





DOORDASH

Optimizing DoorDash Food Delivery Operations: A Comprehensive Data Analysis

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PROJECT OVERVIEW

This project provides a comprehensive analysis and valuable insights aimed at optimizing DoorDash's food delivery operations. The analysis focuses on three key dimensions: dasher performance, delivery efficiency, and revenue generation, each offering actionable insights to enhance operational effectiveness, improve customer satisfaction, and drive growth in key markets.

1 | Dasher Performance: Understanding workload, utilization, idle times, and the impact of these metrics on delivery performance.

2 | Delivery Metrics: Examining factors influencing delivery times, delays, and overall efficiency.

3 | Revenue Analysis: Identifying revenue patterns by market, cuisine preferences, and order characteristics.

Advanced SQL queries will be utilized to extract and preprocess data, followed by detailed analysis and visualization tools.

The insights will be integrated into an interactive dashboard for tracking KPIs and implementing operational improvements.



EXECUTIVE SUMMARY

The primary aim of this project is to leverage data analytics to optimize the operational and business metrics of a food delivery service.

By analyzing dasher performance, delivery efficiency, and revenue patterns across various markets, this project intends to uncover actionable insights.

The results will help improve delivery times, enhance dasher utilization, and identify revenue-generating opportunities.

A robust methodology is used to evaluate key performance indicators (KPIs) such as dasher workload, order density, delivery delays, and market revenue contributions.

Additionally, a user-friendly dashboard will present data visualizations to empower decision-makers with accessible insights.



METHODOLOGY

Data Collection:

- Extraction & Upload: Data is first collected from Kaggle and then stored in the local file system.
- Import: The data is then imported into a MySQL database for efficient querying and processing.

Data Cleaning and Preprocessing:

- Handling Missing Data: Missing or null values are imputed or removed to maintain dataset integrity.
- Removing Duplicates: Duplicate records are eliminated to avoid analysis distortion.
- Consistency Checks: Standardizing data formats and types for uniformity.
- Integrity Validation: Ensuring accurate and reliable data for analysis.

Data Analysis:

- Descriptive Statistics: Analyzing key metrics such as delivery times, order volumes, and revenue across markets.
- KPI Calculation: Using SQL queries to calculate important KPIs, including average delivery times, order density per dasher, market revenue contributions, and TOP 10 categories.

Visualization and Dashboard Creation:

- Power BI Dashboards: Creating interactive dashboards to visualize key metrics, including:
 - Revenue distribution by market.
 - Delivery performance trends.
 - Dasher utilization KPIs to track workload and efficiency.

Insights and Recommendations:

- Summary: Providing insights into DoorDash's operational performance.
- Recommendations: Offering actionable strategies to optimize dasher workload, reduce delivery times, and increase revenue, especially during peak periods.



DATA ANALYSIS

Dasher Performance

- Average Dasher Workload: Analyzing the distribution of dasher workloads across markets to identify over- or under-utilized dashers.
- Busy vs. Idle Dashers: Measuring the ratio of busy dashers (with orders) to idle dashers across markets.
- Outstanding Orders per Dasher: Evaluating the number of outstanding orders per dasher during peak times like lunch and dinner hours.
- Dasher Load Factors: Analyzing dasher load factors in various cities to assess dasher availability and demand.
- Delivery Performance: Examining the link between dasher workload and average delivery time.

Delivery Metrics

- Average Delivery Time: Calculating the average delivery time across markets and times of day.
- Actual vs. Estimated Delivery Time: Comparing predicted delivery times with actual performance to identify discrepancies.
- Peak-hour Order Trends: Analyzing order volumes during peak hours (e.g., 12 PM – 2 PM, 6 PM – 9 PM) and their impact on delivery times.
- Peak-hour Order Volumes: Identifying order volume trends during lunch and dinner periods.
- Impact on Delivery Times: Investigating how peak-hour orders correlate with delivery delays.

