AIRLINES DATA ANALYSIS

BUSINESS PROBLEM

Our company has been providing high-quality air transportation service to our clients for several years, ensuring a safe, comfortable, and convenient journey for our passengers. We operate a diverse fleet of aircraft, ranging from small business jets to medium-sized machines. However, we currently face challenges due to various factors such as stricter environmental regulations, higher flight taxes, increased interest rates, rising fuel prices, and a tight labor market leading to higher labor costs. These challenges are putting pressure on the company's profitability, and we are actively seeking solutions to address this issue. In order to tackle this challenge, the company is planning to analyze their database and identify opportunities to increase the occupancy rate, thereby boosting the average profit earned per seat.

KEY OBSTACLES

1. **Stricter environmental regulations:** The airlines industry is facing increasing pressure to reduce its carbon footprint, leading to the implementation of more stringent environmental laws. These regulations not only raise operating costs but also restrict the potential for expansion.

2. **Higher flight taxes:** Governments worldwide are imposing heavier taxes on aircraft as a means to address environmental concerns and generate revenue. This increase in flight taxes has raised the overall cost of flying, subsequently reducing demand.

3. **Tight labor market resulting in increased labor costs:** The aviation sector is experiencing a scarcity of skilled workers, leading to higher labor costs and an increase in turnover rates.

OBJECTIVE

1. **Increase occupancy rate:** By increasing the occupancy rate, we can boost the average profit earned per seat and mitigate the impact of the challenges we're facing.
2. **Improve 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.
3. **Enhance customer experience:** We need to focus on providing a seamless and convenient experience for our customers, from booking to arrival, to differentiate ourselves in a highly competitive industry and increase customer loyalty.

The end goal of this project would be to identify opportunities to increase the occupancy rate on low-performing flights, which can ultimately lead to increased profitability for the airline.

ANALYSIS

Tools used:- Python, SQLLITE3

BASIC ANALYSIS

The basic analysis of data provides insights into the number of planes with more than 100 seats, how the number of tickets booked and total amount earned changed over time, and the average fare for each aircraft with fare conditions. These findings will be useful in developing strategies to increase occupancy rates and optimize pricing for each aircraft.

Table 1 shows the aircraft with more than 100 seats and actual count of the seats. The bar chart "AirCraft codes Vs Number of Seats" provides visual representation of the same

Aircraft Code	Model	Number of Seats
319	Airbus A319-100	116
320	Airbus A320-200	140
321	Airbus A321-200	170
733	Boeing 737-300	130
763	Boeing 767-300	222
773	Boeing 777-300	402

