

AIRLINE OCCUPANCY

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1.1 Business problem

Our company operates a diverse fleet of aircraft ranging from small business jets to medium-size machines. We have been providing high-quality air transportation services to our client for several years, and our prime 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 environment regulation, higher flight taxes, increased interest rates, rising fuel prices and a tight labour market resulting increased labour costs. As a result, the company's profitability is under pressure and they are looking to conduct an analysis of their databases to find a way to increase their occupancy rate, which can help them to boost the average profit earned per seat.



1.2 Main challenges

1. **Stricter environmental regulations:** The demand on the airline industry to decrease its carbon footprint is growing, which has result in more stringent environmental laws that raise operating cost and restrict expansion potential.

2. **Higher flight taxes:** To solve environmental issues and increase money, governments all around the world are taxing more heavily, which raises the cost of flying and decreases demand.
3. **Tight labour market resulting in increased labour costs:** The lack of trained people in the aviation sector has increased labour costs and increased turnover rates.

1.3 Objectives

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 condition 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 increased customer loyalty.

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

1.4 Basic analysis

The basic analysis of data provides insights into the number of planes with more than 100 seats, how the numbers of the tickets booked and total amount earned charger over the time and the average fare for each aircraft with different fare conditions. These findings will be useful in developing strategies to increase occupancy rate and optimising price for each aircraft. **Table 1** shows the aircraft with more than 100 seats and the actual count of the seats.

Aircraft_Code	Num_Seats
319	116
320	140
321	170
733	130
763	222
773	402

In order to gain deeper understanding of the trend of the ticket bookings and revenue earned through those bookings, we have utilized a line chart visualization. Upon analysis of the chart, we observed that the number of tickets booked exhibits gradual increase from June 33 to July 7th, followed by a relative stable pattern from July 8th until August, with a noticeable peak in the ticket bookings where the highest number were booked on a single day. It is important to note that the revenue earned by the company 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 factor contributing to the peak in the ticket bookings may be beneficial for increasing overall revenue and optimising operational strategies.



Fig 1



Fig 2

We were able to generate a bar graph to graphically compare the data after we completed the computations for the average cost associated with different fare conditions for each aircraft. The graphs **Fig 3** shows data for three types of fares: business, economy and comfort. It is worth mentioning that comfort classes are available

on only on aircrafts, 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 aircrafts, regardless of fare conditions.

