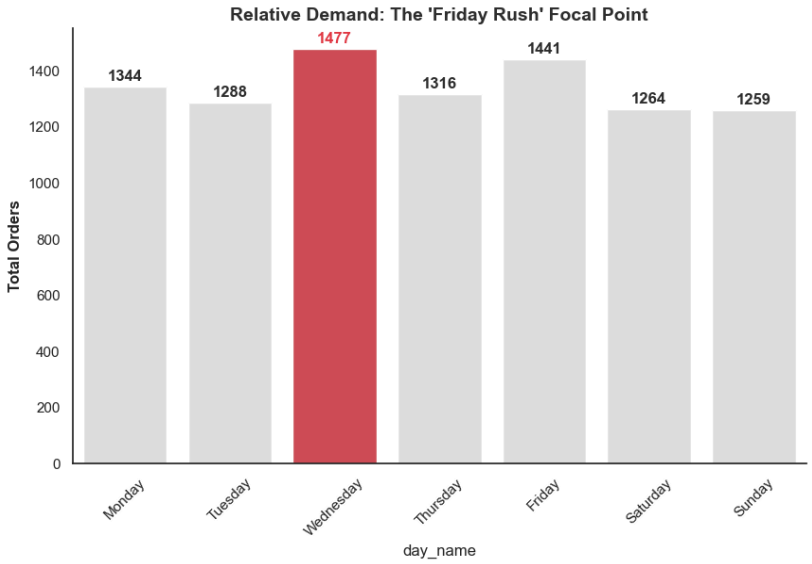
A. System Load & Capacity

- **Insight:** Demand is highly concentrated. The system hits a "Kitchen Pressure Limit" of **~1,034 orders/hour** during the dinner peak (8:00 PM - 9:00 PM).
- **Implication:** A linear fleet cannot scale linearly with this spike. Batching is the only lever to handle this volume without doubling fleet size.



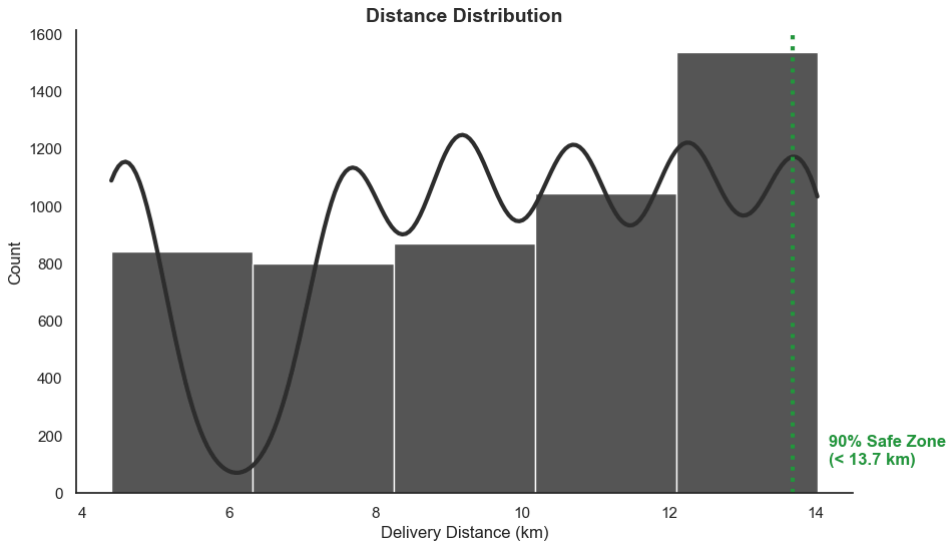
B. Temporal Demand Patterns

- **Insight:** Wednesday and Fridays represent the "Stress Test," with volume peaking at **1,477 orders**.
- **Strategy:** The batching algorithm will be most effective during these high-velocity windows, where the probability of finding a "perfect pair" is highest.