Table 1

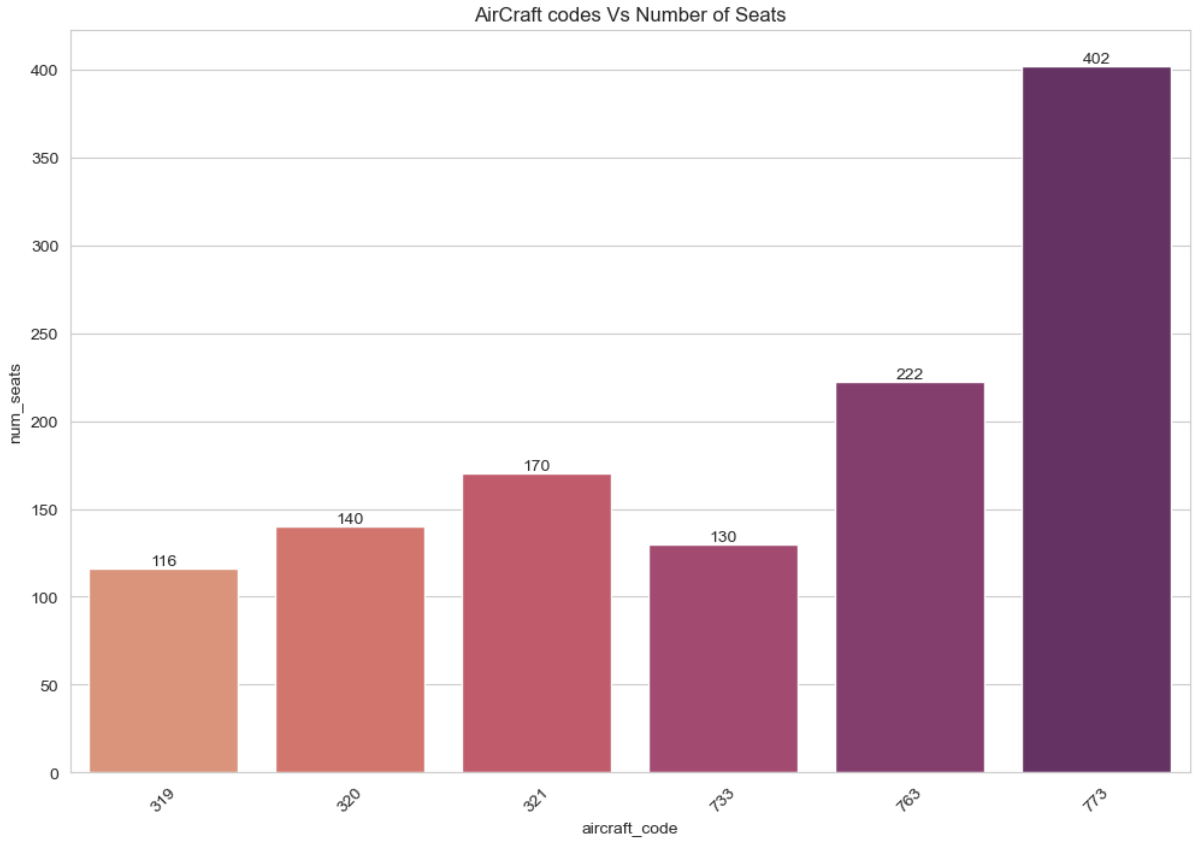

Figure 1

In order to gain a deeper understanding of the trend of ticket bookings and revenue earned through those bookings, we have utilized a line chart visualization. Upon analysis of the chart, we observe that the number of tickets booked exhibits a gradual increase from July 8th until August, with a noticeable peak in ticket bookings where the highest number of tickets were booked on a single day. It is important to note that the revenue earned by the company from these bookings is closely tied to the number of tickets booked. Therefore, we can see a similar trend in the total revenue earned by the company throughout the analysed time period. These findings suggest that further exploration of the factors contributing to the peak in ticket bookings may be beneficial for increasing overall revenue and optimizing operational strategies.

