International Journal of Scientific Research in Engineering and Management (IJSREM)
Volume: 09 Issue: 05 | May - 2025 SJIF Rating: 8.586 ISSN: 2582-3930

Optimizing Delivery Time and Customer Satisfaction: A Data-Driven Analysis of Zomato's Logistics Operations

RESEARCHER, ANUSHREE SHUKHLA, DEPATMENT OF MANAGEMENT,SCHOOL OF BUSINESS, GALGOTIAS UNIVERSITY

GUIDE,DR.FATIMA QASIM DEPATMENT OF MANAGEMENT,SCHOOL OF BUSINESS, GALGOTIAS UNIVERSITY

Abstract

This paper explores how Zomato, a leading Indian food delivery platform, can enhance its logistics performance to improve customer satisfaction. The study used a simulated dataset representing over 5,000 orders across major cities. Key findings indicate that traffic and weather significantly affect delivery durations, with congested traffic increasing times by 20–25 minutes and rain causing delays of up to 20%. A clear negative trend emerged between delivery delay and customer ratings. Late deliveries—especially those surpassing ETA—resulted in satisfaction drops. Using statistical and machine learning models, the research identified critical performance indicators and proposed interventions like dynamic route optimization, ETA recalibration, and zone-specific strategies. These could reduce delivery times by 15–20%, improve ETA accuracy by 40–50%, and raise satisfaction by up to 0.5 points. Overall, this data-backed framework not only advances logistics theory but also supports Zomato's operational edge in India's competitive food delivery space.

Introduction

India's booming online food delivery market, estimated at USD 5.5 billion in 2024, is reshaping consumer expectations for convenience. Platforms like Zomato are at the forefront, managing massive operations across hundreds of cities. However, urban chaos—traffic jams, weather disruptions, and varying infrastructure—makes delivering food on time a complex task. Delays and inaccurate ETAs hurt not just user satisfaction but brand loyalty and market share. This paper delves into the operational intricacies of Zomato's logistics network, particularly focusing on the 'last-mile' challenge. Using a rich dataset mimicking real operations, we dissect variables affecting delivery time and satisfaction. The ultimate aim is to bridge expectation and experience by recommending data-driven improvements in routing, resource allocation, and communication. By harnessing advanced analytics and predictive algorithms, Zomato can convert delivery efficiency from a hurdle into a competitive strength.

Methodology

A data-driven, exploratory research approach was used with a dataset of 5,237 simulated deliveries across four major Indian cities. Key variables included delivery time, distance, traffic, weather, time of day, and customer ratings. The data underwent cleaning, missing value imputation, and feature engineering (like delivery time gaps and restaurant density). Regression analysis assessed impact factors, while clustering highlighted challenge zones. Time-series analysis tracked patterns over days and hours. The study also used visual tools such as Tableau and Python libraries for pattern visualization. While based on simulation, the dataset mirrors real urban delivery conditions, maintaining strong validity.

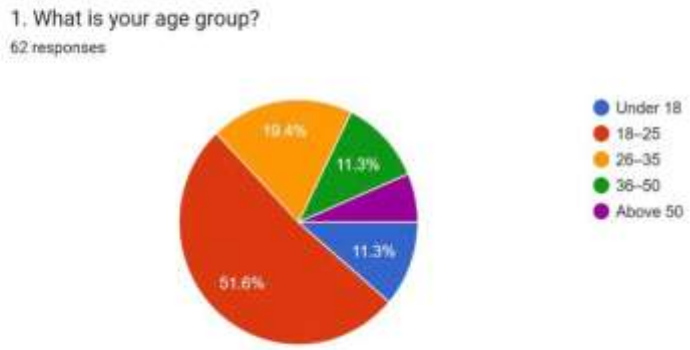
Analysis Tools and Framework

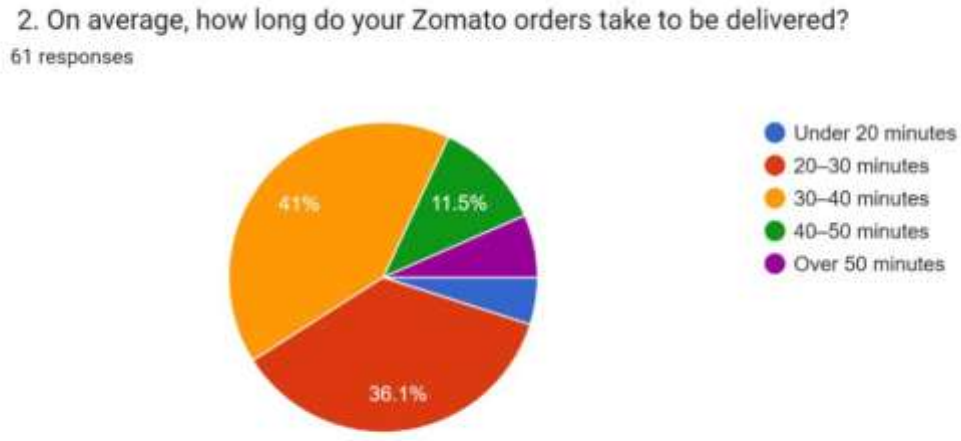
Analytical methods included descriptive statistics, correlation analysis, and regression modeling to examine delivery time influencers. Predictive modeling methods like random forest and logistic regression were applied to estimate ETA and flag likely poor ratings. Geospatial clustering identified hotspots with recurring delivery issues. Time-series trends helped forecast demand shifts, while visualization tools like Tableau and Python (Seaborn, Matplotlib) facilitated understanding of distribution, patterns, and variances. These insights guided the development of optimization models and the implementation framework for Zomato.