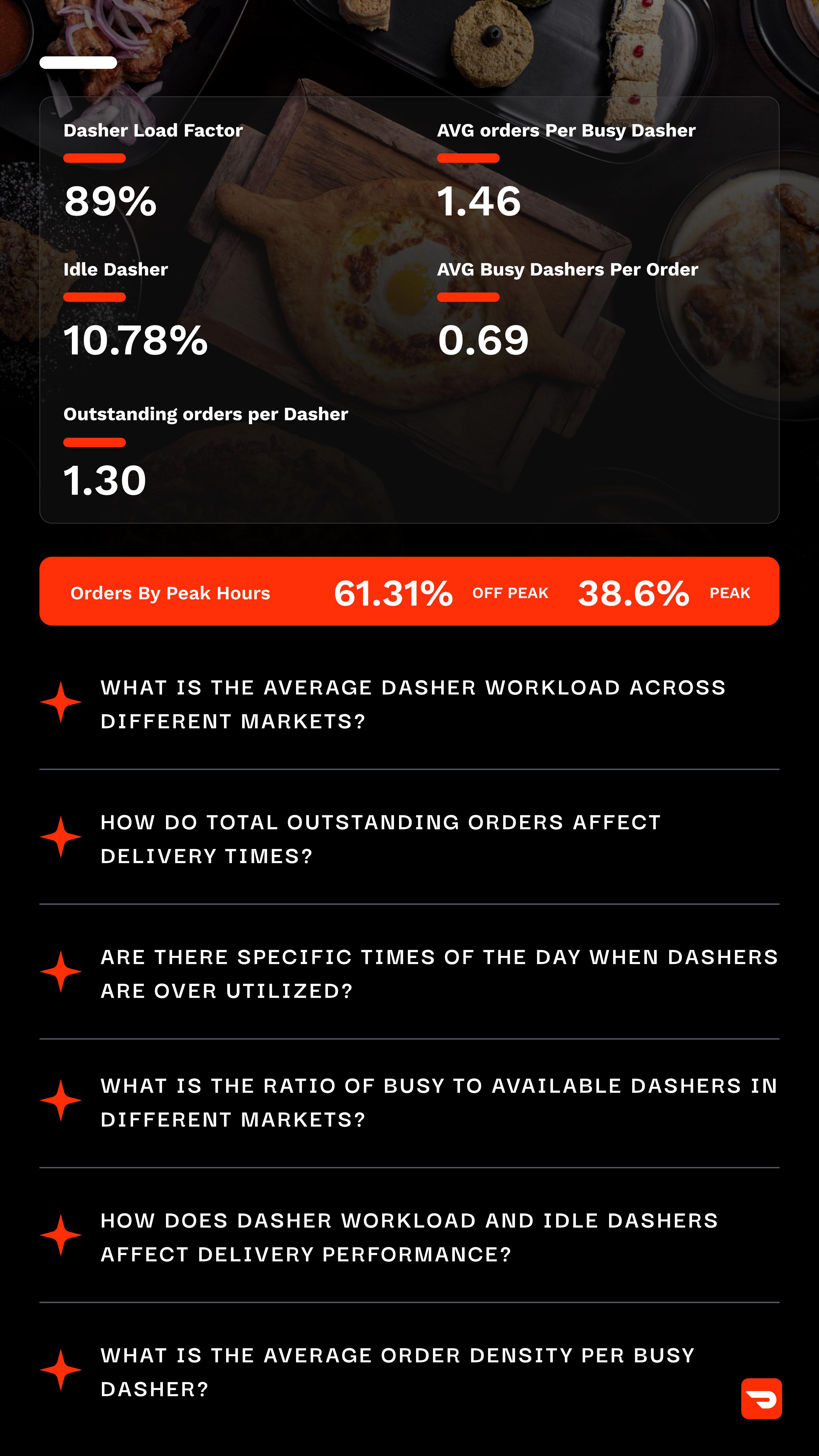
Revenue Analysis

- Revenue Contribution by Market: Identifying which markets contribute most to DoorDash's revenue.
- Cuisine Popularity: Analyzing popular cuisines by order volume and revenue, and identifying high-sales cuisines across regions.
- Order Value Characteristics: Studying large or peak-hour orders and their influence on revenue generation.
- Average Order Value by Market: Examining the average value of orders across various markets to assess regional spending patterns.
- Revenue per Cuisine: Analyzing revenue generated by different cuisines to identify top-performing cuisines in terms of both volume and revenue.
- Market-Specific Cuisine Revenue Trends: Identifying regional preferences and how specific cuisines contribute to market revenue



DASHER INSIGHTS





Dasher Load Factor

89%

AVG orders Per Busy Dasher

1.46

Idle Dasher

10.78%

AVG Busy Dashers Per Order

0.69

Outstanding orders per Dasher

1.30

Orders By Peak Hours

61.31% OFF PEAK

38.6% PEAK

★ WHAT IS THE AVERAGE DASHER WORKLOAD ACROSS DIFFERENT MARKETS?

★ HOW DO TOTAL OUTSTANDING ORDERS AFFECT DELIVERY TIMES?

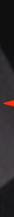
★ ARE THERE SPECIFIC TIMES OF THE DAY WHEN DASHERS ARE OVER UTILIZED?