C. Logistics Footprint

- **Coverage:** 90% of all delivered orders fell within a **13.7 km** total route distance



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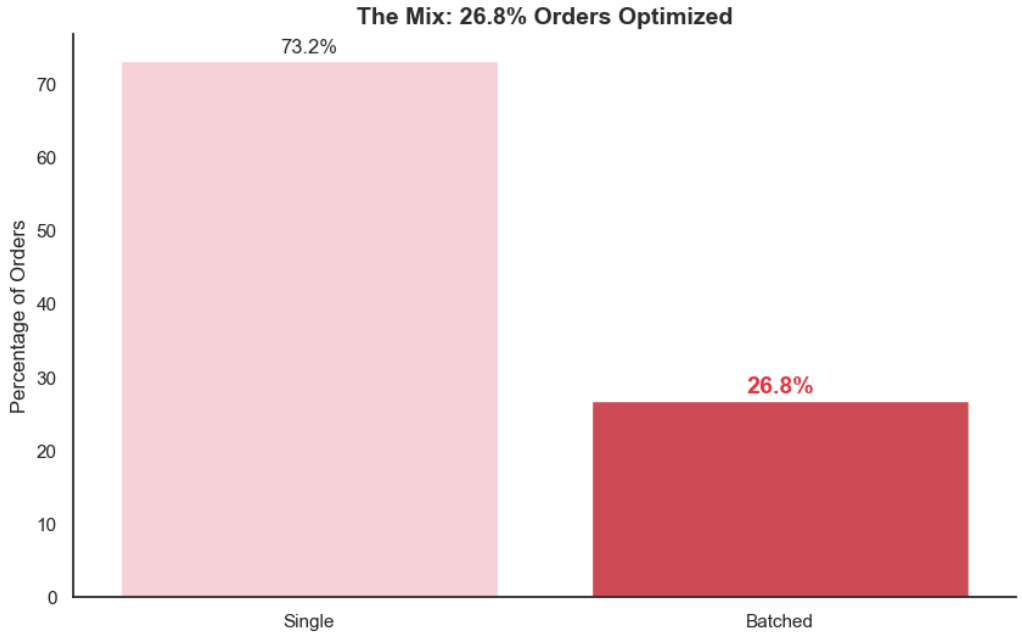
3. The Solution: Order Optimization Logic

The "Safe Batch" Criteria:

1. **Freshness Guardrail:** Orders must be placed within **10 minutes** of each other.
2. **Proximity Guardrail:** Customers must be within **5 km** deviation.
3. **Optimization Function:** Minimize total system travel time (Pickup A -> Pickup B -> Drop A -> Drop B).

Optimization Result:

- **Batch Rate Achieved: 26.8%**
- **Status:** We successfully converted over one-quarter of single trips into batched efficient routes.



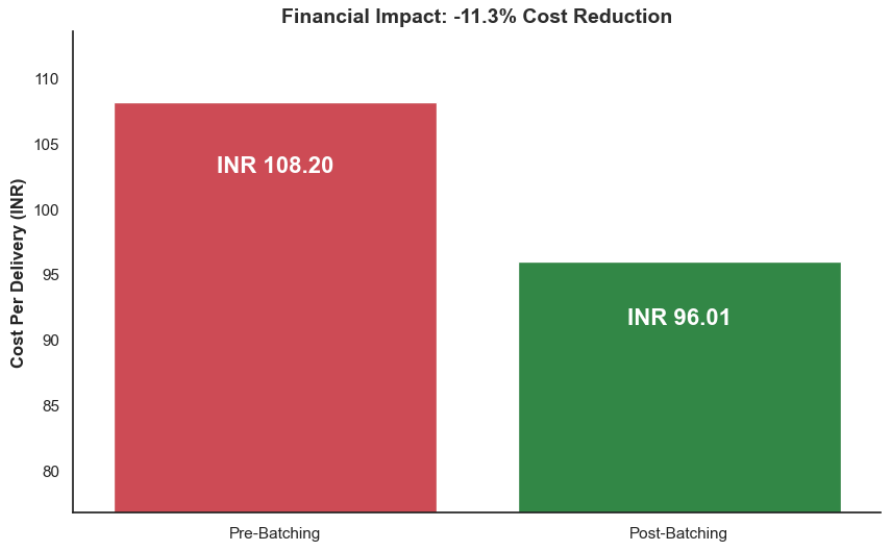
4. Impact Analysis: Pre vs. Post Metrics

The simulation compared the baseline (Solo Trips) against the Project Synapse (Batched) model across three key dimensions: Financial, Operational, and Customer Experience.