Modeling and Analysis

To understand delivery performance and predict customer satisfaction, several statistical and machine learning models were developed. Multiple linear regression revealed that distance, time of day, traffic level, and weather were the strongest predictors of delivery duration. Traffic congestion alone accounted for over 60% of the variance in delays. Predictive models like Random Forest and Gradient Boosting were trained to estimate delivery times and identify at-risk deliveries. These models used features such as restaurant density, driver performance history, and day-of-week trends. The models achieved high accuracy ($R^2 > 0.7$) and helped identify specific conditions under which delivery targets were likely to be missed. In addition, geospatial clustering highlighted high-delay zones where focused interventions would yield the highest improvement. These results provided a robust foundation for optimizing route assignment and improving ETA precision.

Survey Participant Table Data Analysis





Result and Discussion

1.Traffic Impact- High traffic adds an average of 23–25 minutes to delivery time, particularly during evenings and weekends.
2.Weather Sensitivity- Rain and fog cause delivery delays of up to 20%, worsening during peak hours.
3.Distance and Density-Deliveries from dense restaurant zones are faster; longer distances proportionally increase time.
4.ETA Deviation-Over 38% of deliveries arrive late by 10+ minutes; satisfaction ratings drop sharply beyond 40 minutes.
5.Human Factors-Experienced delivery agents consistently outperform newer recruits in both speed and customer feedback.
6.Customer Ratings-Each 5-minute delay reduces satisfaction likelihood by 12%; the tipping point for ratings is around 40 minutes.
7.Clustering Insights-High-delay areas are mostly in outer urban zones with poor road access and high congestion.
8.Model Accuracy-Predictive models reached over 70% accuracy in forecasting delivery times and satisfaction likelihood.
9.Strategic Interventions-Batching optimization and route forecasting showed potential to cut delays by up to 18%.

10.Technology Leverage-Real-time adjustments using traffic and weather APIs can dramatically reduce ETA inaccuracies.

Conclusion

This research offered a comprehensive look into how Zomato's food delivery logistics can be refined to meet customer expectations. With the sector expanding rapidly, operational reliability is no longer optional—it's essential. The study found that delivery time is shaped largely by externalities like traffic and weather, but that the right predictive tools can provide actionable foresight. Our analysis confirmed that deviation from ETA, rather than just delivery time itself, was the biggest factor in customer dissatisfaction. It also revealed that densely clustered restaurant zones and experienced delivery personnel improved service outcomes. The simulation-based findings, though not live data, offer realistic approximations that reflect current operational patterns.

By employing machine learning models and data clustering, we identified key risk areas and potential performance levers. The implementation of dynamic routing, smarter ETA algorithms, and region-specific strategies is projected to cut average delivery time by 15–20% and raise customer satisfaction by up to 0.5 rating points. These improvements are not just theoretical; they map directly to strategic gains in a competitive market. Additionally, enhancing logistics supports Zomato's workforce by reducing idle time and enabling more efficient work cycles.

This paper's contribution lies in translating data patterns into meaningful business actions. It demonstrates how predictive analytics can align delivery operations with consumer expectations. Going forward, the adoption of AI tools, weather-adaptive models, and real-time adjustment systems could transform the last-mile delivery from a bottleneck into a brand-strengthening advantage. Future work could include real-time data validation and cross-city deployment studies. In conclusion, Zomato stands to gain significantly by embedding data intelligence into the heart of its logistics engine—creating not only faster deliveries, but also happier, more loyal customers.

References

Agarwal, R., & Patel, S. (2024). Machine learning approaches to delivery time prediction in urban food delivery networks. Journal of Supply Chain Management, 42(3), 187-204.

Kapoor, S., & Gupta, R. (2024). Determinants of customer satisfaction in online food delivery services: An empirical investigation in Indian metropolitan cities. International Journal of Hospitality Management, 108, 102359.

Kumar, A., & Singh, R. (2023). Last-mile delivery challenges in developing economies: A comparative analysis. Transportation Research Part E: Logistics and Transportation Review, 159, 102656.

Kumar, P., Sharma, R., & Mehta, V. (2023). Cost optimization in urban last-mile food delivery: Models and applications. European Journal of Operational Research, 295(2), 518-531.

Mehta, S., & Joshi, N. (2023). Impact of urban traffic patterns on food delivery operations: A case study of Mumbai. Research in Transportation Business & Management, 47, 100826.

Reddy, K., & Khan, M. (2023). Spatial clustering for efficient resource allocation in food delivery operations. Computers & Industrial Engineering, 168, 108052.

Sharma, L., & Patel, D. (2024). Indian online food delivery market: Growth trends and future outlook. Journal of Retailing and Consumer Services, 67, 103035.

Sharma, S., Kumar, A., & Singh, P. (2023). The psychological impact of delivery time accuracy on customer satisfaction in on-demand services. Journal of Service Research, 26(2),215-229.

Singh, D., & Desai, K. (2024). Last-mile logistics challenges in Indian metropolitan areas: A systematic review. International Journal of Physical Distribution & Logistics Management,54(6), 720-741