★ WHAT IS THE RATIO OF BUSY TO AVAILABLE DASHERS IN DIFFERENT MARKETS?

★ HOW DOES DASHER WORKLOAD AND IDLE DASHERS AFFECT DELIVERY PERFORMANCE?

★ WHAT IS THE AVERAGE ORDER DENSITY PER BUSY DASHER?





WHAT IS THE AVERAGE DASHER WORKLOAD ACROSS DIFFERENT MARKETS?

The average dasher workload varies across different markets, with Miami having the highest load factor at 0.92 and Los Angeles the lowest at 0.80. Overall, the workload across all cities is relatively high, indicating a busy environment for dashers.

The cities with higher dasher load factors, such as Miami (0.92) and San Francisco (0.90), suggest a more consistent demand for delivery services, requiring dashers to work at or near their capacity.

★ HOW DO TOTAL OUTSTANDING ORDERS AFFECT DELIVERY TIMES?

As the number of outstanding orders increases, delivery times also tend to rise, particularly when orders exceed a certain threshold, with notable peaks observed when the outstanding orders are very high.

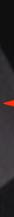
When the total outstanding orders are below approximately 50, the average delivery time remains relatively stable, hovering around 44 to 45 minutes. However, once the number of outstanding orders begins to climb, particularly beyond 100, the delivery times start to increase significantly, peaking at times above 60 minutes.

★ ARE THERE SPECIFIC TIMES OF THE DAY WHEN DASHERS ARE OVER UTILIZED?

Dashers are overutilized during the early morning and evening hours, with peak utilization observed between 3:00 AM and 4:00 AM. During this period, the average utilization exceeds 0.90, with the highest value of 0.922 at 3:00 AM, indicating a heavy workload for dashers. In contrast, utilization decreases significantly after 6:00 AM, before rising again in the evening.

The highest utilization occurs between 3:00 AM and 4:00 AM, followed by a notable spike at 19:00 and 20:00, likely due to increased customer demand during dinner hours.





WHAT IS THE RATIO OF BUSY TO AVAILABLE DASHERS IN DIFFERENT MARKETS?

Miami stands out with the highest busy-to-available dasher ratio of 0.94, indicating strong demand and a potential shortage of available dashers to meet it.

Markets like San Francisco, Chicago, and New York City have relatively high ratios (ranging from 0.89 to 0.90), signaling consistent demand and potentially strained resources. In Los Angeles, the lower ratio suggests that the market has a better balance between demand and dasher availability, possibly indicating a less crowded or more efficiently distributed dasher base.



HOW DOES DASHER WORKLOAD AND IDLE DASHERS AFFECT DELIVERY PERFORMANCE?

Dasher workload has a significant impact on delivery performance. When the average dasher workload exceeds 0.7, especially during peak hours like 2:00 AM to 4:00 AM and 19:00 to 20:00, delivery performance declines, as overburdened dashers lead to delays. High utilization during these periods indicates that dashers are stretched thin, which can slow down deliveries.

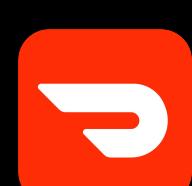
When workload is lower, dashers can handle orders more efficiently, reducing delivery times. However, low utilization could lead to idle dashers, which might impact performance if demand spikes.



WHAT IS THE AVERAGE ORDER DENSITY PER BUSY DASHER?

The average order density per busy dasher is highest in New York City, where each busy dasher handles about 1.44 orders on average. Following closely are San Francisco and Others, with densities of 1.42 and 1.37 respectively, indicating that dashers in these areas also handle a relatively high volume of orders.

Miami and Los Angeles have slightly lower densities at 1.32 and 1.31, but still show significant order volumes, suggesting that busy dashers in these cities are managing multiple orders, potentially leading to operational strain.



DELIVERY INSIGHTS



AVG Estimated Delivery Time

Average Delivery Delay

14.23

32.90

Order To Dasher Ratio

Outstanding orders per Dasher

1.46

1.30

Average Delivery Time

47.13

Orders By category

28.07% LOW ITEMS

62.13% MEDIUM

9.8% HIGH

★ WHAT IS THE AVERAGE DELIVERY TIME ACROSS ALL ORDERS?

★ WHICH MARKET HAS THE HIGHEST AVERAGE DELIVERY TIMES?

★ HOW DOES THE ACTUAL DELIVERY TIME COMPARE TO THE ESTIMATED DELIVERY TIME?

★ WHICH MARKETS EXPERIENCE THE HIGHEST DELAYS DURING PEAK HOURS?

