E-Commerce Logistics Performance Analytics

Improving Delivery Efficiency Through Data-Driven Insights

Project Title: E-Commerce Logistics Performance Analytics
Sector: E-Commerce & Logistics
Team: Group 4 – Section A

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2. Executive Summary

In today's competitive e-commerce environment, fast and reliable delivery is no longer optional—it is expected. Customers judge brands not only by product quality but also by delivery speed and service experience. Even minor delays can reduce customer satisfaction and affect long-term loyalty.

This project analyzes 8,449 delivery records to evaluate courier performance, city-level delivery efficiency, and service type effectiveness. Using Google Sheets for data cleaning, pivot analysis, and dashboard development, we created a structured performance monitoring framework.

Our findings show that the overall average delivery time is approximately 2.81 days, with an average product rating of 3.0. While some couriers such as Ninja Express perform well in terms of speed and ratings, others show room for improvement. Certain cities—particularly Surabaya—experience significantly higher delivery times.

Based on our analysis, we recommend optimizing courier allocation, improving route efficiency in slower cities, and enhancing monitoring mechanisms through structured KPI tracking. Implementing these improvements can lead to higher customer satisfaction, better operational efficiency, and stronger brand performance.

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3. Sector & Business Context

The e-commerce logistics sector plays a critical role in the customer experience journey. Efficient delivery operations influence repeat purchases, ratings, and overall customer trust. With increasing competition, businesses must continuously monitor and improve logistics performance.

However, logistics operations face several challenges:

- Uneven courier performance
- City-specific infrastructure differences
- Increasing delivery expectations
- Limited visibility into performance metrics

This project was chosen because logistics efficiency directly impacts both operational cost and customer satisfaction, making it a high-value area for analytical improvement.

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4. Problem Statement & Objectives

Problem Statement

The company lacks a structured, data-driven framework to evaluate courier performance and delivery efficiency across different cities and service types.

Objectives

The key objectives of this project were:

- Measure overall delivery performance.
- Compare courier efficiency.
- Analyze city-wise delivery trends.
- Evaluate customer ratings in relation to delivery speed.
- Develop an interactive dashboard for executive decision-making.

The success of the project is measured by the ability to generate clear insights and actionable business recommendations.

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5. Data Description

The dataset contains 8,449 delivery records, where each row represents a completed order.

Key Variables Included:

- Courier Name
- Delivery Type (Express, Next Day, Regular, Same Day)
- City
- Estimated Delivery Time (in days)
- Product Rating

The data is structured in tabular format and was processed entirely in Google Sheets.

Limitations of the Data:

- No cost-related information
- No real-time tracking data
- No distance or traffic variables
- Estimated delivery time used instead of actual delivery time

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6. Data Cleaning & Preparation

All cleaning and preparation steps were performed in Google Sheets, as required by the capstone guidelines.

The following steps were undertaken:

- Removed missing values
- Standardized courier naming conventions
- Converted delivery time into numeric format

- Removed duplicate records
- Created pivot-based summary tables

Additional calculated metrics such as average delivery time per courier and order share percentage were derived using pivot tables. Assumptions were made that estimated delivery time reasonably reflects operational efficiency and that product ratings are partially influenced by delivery performance.

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7. KPI & Metric Framework

To evaluate logistics performance, we defined the following key performance indicators:

- Total Orders – Measures overall operational volume
- Average Delivery Time – Measures operational efficiency
- Average Product Rating – Indicates customer satisfaction
- Courier Order Share (%) – Shows load distribution among couriers
- City-Level Average Delivery Time – Identifies geographic efficiency

These KPIs were aligned with the project's objective of identifying operational strengths and weaknesses.

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8. Exploratory Data Analysis

The analysis revealed several important patterns.

Overall Performance:

- Total Orders: 8,449
- Average Delivery Time: 2.81 Days
- Average Product Rating: 3.00

Courier Performance:

Ninja Express demonstrates the fastest average delivery time (~2.63 days) and the highest rating (~3.60). Pos Indonesia shows comparatively slower performance (~2.97 days). J&T Express handles the largest volume of orders (~30%), indicating high operational load.

City-Level Insights:

Bandar Lampung and Bekasi show relatively faster delivery times. Surabaya records the highest average delivery time (~3.92 days), suggesting potential bottlenecks.

Delivery Type Performance:

Contrary to expectations, Same-Day delivery does not significantly outperform other types, indicating a potential operational gap.

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9. Advanced Analysis

Further analysis suggests that delivery delays may be influenced by city infrastructure, route complexity, or courier load imbalance. We also observed that higher delivery time does not always directly correlate with lower ratings, indicating that other factors (such as product quality) may also influence customer feedback.

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10. Dashboard Design

An interactive dashboard was developed in Google Sheets to provide a comprehensive view of logistics performance.

The dashboard includes:

- KPI Summary Section
- Courier Performance Comparison
- Delivery Type Analysis
- Product Rating by Courier
- Order Share Distribution

- City-Level Speed Analysis
- Interactive Filters (Courier, Delivery Type, City)

The design focuses on clarity, executive readability, and decision-oriented insights.

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11. Key Insights

- The overall delivery time is moderate at 2.81 days.
- Ninja Express performs best in both speed and rating.
- Pos Indonesia shows slower delivery performance.
- J&T Express carries the highest operational load.
- Surabaya experiences significant delivery delays.
- Same-Day delivery does not show expected performance advantage.
- Customer ratings remain average, indicating room for improvement.
- Courier distribution is uneven, creating operational imbalance.

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12. Recommendations

Based on the findings, the following actions are recommended:

- Optimize delivery routes in high-delay cities.
- Rebalance order allocation across couriers.
- Strengthen performance monitoring for underperforming couriers.
- Improve operational efficiency in Same-Day delivery services.
- Integrate structured KPI dashboards into regular management reviews.

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13. Impact Estimation

If average delivery time is reduced by even 0.3 days:

- Customer satisfaction may improve by 10–15%.
- Repeat purchase likelihood may increase by 5–8%.
- Operational reattempt costs may decrease.
- Overall service reliability perception will strengthen.

Improved courier allocation alone could potentially enhance efficiency by 8–12%.

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14. Limitations

- Lack of cost data limits financial impact calculation.
- Absence of real-time tracking reduces accuracy.
- Estimated delivery time may not reflect actual performance.
- Ratings may be influenced by factors unrelated to delivery.

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15. Future Scope

Future enhancements may include:

- Integration of real-time courier APIs
- Inclusion of delivery cost analysis
- Machine learning-based delay prediction

- Traffic and weather data integration
- Customer segmentation analysis

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16. Conclusion

This project successfully developed a structured, KPI-driven framework for evaluating logistics performance. By analyzing delivery data and building an interactive dashboard, we identified operational inefficiencies and provided actionable recommendations. The analysis demonstrates how structured data evaluation can improve logistics efficiency, customer satisfaction, and overall business performance.

Team Member	**Dataset & Sourcing**	**Cleaning**	**KPI & Analysis**	**Dashboard**	**Report**	PPT	**Overall Role**
Arun				✔			Dashboard
Keshav			✔				KPI analysis
Mausam		✔					Data cleaning
Harsha					✔		Report
Sarvesh			✔				KPI & Analysis
Sayan	✔					✔	PPT

Declaration: We confirm that these contributions are accurate and verifiable through Google Sheets version history. Team Signature Block:

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