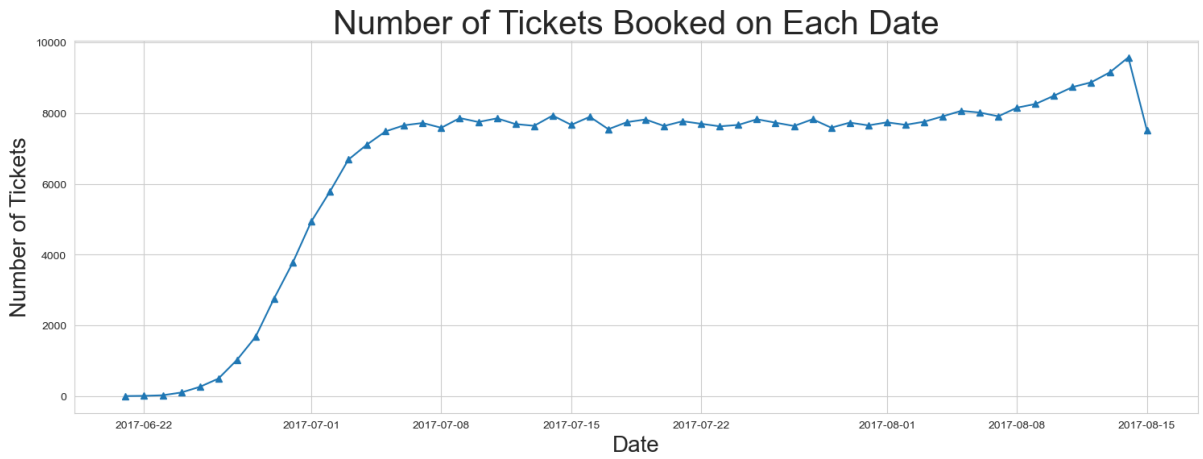

Figure 2

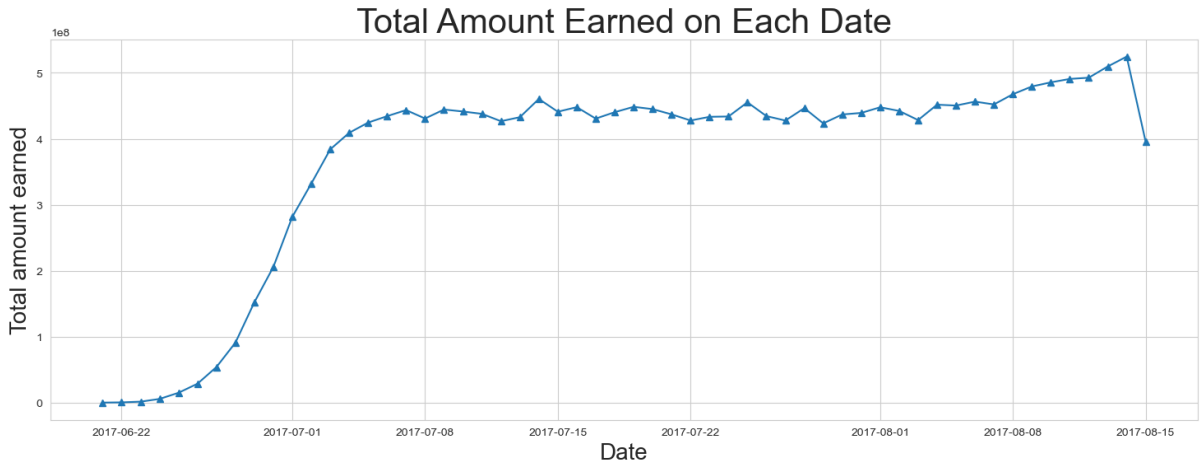

Figure 3

We were able to generate a bar graph to graphically compare the data after we completed the computations for the average costs associated with different fare conditions for each aircraft. The graph Figure 4 shows data for three types of fares: buisness, economy, and comfort. It is worth mentioning that the comfort class is available on only one aircraft, the 773. The CN1 and CR2 planes, on the other hand, only provide the economy class. When different pricing circumstances within each aircraft are compared, the charges for business class are consistently greater than those for economy class. This trend may be seen across all planes, regardless of fare conditions.

