Fuel Optimization & Customer Retention for Aircraft Operations

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Business Problem

Our company operates a diverse fleet of aircraft ranging form small business jet to medium-sized machines. We have been providing high-quality air transportation services to our clients for several years, and our primary focus is to endure a safe ,comfortable, and convenient journey for our passengers. However, we are currently facing challenges due to several factors such as stricter environmental regulations, higher flight taxes, increased interest rates, rising fuel prices, and a tight labor market resulting in increased labor costs. Ad a result, the company's profitability is under pressure, and they are seeking way to address this issue. To tackle this challenge, they are looking to conduct an analysis of their database to find ways to increase their occupancy rate, which can boost the average profit earned per seat.

Objectives

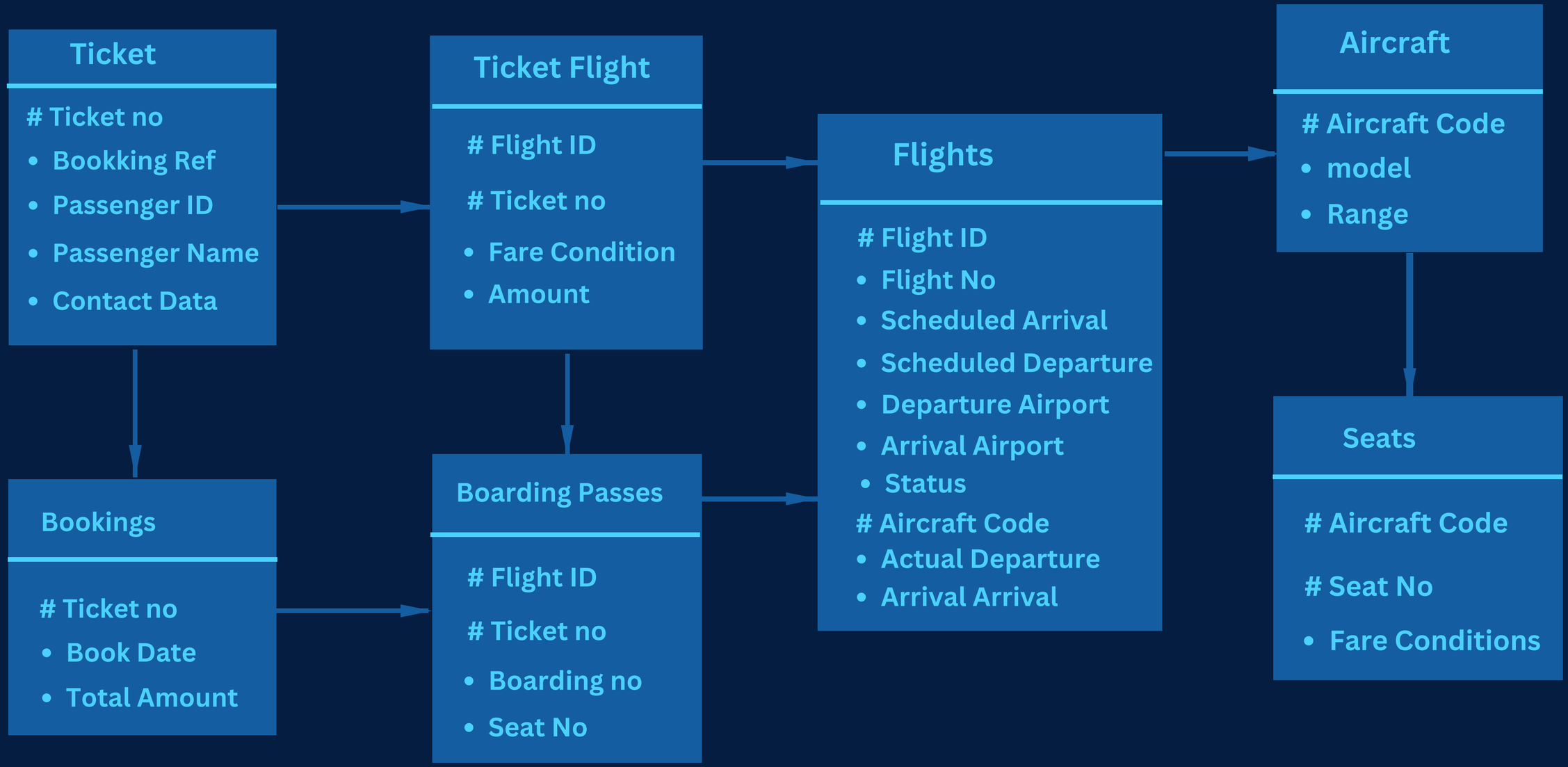
- **increase occupancy rate :** By increasing the occupancy rate, we can boost the average profit earned per seats and mitigate the impact of the challenges we're facing.