★ WHAT ARE THE PEAK HOURS FOR ORDERS ACROSS DIFFERENT MARKETS?





WHAT IS THE AVERAGE DELIVERY TIME ACROSS ALL ORDERS?

The average delivery time across all orders is approximately 47.13 minutes. This indicates a standard delivery time, likely influenced by factors such as order volume, traffic conditions, and dasher availability.

This average delivery time represents a broad snapshot of all orders, but it could vary significantly depending on market conditions, time of day, and specific operational factors. While 47.13 minutes is reasonable in many urban settings, it could be considered a key metric for assessing the efficiency of the delivery process, and tracking it over time could reveal trends or inefficiencies.



WHICH MARKET HAS THE HIGHEST AVERAGE DELIVERY TIMES?

Miami has the highest average delivery time, with an average of approximately 50.57 minutes. This indicates that the delivery process in Miami may be facing specific challenges that increase the time it takes to complete an order.

A deeper dive into local factors, such as traffic patterns, regional staffing, and order density, could offer further insights into why delivery times in Miami are longer compared to other markets.



HOW DOES THE ACTUAL DELIVERY TIME COMPARE TO THE ESTIMATED DELIVERY TIME?

The actual delivery times are significantly higher than the estimated delivery times across all markets. For instance, Miami's average actual delivery time is around 50.57 minutes, whereas its estimated delivery time is only about 14.17 minutes, indicating a large discrepancy between expected and actual performance. The substantial gap between actual and estimated delivery times highlights potential issues in accurately predicting delivery durations. This discrepancy may be influenced by factors such as traffic, weather conditions, delays in processing or preparing orders, or challenges in optimizing delivery routes.





★ WHICH MARKETS EXPERIENCE THE HIGHEST DELAYS DURING PEAK HOURS?

Miami and New York City experience the highest average delays during peak hours, with Miami leading at 39.58 minutes and New York City following closely at 37.30 minutes.

Peak hour delays may be caused by a combination of high order volumes, traffic congestion, dasher availability, or inefficient routing. Miami's lead in delays could be attributed to factors such as heavy traffic or bottlenecks in delivery areas, while New York City's delays may be compounded by its dense population and complex urban infrastructure.

★ WHAT ARE THE PEAK HOURS FOR ORDERS ACROSS DIFFERENT MARKETS?

The peak hours for orders across different markets typically occur around 1 AM and 2 AM, with these being the hours of highest order volume. This trend is consistent across cities like San Francisco, New York City, Miami, Chicago, and Los Angeles, where 2 AM sees the highest number of orders, followed closely by 1 AM.

These late-night hours may reflect increased demand due to late-night dining or other local factors. Recognizing these peak hours can aid in streamlining delivery operations.



REVENUE INSIGHTS



Total Revenue

\$4.71M

Revenue Per Item

\$8.43

Total Orders

174K

AVG Busy Dashers Per Order

0.69

Average Item Per Order

3.21

AVG Min and Max Prices

\$452.7 MAX PRICE

\$8.34 MIN PRICE

★ WHAT IS THE REVENUE CONTRIBUTION OF EACH MARKET?

★ WHAT ARE THE MOST POPULAR CUISINES BASED ON ORDER VOLUME?

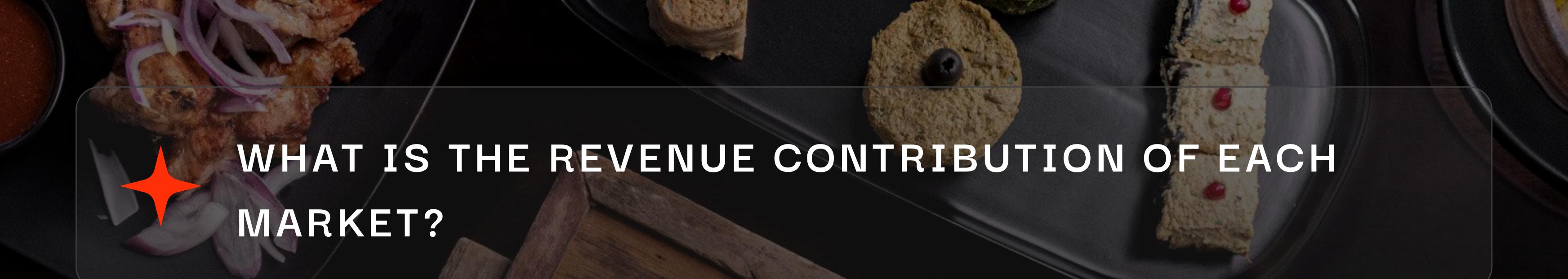
★ WHICH TIMES OF DAY OR DAYS OF THE WEEK SEE THE HIGHEST ORDER VOLUMES?