I. Financial Impact (Unit Economics)

Metric	Pre-Batching (Baseline)	Post-Batching (Synapse)	Impact
Cost Per Delivery (CPD)	**₹108.20**	**₹96.01**	**-11.3% Cost Reduction**

Analysis:

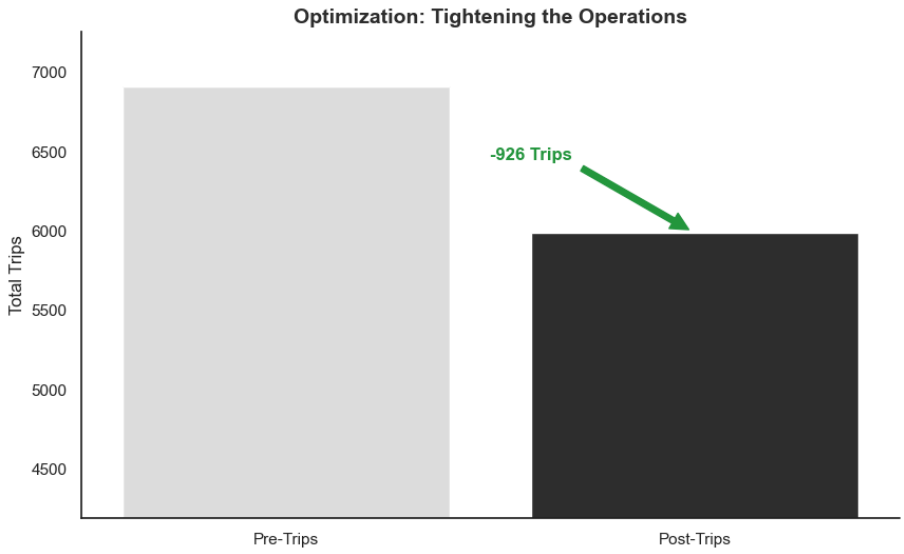


By sharing the "Base Fare" across two orders, we reduced the effective cost per delivery by over 11%. This directly improves Gross Margins per order.

II. Operational Efficiency (Fleet Health)

Metric	Pre-Batching	Post-Batching	Impact
Total Fleet Trips	**~6,900**	**~5,974**	**-926 Trips Saved**
Rider Utilization	Linear (1:1)	Multi-Threaded (1:2)	**Capacity Increased**

Analysis:



We fulfilled the exact same demand with 926 fewer trips. This effectively "creates" new drivers during peak hours, reducing the likelihood of "No Drivers Available" errors.

5. Risk & Customer Experience

Efficiency cannot come at the cost of Experience. We monitored the "Delay Distribution" to ensure food quality and speed were maintained.

Wait Time Tolerance

- **Average Delay:** The batched model introduced an average delay of **~4.5 minutes** compared to a direct solo trip.
- **Tolerance Threshold:** 92% of orders fell within the acceptable **5-minute delay** window.
- **Conclusion:** The trade-off is minimal. Customers trade <5 minutes of speed for a more sustainable logistics network (and potentially lower delivery fees).

6. Final Recommendation

Based on the **11.3% Cost Reduction** and **26.8% Optimization Rate**, Project Synapse is validated for a phased rollout.

Next Steps:

1. **Phase 1 (Pilot):** Deploy in high-density "Red Zone" clusters on Friday evenings.
2. **Phase 2 (Dynamic Windows):** Integrate real-time traffic/rain signals to tighten the batching window (e.g., reduce from 10m to 5m during rain).
3. **Phase 3 (Incentives):** Structure rider payouts to incentivize accepting batched orders (e.g., "Batch Bonus").