

# Enhancing Profit Margins In A Challenging Aviation Industry

**Business Problem:** Our company operates a diverse fleet of aircraft ranging from small business jets 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 ensure 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 labour market resulting in increased labour costs. As a result, the company's profitability is under pressure, and they are seeking ways 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 help boost the average profit earned per seat.

## I. OBJECTIVE

The objective of this report is to conduct a comprehensive analysis of airline operations to identify strategic opportunities for improving profitability amidst rising operational challenges. Due to strict environmental regulations, increased flight taxes, soaring fuel prices, and a tight labour market driving up costs, the company's profit margins are under significant pressure.

To mitigate these issues, the focus of this report is to:

- **Increase the Occupancy Rate:** By analysing flight and booking data, we aim to identify underperforming routes and implement strategies to boost seat utilisation, thereby increasing the average profit earned per seat.
- **Optimise Pricing Strategy:** Evaluate current fare structures and market trends to develop more dynamic, data-driven pricing models that appeal to different customer segments and market conditions.

- **Enhance Customer Experience:** Improve the end-to-end passenger journey — from booking through to arrival — to increase satisfaction, loyalty, and repeat business in a highly competitive industry.

The ultimate goal of this task aims to uncover actionable insights that help increase occupancy on low-performing flights, leading to greater operational efficiency and profitability for the airline.

## II. ABOUT THE DATASET

The database 'travel.sqlite' is from an open-source which includes 8 tables. The database comprises the following tables:

- **aircrafts\_data**
- **airports\_data**
- **boarding\_passes**
- **aircrafts\_data:**
- **bookings**
- **flights**
- **seats**
- **tickets\_flights**
- **tickets**

## III. 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 different 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 the actual count of the seats.

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

Aircraft Code	Number of Seats
319	116
320	140
321	170
733	130
763	222
773	402

TABLE I

increase from June 22nd to July 7th, followed by a relatively stable pattern 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 analyzed 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.

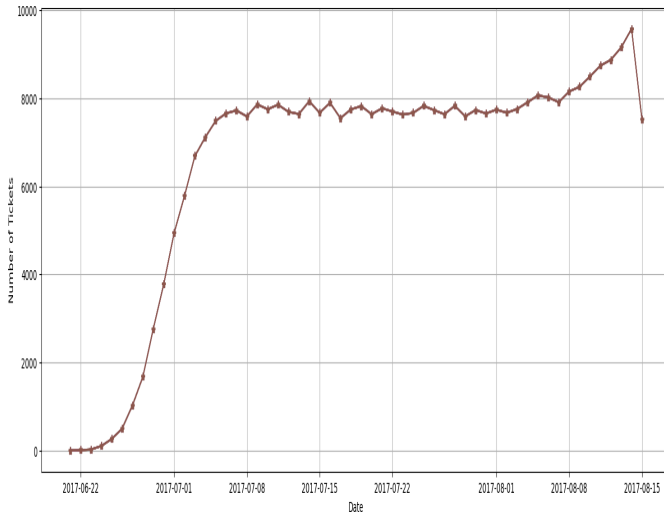


Fig. 1.

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 Fig.3 shows data for three types of fares: business, economy, and comfort. It is worth mentioning that the comfort class is available on only one aircraft,

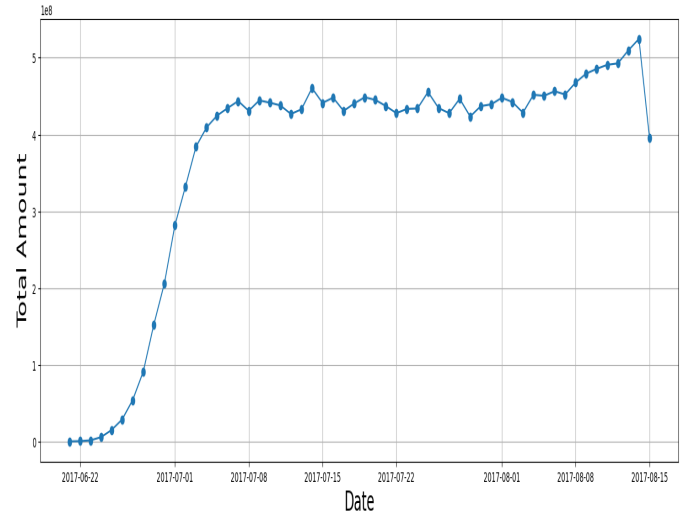


Fig. 2.

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.