★ WHICH CUISINES GENERATE THE MOST REVENUE?

★ WHAT IS THE AVERAGE NUMBER OF DISTINCT ITEMS PER ORDER?

★ WHAT IS THE AVERAGE PRICE PER ITEM FOR EACH CUISINE CATEGORY?





★ WHAT IS THE REVENUE CONTRIBUTION OF EACH MARKET?

San Francisco and New York City are the largest revenue contributors, with revenue contributions of \$1,397,675.54 (29.68%) and \$1,334,252.41 (28.34%), respectively, collectively accounting for 58.02% of the total revenue. These two markets together generate a substantial portion of the overall revenue.

On the other hand, Miami contributes a considerable \$1,002,883.83 (21.30%) of the total revenue, making it another important market. Meanwhile, Chicago and Los Angeles, with contributions of \$539,514.07 (11.46%) and \$417,162.18 (8.86%), respectively, still play a key role in the overall revenue structure.

★ WHAT ARE THE MOST POPULAR CUISINES BASED ON ORDER VOLUME?

American cuisine tops the list, likely due to its broad appeal, encompassing a wide range of popular dishes such as burgers, sandwiches, and fried foods. Pizza and Mexican are the next most ordered categories, with pizza consistently ranking high across delivery platforms globally due to its versatility and widespread popularity. Burger and sandwich also feature prominently in the top five, aligning with the trend of consumers seeking quick, easily customizable, and satisfying meals. Asian cuisines like Chinese, Japanese, and Thai also show significant order volume, showcasing ongoing consumer demand for diverse and exotic flavors.

★ WHICH TIMES OF DAY OR DAYS OF THE WEEK SEE THE HIGHEST ORDER VOLUMES?

The highest order volumes occur around 2:00 AM, with Thursday leading at 6,263 orders, followed by Wednesday (6,170 orders) and Friday (6,036 orders). Late-night hours, particularly on Thursday, Wednesday, and Friday, see the most significant demand.

Additionally, Friday and Saturday have high order volumes, especially around 3:00 AM and 4:00 AM. Thursday, Wednesday, and Friday are the busiest days of the week, driving peak activity.





WHICH CUISINES GENERATE THE MOST REVENUE?

American cuisine generates the highest revenue, with over \$564,000 in total revenue, making it the most profitable category. This is followed by Pizza with \$460,000 and Mexican with \$352,000. The Japanese cuisine category comes in fourth, generating \$275,000, followed by Italian with \$248,000 in revenue.

Other popular cuisines that generate significant revenue include Chinese (\$239,000), Burger (\$211,000), and Thai (\$193,000), reflecting the demand for globally recognized food styles. Interestingly, niche categories such as Japanese, Chinese, and Indian also contribute substantially to overall revenue.



WHAT IS THE AVERAGE NUMBER OF DISTINCT ITEMS PER ORDER?

The average number of distinct items per order is approximately 3.21. This indicates that, on average, customers order just over three different items in a single transaction.

The number suggests a moderate level of complexity in order fulfillment, as businesses need to manage multiple items for each delivery, potentially increasing operational challenges but also providing opportunities for upselling and larger orders.



WHAT IS THE AVERAGE PRICE PER ITEM FOR EACH CUISINE CATEGORY?

The average price per item varies significantly across different cuisine categories, with cheese commanding the highest average price of \$17.57 per item, while convenience store items have the lowest average price at \$3.42 per item. Premium cuisines such as cheese, alcohol-plus-food, and steak tend to have higher average prices, reflecting the more specialized or luxury nature of these items. Fast food and casual categories, such as fast, burger, and sandwich, show relatively lower average prices, indicative of their quick-service and value-oriented positioning. International cuisines like mexican, indian, and chinese are typically priced in the middle range.



DASHBOARD VISUALS

DASHER INSIGHTS:



Overview:

The Dasher Insights Page provides a comprehensive view of dasher performance, focusing on how efficiently dashers are utilized across different markets. It tracks key metrics like dasher load, idle times, and order distribution, helping you identify potential areas for improvement in dasher allocation and order management.

Key Metrics:

- Dasher Load Factor:** Measures how much work busy dashers are handling compared to the available pool of dashers.
- Idle Dasher Percentage:** Highlights the percentage of dashers who are on shift but not currently handling orders.
- Outstanding Orders per Dasher:** Shows the average number of orders still pending per dasher.
- Orders per Busy Dasher:** Measures how many orders each busy dasher is handling on average.