- **improving pricing strategy :** We need to develop a pricing strategy that takes into account the changing market conditions and customer preferences to attract and retain customers.

- **Enhance customer experience :** We need to focus on providing a seamless and convenient experience for our customer. from booking to arrival, to differentiate ourselves in a highly competitive industry and increase customer loyalty.

The end goal of this task would be to identify opportunities to increases the occupancy rate on low performing flights, and improve customer loyalty , which can ultimately lead to increase profitability for the airline.

Schema Used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Data analysis overview

Occupancy Insights

- Identified aircraft and routes with low occupancy rates.
- Pinpointed underperforming routes for optimization

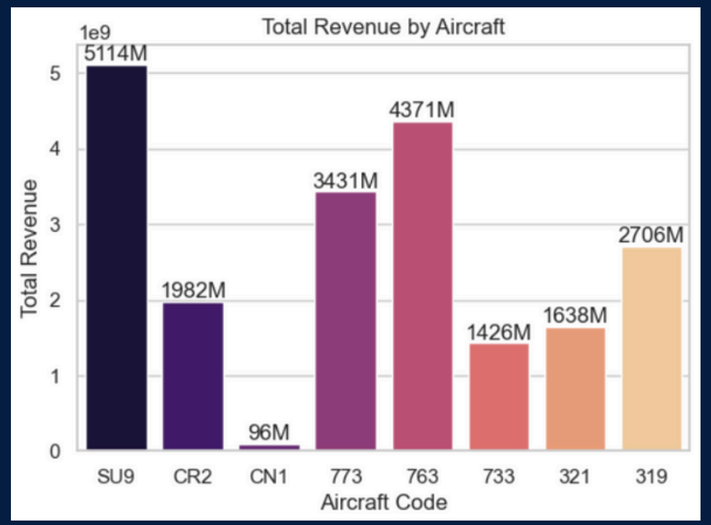
Customer Segmentation

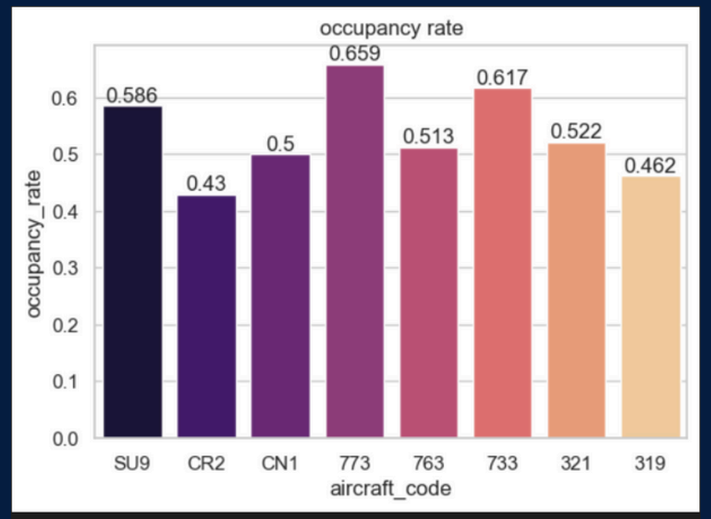
- Grouped customers into 4 categories based on purchase behavior:
  - Frequent vip customers: High purchase frequency.
  - Medium value Customers: Moderate frequency and spending.
  - Low value customers : Rarely purchase.
  - VIP Customers: High spending with strategic importance

3. Time Series Analysis

- Analyzed hourly and daily peak hours to identify revenue-generating timeframes.
- Used insights to optimize flight schedules and improve resource allocation.

