

Project Context

This project analyses the shipment process across multiple logistics segments to identify performance weaknesses and opportunities for reducing overall delivery delays. The primary objective was to evaluate how shipments progress through each stage and determine which parts of the process contribute most to delays.

Dataset Overview

The dataset contains shipment-level records identified by a unique shipment ID and associated airport information. Each shipment progresses through four operational segments:

- RCS — Received from shipper
- DEP — Departure
- RCF — Received from flight
- DLV — Delivered to consignee

These segments may occur across multiple transport legs (LEG1–LEG4). The dataset also includes information on the number of segments per shipment and the number of incoming transport events.

Durations were recorded in minutes and converted to days for analysis.

Methodology

Data preparation and analysis were conducted in Microsoft Excel using Power Query and Pivot Tables.

Key steps included:

- Transforming the dataset from wide to long format
- Aggregating event data to shipment level
- Calculating planned duration, actual duration, and delay for each segment
- Identifying and isolating extreme outliers ($\text{delay} > 500,000$ minutes) to preserve data quality
- Computing descriptive statistics, percentiles, and variability measures
- Performing segment-level delay analysis to identify operational bottlenecks

Key Findings

- Shipment durations exhibit a strongly right-skewed distribution, indicating the presence of infrequent but severe delays.

- High percentiles confirm a long-tail pattern, where a small proportion of shipments take substantially longer than typical.
- Delivery times show high variability, suggesting limited predictability in operational performance.
- Approximately 72% of shipments were completed earlier than planned, while 28% experienced delays.
- The departure (DEP) segment was identified as the primary source of delays, indicating potential issues in pre-departure processes such as handling, preparation, or scheduling.

Overall, while most shipments perform efficiently, a small subset of delayed cases disproportionately impacts average performance and system reliability.

Limitations & Assumptions

- Extreme delay values ($> 500,000$ minutes) were treated as outliers and excluded from the core analysis to avoid distortion of results.
- The analysis assumes that recorded timestamps accurately reflect operational events.
- External factors (e.g., weather, customs procedures, or airport congestion) were not available in the dataset and could not be evaluated.
- Results are descriptive and do not imply causation.

Conclusion

The analysis indicates that the logistics process is generally efficient but vulnerable to significant delays in specific cases. Targeted improvements in pre-departure operations could reduce overall delivery times and improve consistency. Addressing the causes of extreme delays would likely yield the greatest impact on performance predictability.