Visuals:

- Line Chart showing Outstanding Orders per Dasher over time, to track trends in order density.

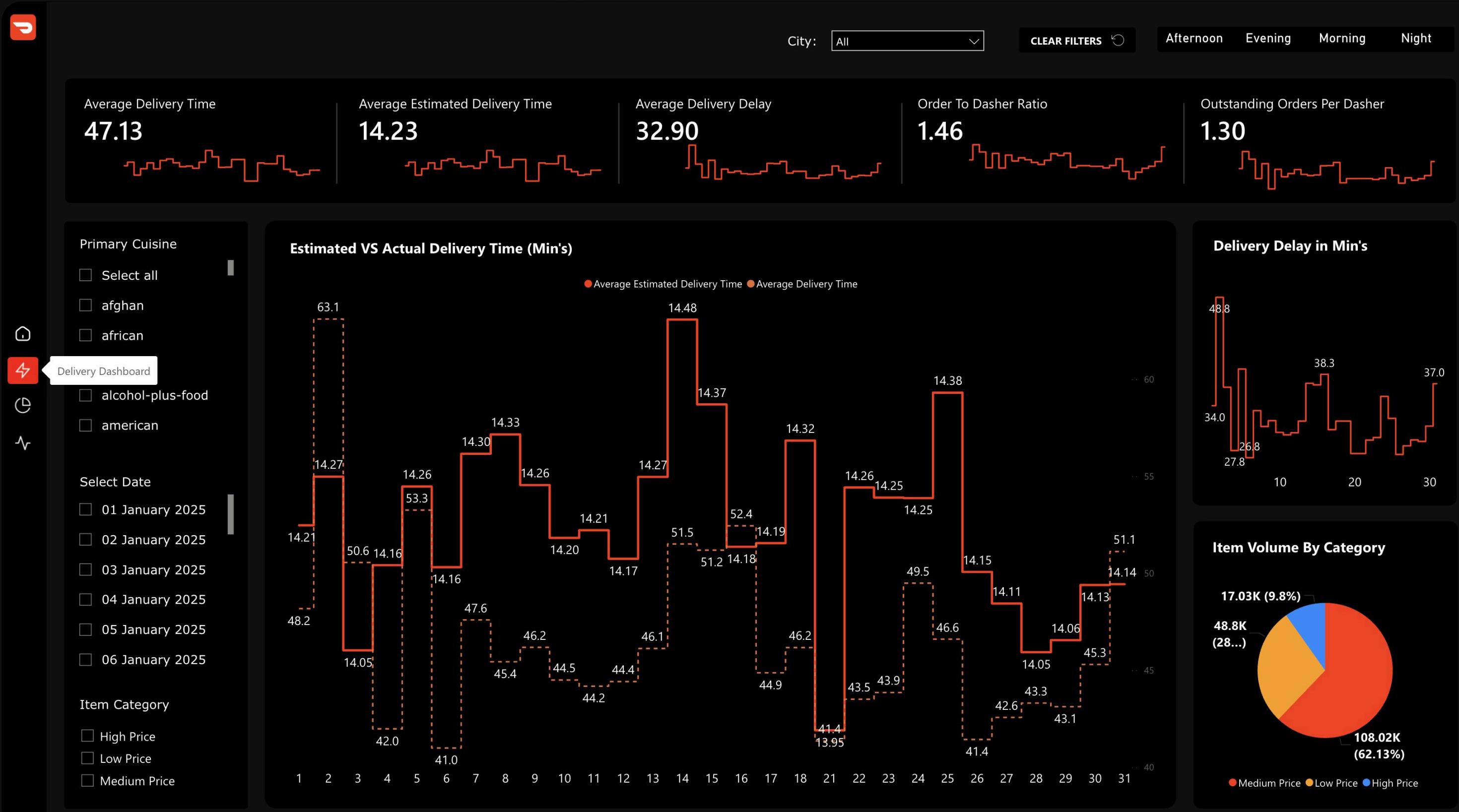


- Line Chart for Idle Dashers Percentage, helping us see how much idle time is occurring in different periods.
- Pie Chart breaking down Item Volumes by Price Category (Low, Medium, High), giving us a snapshot of how orders are distributed across pricing tiers.
- Donut Chart illustrating Orders by Peak Hours, comparing peak vs off-peak periods.
- Line and Stacked Column Chart displaying Busy Dashers per Order, showing the correlation between order volume and dasher availability.

Features:

- Filters to slice data by City/Market and Period of the Day.
- Buttons to easily Clear Filters and Show/Hide Filters for streamlined navigation.