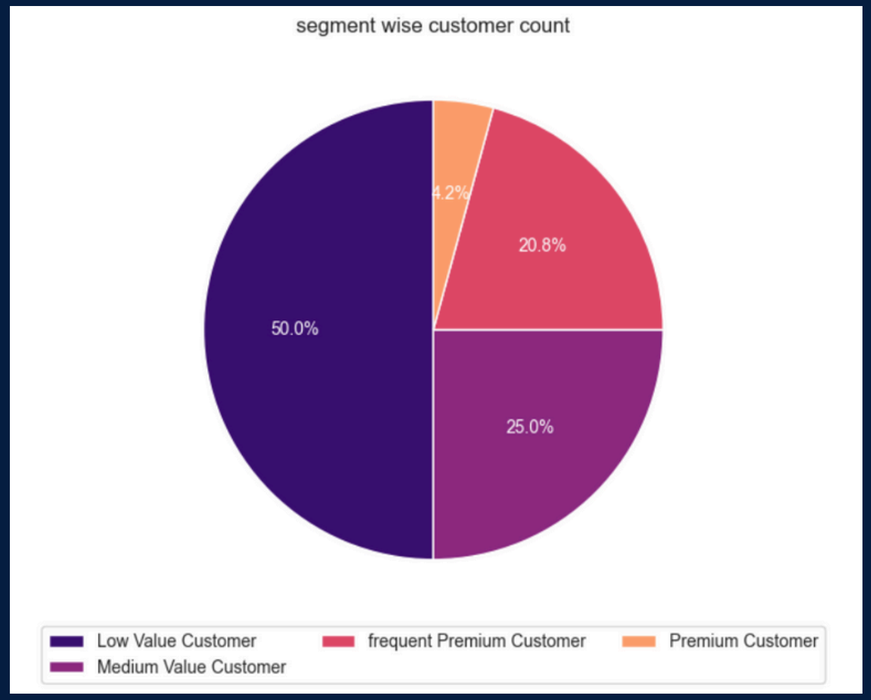
Key Insights: Aircraft Occupancy





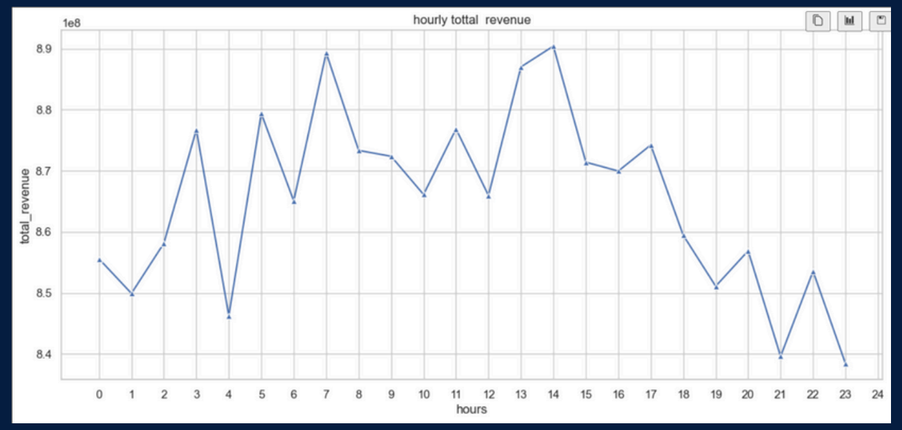
- **Top Performer:** SU9 generates the highest revenue (5.1B), while 773 has the highest occupancy rate (0.659).
- **High Efficiency:** 773 balances strong revenue (3.43B) with the best seat utilization.
- **Underperformers:** CR2 and CN1 have both low revenue and occupancy, indicating inefficiency.
- **Moderate performers:** 319 and 321 show moderate revenue but low-to-mid occupancy rates.
- **Strategic Focus Needed : -** To enhance occupancy rates and revenue, it is crucial to align aircraft selection with the number of available bookings. Deploying aircraft with higher capacity on high-demand routes and optimizing schedules for low-occupancy flights will ensure better seat utilization