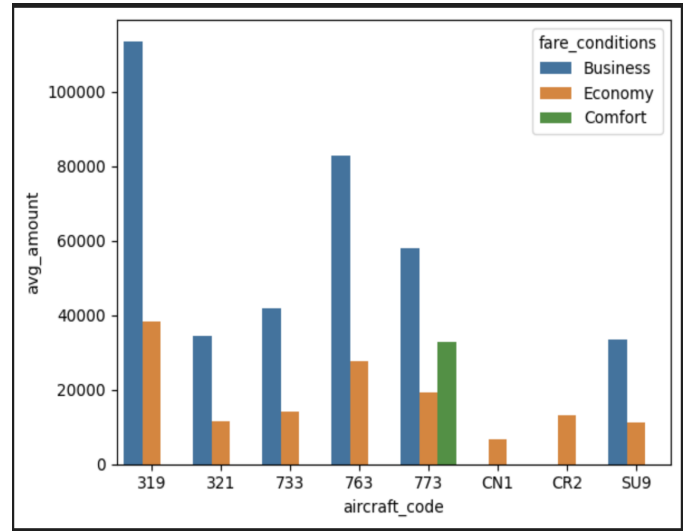


Fig. 3.

#### IV. 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 itineraries generate the most income and alter their operations appropriately. This research can also assist in identifying potential for pricing optimization and allocating resources to more profitable routes. The below Fig. 4 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 Fig. 3, it can be seen that the price of the business 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.

The average occupancy per aircraft is another critical number to consider. Airlines may measure how successfully they fill their seats and discover chances to boost occupancy rates by using this metric. Higher occupancy rates can help airlines increase revenue and profitability while lowering operational expenses associated with vacant seats. Pricing strategy, airline schedules, and customer satisfaction are all factors that might influence occupancy rates. The below Fig. 5 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. A higher occupancy rate means the aircraft seats are more booked and only a few seats are left unbooked. 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 if it is a realistic strategy. Airlines may enhance occupancy rates and revenue while delivering greater value and service to consumers by optimizing pricing tactics and other operational considerations. The below figure 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	total_revenue	ticket_count
0	319	2706163100	52853
1	321	1638164100	107129
2	733	1426552100	86102
3	763	4371277100	124774
4	773	3431205500	144376
5	CN1	96373800	14672
6	CR2	1982760500	150122
7	SU9	5114484700	365698

Fig. 4.

	aircraft_code	booked_seats	num_seats	occupancy_rate
0	319	53.58318098720292	116	0.461923974
1	321	88.80923076923077	170	0.522407235
2	733	80.25546218487395	130	0.6173497
3	763	113.93729372937294	222	0.51323105
4	773	264.9258064516129	402	0.6590194
5	CN1	6.004431314623338	12	0.50036927
6	CR2	21.48284690220174	50	0.429656938
7	SU9	56.81211267605634	97	0.58569188

Fig. 5.

## V. CONCLUSION

To summarize, analyzing revenue data such as total revenue per year, average revenue per ticket, and average occupancy per aircraft is critical for airlines seeking to maximize profitability. Airlines can find areas for improvement and modify their pricing and route plans as a result of assessing these indicators. A greater occupancy rate is one important feature that can enhance profitability since it

	aircraft_code	booked_seats	num_seats	occupancy_rate	Inc occupancy rate	Inc Total Annual Turnover
0	319	53.58318098720292	116	0.46192397402761143	0.5081163714303726	2976779410.0
1	321	88.80923076923077	170	0.5224072398190045	0.574647963800905	1801980510.0
2	733	80.25546218487395	130	0.617349709114415	0.6790846800258565	1569207310.0000002
3	763	113.93729372937294	222	0.5132310528350132	0.5645541581185146	4808404810.0
4	773	264.9258064516129	402	0.659019419033863	0.7249213609372492	3774326050.0
5	CN1	6.004431314623338	12	0.5003692762186115	0.5504062038404727	106011180.00000001
6	CR2	21.48284690220174	50	0.42965693804403476	0.4726226318484382	2181036550.0
7	SU9	56.81211267605634	97	0.5856918832583128	0.644261071584144	5625933169.999999

Fig. 6.

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 factors that people are not buying tickets from those aircrafts. They should decide the reasonable price according to the condition and facility of the aircraft and it should not be very cheap or high. Furthermore, boosting occupancy rates should not come at the price of consumer happiness or safety. Airlines must strike a balance between the necessity for profit and the significance of delivering high-quality service and upholding safety regulations. Airlines may achieve long-term success in a highly competitive business by adopting a data-driven strategy to revenue analysis and optimisation.