DELIVERY INSIGHTS:



Overview:

The Delivery Insights Page focuses on delivery efficiency, comparing actual delivery times to estimated delivery times. It helps identify delays, measure the performance of the delivery process, and assess whether orders are meeting their promised delivery times.

Key Metrics:

- Average Delivery Time: Tracks the average time taken from order creation to delivery.
- Estimated Delivery Time: Shows the expected time for an order to be delivered, based on system estimates.



- **Delivery Delay:** The gap between the estimated and actual delivery times, highlighting any delays in the system.
- **Order-to-Dasher Ratio:** Measures the number of orders per dasher, helping assess dasher workload balance.
- **Outstanding Orders per Dasher:** Tracks the remaining orders assigned to dashers.

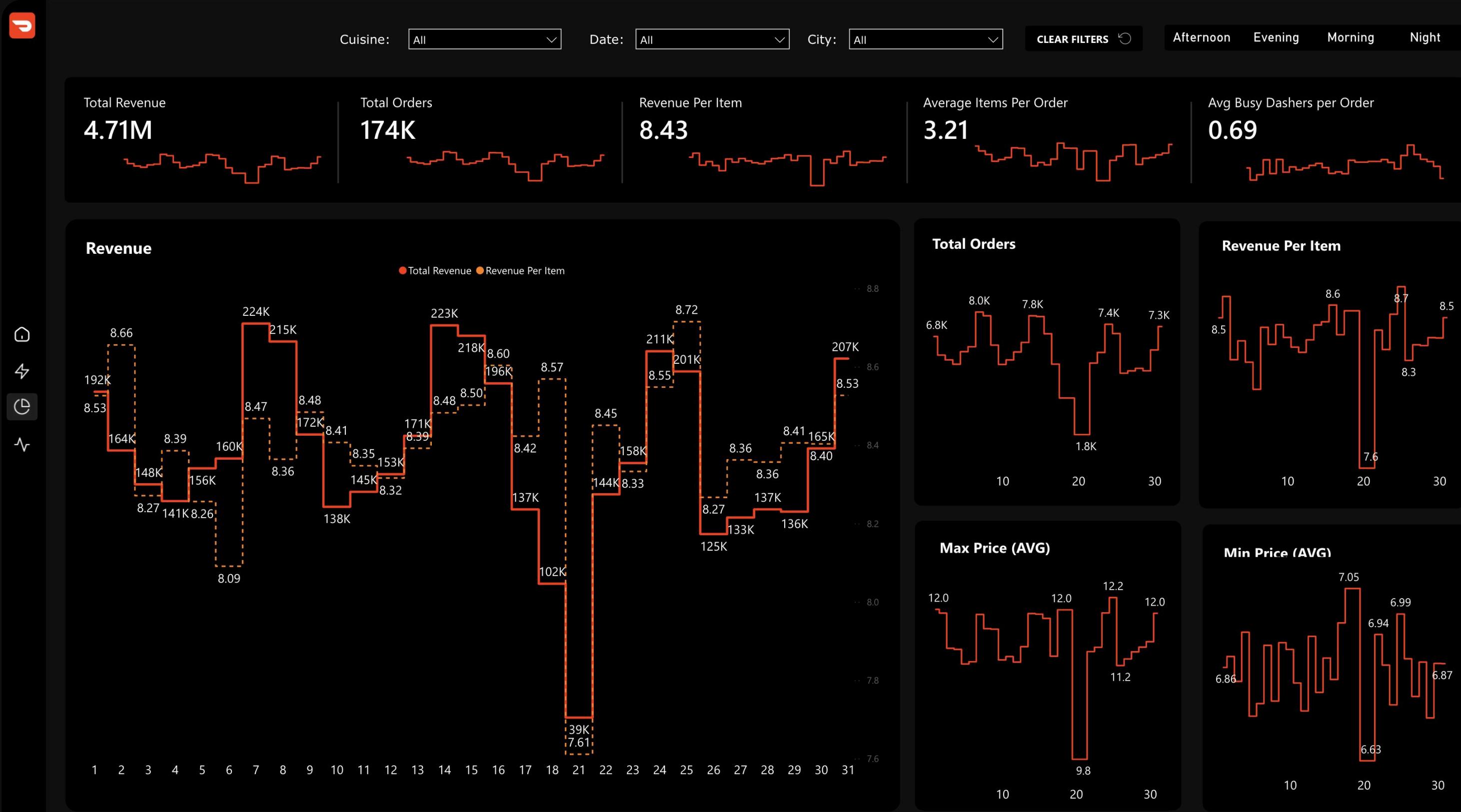
Visuals:

- Line Chart comparing Estimated vs. Actual Delivery Time across dates to identify any discrepancies.
- Line Chart displaying Delivery Delay trends, showing how delays fluctuate over time.
- Pie Chart visualizing Item Volumes by Price Category (Low, Medium, High), offering insight into how item pricing impacts delivery performance.