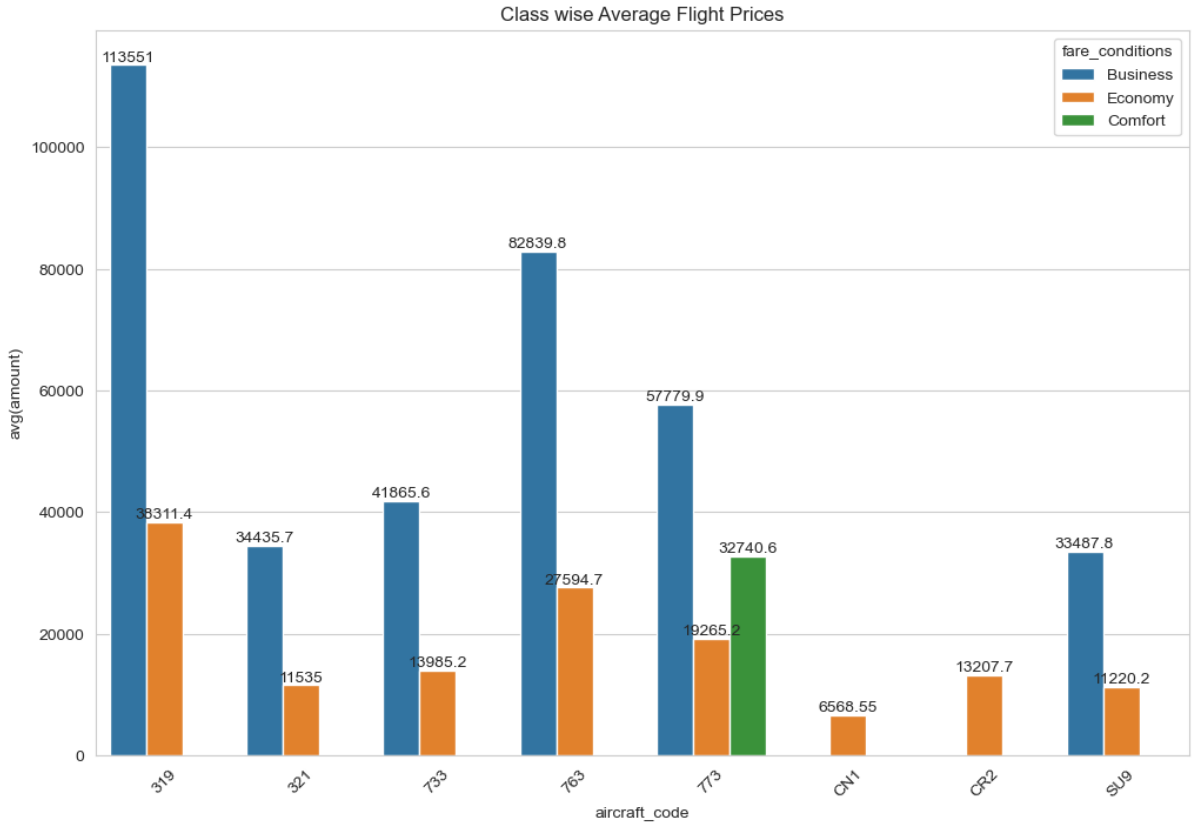

Figure 4

ANALYZING OCCUPANCY RATE

Airlines must thoroughly analyze their revenue streams in order to maximize profitability. The overall income per year and average revenue per ticket for each aircraft are important metrics to consider. Airlines may use this information to determine which aircraft types and itineraies generate the most income and alter their operations appropriately. This research can also assist indentifying potential for pricng optimization and allocating resources to more profitable routes. The below Figure 5 shows the total revenue, total tickets and average revenue made per ticket for each aircraft. The aircraft with the highest total revenue is SU9 and from the Figure 4 it can be seen that the price of the buisness class and economy class is the lowest in this aircraft. This can be the reason that most of the people bought this aircraft ticket as its cost is less compared to others. The aircraft with least total revenue is CN1, and the possible reason behind this is it only offers economy class with very least price and it might be because of its poor conditions or less facilities

	aircraft_code	ticket_count	total_revenue	avg_revenue_per_ticket
0	319	52853	2706163100	51201
1	321	107129	1638164100	15291
2	733	86102	1426552100	16568
3	763	124774	4371277100	35033
4	773	144376	3431205500	23765
5	CN1	14672	96373800	6568
6	CR2	150122	1982760500	13207
7	SU9	365698	5114484700	13985

Figure 5

The average occupancy per aircraft is another critical number to consider. Airlines may measure how successfully they fill their seats and dicover chances to boost occupancy rates by using this metric. Higher occupancy rates can help airlines increase revenue and profitability while lowering operational expenses assoiciated with vacant seats. Pricing strategy, airline schedules, and customer satisfaction are all factors that might influence occupancy rates. The below Figure 6 shows the average booked seats from the total number of seats for each aircraft. The occupancy rate is calculated by dividing the booked seats by the total number of seats. Higher occupancy rate means the aircraft seats are more booked and only few seats are left unbooked.

	aircraft_code	booked_seats	num_seats	occupancy_rate
0	319	53.583181	116	0.461924
1	321	88.809231	170	0.522407
2	733	80.255462	130	0.617350
3	763	113.937294	222	0.513231
4	773	264.925806	402	0.659019
5	CN1	6.004431	12	0.500369
6	CR2	21.482847	50	0.429657
7	SU9	56.812113	97	0.585692

Figure 6

Airlines can assess how much their total yearly turnover could improve by providing all aircraft a 10% higher occupancy rate to further examine the possible benefits of raising occupancy rates. This research can assist airlines in determining the financial impact of boosting occupancy rates and revenue while delivering greater value and service to consumers by optimizing pricing tactics and other operational considerations. The below Figure 7 shows how the total revenue increased after increasing the occupancy rate by 10% and it gives the result that it will increase gradually so airlines should be more focused on the pricing strategies.

	aircraft_code	booked_seats	num_seats	occupancy_rate	Inc occupancy rate	Inc Total Annual Turnover
0	319	53.583181	116	0.461924	0.508116	2.976779e+09
1	321	88.809231	170	0.522407	0.574648	1.801981e+09
2	733	80.255462	130	0.617350	0.679085	1.569207e+09
3	763	113.937294	222	0.513231	0.564554	4.808405e+09
4	773	264.925806	402	0.659019	0.724921	3.774326e+09
5	CN1	6.004431	12	0.500369	0.550406	1.060112e+08
6	CR2	21.482847	50	0.429657	0.472623	2.181037e+09
7	SU9	56.812113	97	0.585692	0.644261	5.625933e+09

Figure 7

CONCLUSION

In conclusion, airlines can maximize profitability by analyzing revenue data and making informed decisions. Factors such as total revenue, average revenue per ticket, and average occupancy per aircraft play a crucial role in this analysis. By identifying areas for improvement, adjusting pricing strategies, and optimizing routes, airlines can increase their profitability. A greater occupancy rate is one important feature that can enhance profitability since it allows airlines to maximize revenue while minimizing costs associated with vacant seats. The airline should revise the price for each aircraft as the lower price and high price is also the factor that people are not buying tickets from those airlines. They should decide the reasonable price according to the condition and facility of the aircraft.

However, it's important for airlines to consider consumer happiness and safety while striving for profit. Balancing these factors is key to long-term success in the competitive airline industry. Adopting a data-driven approach to revenue analysis and optimization can lead to sustainable growth and success.