Customer Segmentation Analysis



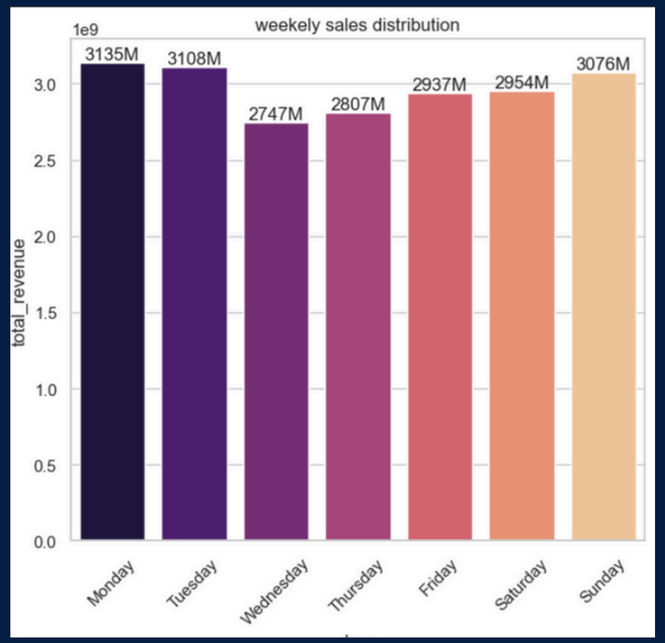
- **Low-Value Customers Dominate (50%)** – Half of the customer base falls into the low-value segment, indicating a need for strategies to increase their spending.
- **Medium-Value Customers (25%)** – A quarter of the customers contribute moderately, showing potential for targeted upselling or loyalty programs.
- **Frequent Premium Customers (20.8%)** – These high-spending, recurring customers are valuable and should be nurtured with personalized offers.
- **Premium Customers are the Smallest Segment (4.2%)** – A very small percentage are premium customers, suggesting room for growth in attracting and retaining more high-value clients.
- **Strategic Focus Needed** – Efforts should be made to convert low and medium-value customers into frequent premium customers through targeted engagement, loyalty incentives, and personalized services.