Features:

- Filters available for Store Category, Order Date, and Item Volume.
- Clear Filters button for resetting all applied filters.

REVENUE INSIGHTS:



Overview:

The Revenue Insights Page helps track financial performance, showing revenue trends and key metrics that drive business profitability. By analyzing total revenue, orders, and average revenue per item, this page gives a clear picture of how the business is performing financially.



Key Metrics:

- Total Revenue: The overall revenue generated during the selected period.
- Revenue per Item: Tracks the average revenue earned from each item sold.
- Average Items per Order: Measures how many items are typically purchased in each order.
- Busy Dashers per Order: Assesses how many dashers are typically involved in fulfilling each order.

Visuals:

- Line Chart showing Revenue per Item trends, allowing us to track how revenue per item changes over time.
- Line Chart visualizing Total Orders over time, giving insight into overall order volume trends.
- Line Chart for Max/Min Price trends, tracking price fluctuations and their impact on revenue.

Features:

- Filters for Cuisine, Date, and City/Market to drill down into specific data points.
- Clear Filters button to reset the filters and start fresh.



RECOMMENDATIONS

Dasher Workload & Delivery Performance:

Optimize Load Distribution: Balance dasher workload in high-demand areas by increasing dashers during peak hours (18:00, 20:00, 22:00).

Peak Hour Incentives: Offer bonuses during peak demand periods to attract more dashers.

Delivery Efficiency & Timeliness:

Enhance Time Estimates: Improve accuracy by incorporating real-time traffic, weather, and location data.

Predictive Analytics: Use AI to forecast demand and dynamically adjust resources to reduce delays in high-demand cities.

Buffer Times: Implement buffer periods during peak hours to manage delays and set realistic delivery expectations.

Cuisine Popularity & Product Offering:

Expand High-Performing Cuisines: Introduce premium versions or exclusive options of popular cuisines (e.g., Pizza, Mexican, American) to attract customers willing to spend more.

Localize Menus: Customize menu offerings based on local tastes and regional preferences (e.g., Japanese, Indian, or regional specialties) to better serve diverse customer bases.

Seasonal Menus: Offer limited-time or seasonal menu items that reflect current food trends, increasing order volumes during specific times of the year (e.g., summer specials or holiday-themed meals).



High-Value Orders & Delivery Efficiency:

Prioritize High-Value Orders: Expedite high-value orders (e.g., orders above \$50) during peak hours to ensure quicker delivery and enhanced customer satisfaction.

Accurate Time Estimates: Provide more accurate delivery times for high-value orders and ensure appropriate resources to avoid delays.

Premium Delivery Option: Offer an exclusive “premium delivery” service for customers willing to pay extra for faster, personalized service.

Time Optimization & Order Volume Management:

Optimize Peak Hour Resources: Use predictive models to adjust resources dynamically during peak hours, increasing dasher numbers or restaurant staff.

Promote Off-Peak Ordering: Offer discounts to encourage orders during off-peak hours, reducing strain during peak times.

Flexible Delivery Windows: Provide customers with a range of delivery windows or guaranteed delivery for certain hours to improve satisfaction.



CONCLUSION

The goal of this project was to explore delivery performance, dasher workload, order volumes, and revenue contributions across various markets. By analyzing data across these areas, I aimed to provide actionable insights for improving delivery efficiency, optimizing dasher performance, and increasing overall revenue. I also aimed to identify the key factors influencing late deliveries and highlight the operational challenges faced in different markets.

Recommendations:

Strategies such as better dasher load management, offering incentives during peak hours, and refining delivery time predictions are essential for improving service levels.

The data-driven insights suggest that operational efficiency can be enhanced by:

1. Optimizing dasher load distribution during peak hours.
2. Improving delivery time accuracy through better predictive models and better resource allocation.
3. Focusing on high-revenue markets and popular cuisines to maximize earnings while maintaining customer satisfaction.
4. Implementing extra incentives for dashers during peak hours.

Considerations:

Real-time data monitoring should be implemented to adapt delivery strategies dynamically. Dashers should also be incentivized to work during peak periods, and additional analytics can be leveraged to track the efficiency of these interventions.

Continuous optimization based on customer feedback and evolving market conditions will be crucial for sustaining performance and driving long-term growth.





THANK YOU