Time Series Analysis



Hourly analysis

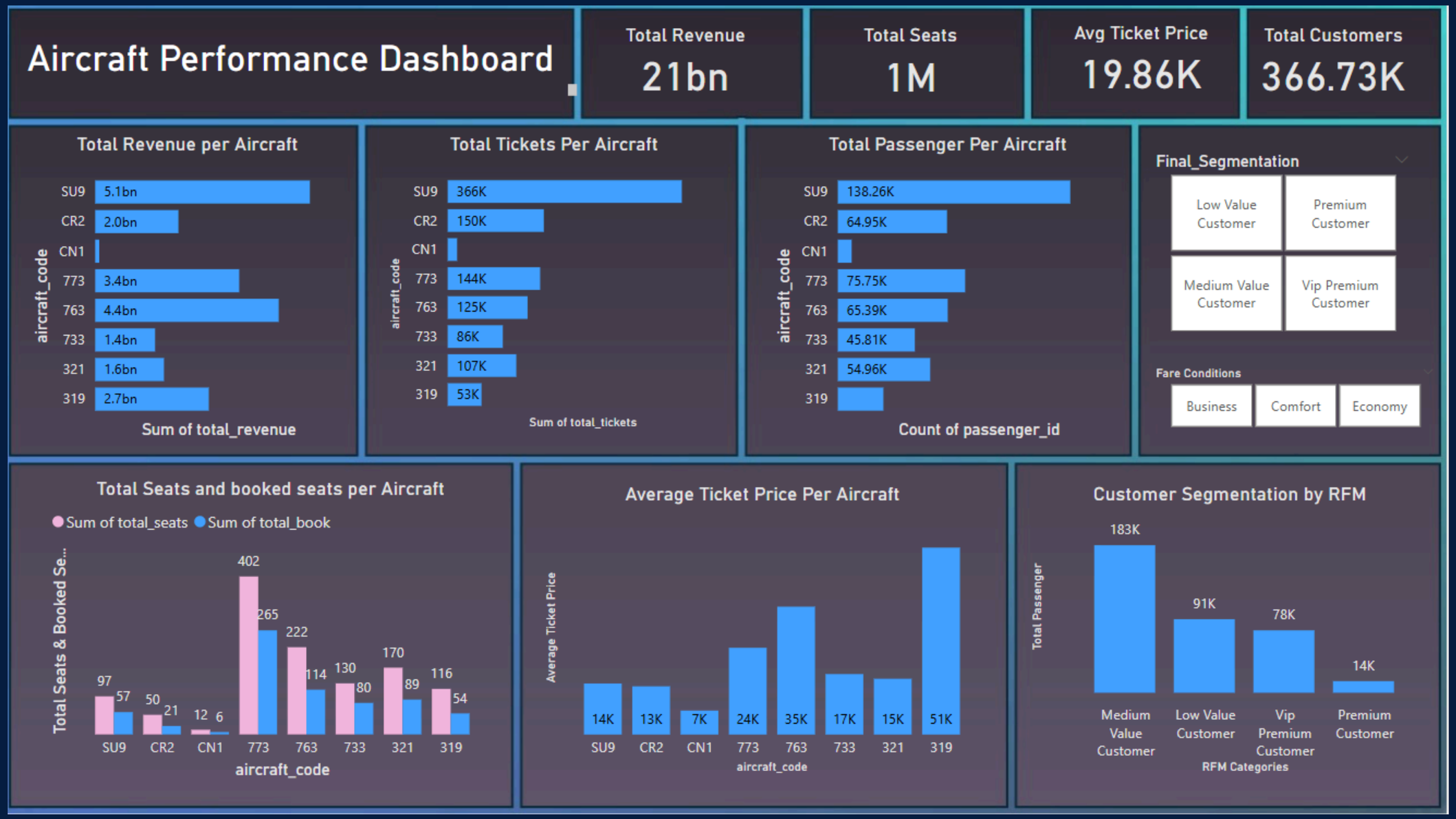
- Peak Revenue Hours: Significant revenue is generated during hours 3, 6, 13, and 15, indicating these are the busiest times for ticket bookings.
- Low Revenue Hours: Revenue sharply declines during hours 4, 12, and 21–24, likely due to reduced customer activity.
- Fluctuating Trend: Revenue does not follow a steady pattern, with frequent peaks and dips, highlighting inconsistent booking behavior throughout the day



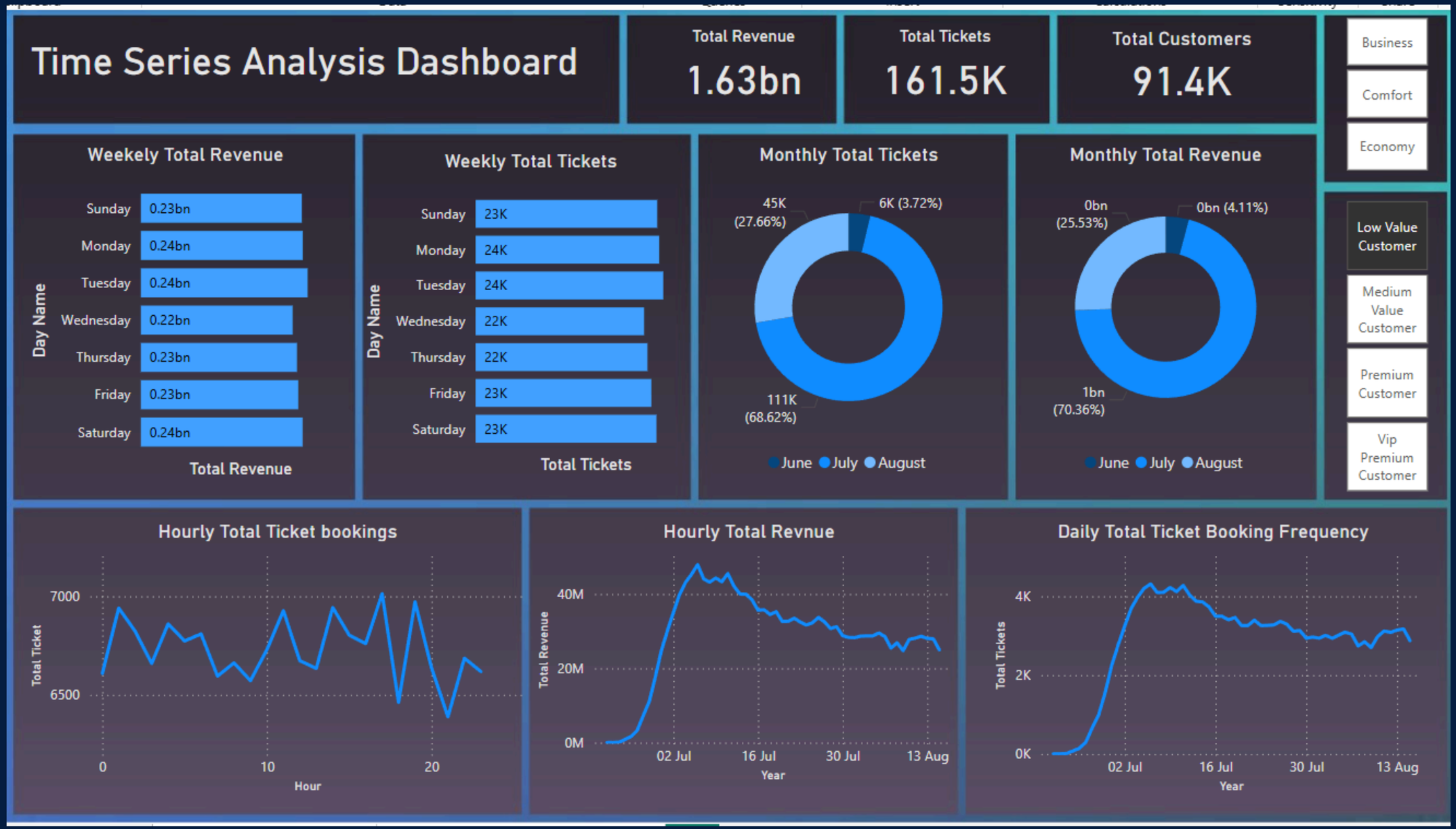
Weekely Analysis

- Highest Revenue Days: Monday and Tuesday have the highest sales, exceeding 3100M in total revenue, indicating these are peak business days.
- Lowest Revenue Day: Wednesday has the lowest sales, with total revenue dropping to 2747M, suggesting a mid-week slowdown in customer activity.

Power BI Dashboard



Power BI Dashboard



Strategic Recommendations

Quantified Potential Impact:

1. Aircraft Optimization:
    - Reduction in Fuel Costs: Strategic deployment of high-occupancy aircraft like 773 and better utilization of underperformers (CR2, CN1) could achieve a 10-15% reduction in fuel costs by minimizing unnecessary capacity.
    - Increased Revenue: Matching aircraft capacity to demand is expected to boost overall revenue by 8-12%, leveraging efficient aircraft like 773 and SU9.

2 . Customer Retention and Revenue Growth:
    - Customer Retention Rates: Targeted strategies for converting low and medium-value customers into frequent premium customers can increase retention by 15-20%, enhancing customer loyalty.
    - Revenue Growth: Better segmentation and personalized offers for premium customers could lead to a 5-8% increase in total revenue.

Strategic Recommendations:

- Aircraft Selection and Scheduling: Optimize aircraft deployment on high-demand routes and adjust schedules for underutilized flights to maximize efficiency.
- Customer Engagement: Introduce loyalty programs, upselling strategies, and personalized marketing to convert low-value customers and nurture high-value clients.

Conclusion

By leveraging data-driven insights, we've identified key opportunities to optimize fuel usage and improve customer retention. The actionable strategies outlined not only promise substantial cost reductions but also set the stage for long-term growth through increased customer loyalty.
Focusing on aircraft optimization and tailored customer engagement can significantly reduce operational inefficiencies and drive a more personalized customer experience. The potential impact on both fuel costs and revenue growth highlights the importance of data-backed decision-making in driving profitability

Tools and Techniques Used

- Python: Data processing, analysis, and visualization.
- SQL: Querying and transforming data.
- Power BI: Creating interactive dashboards for insights.