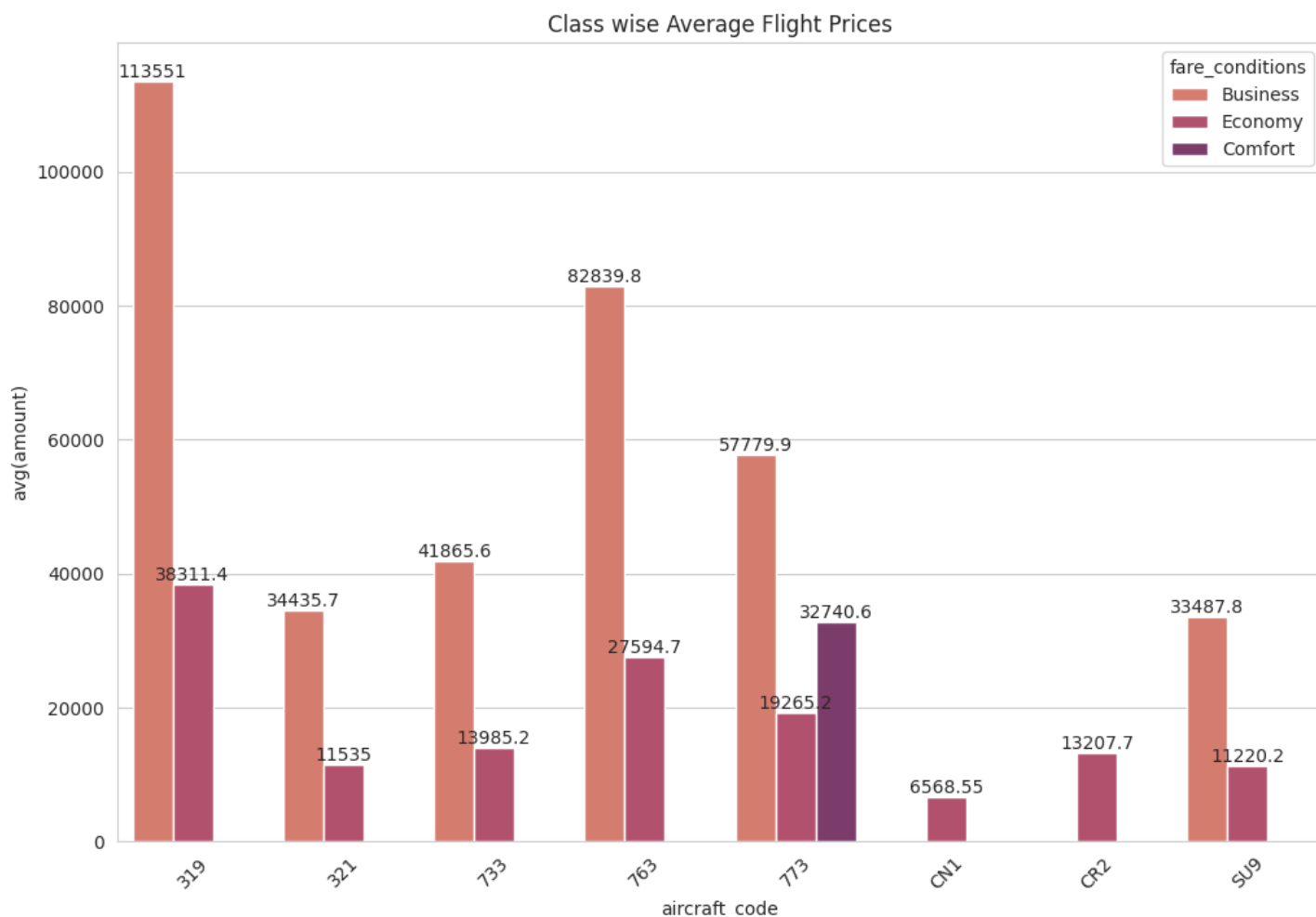


Fig 3

1.5 Analysing occupancy rate

Airlines must thoroughly analyse their revenue streams in order to maximize profitability. The overall income per year and revenue per ticket for each aircraft are important metrics to consider. Airlines may use this information to determine which aircraft types and itineraries generate most income and alter their operation 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 tickets for each aircraft. The aircraft with the highest total revenue is SU9 and from the **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 less compared to others. The aircraft with the total revenue is CN1, and the possible reason behind this is it offer economy class with very least price and it might be because of its poor condition 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

Fig 4

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 using this metrics. 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 total number of seats for each aircraft. The occupancy rate is calculated by dividing the booked seats by the total number of the seats in the aircraft. Higher occupancy rate means the aircraft seats are more booked and only few seats are left un-booked.

	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

Fig 5

Airline 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 revenues while delivering greater value and services to customers 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 give the result that it will increase gradually so, airlines should be more focused on pricing strategies.

	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

1.6 Analysing other factors for profitability

Low revenue generating airports may indicate underutilization of infrastructure and resources. These airports might have lower passenger traffic, limited demand, or operational challenges that contribute to reduced revenue. Airlines should evaluate the potential causes of low revenue generation at these airports. They can consider implementing targeted marketing campaigns, enhancing airport services, or adjusting flight schedules to attract more passengers. If certain airports consistently underperform despite these efforts, it might be prudent to reduce or eliminate flights to those locations to allocate resources more effectively elsewhere. **Fig 7** shows 10 lowest revenue generating airports

	airport_name	total_revenue
70	Strezhevoy Airport	246400
22	Grabtsevo Airport	2097600
52	Nyagan Airport	2294400
77	Ukhta Airport	2746300
82	Usinsk Airport	3141100
14	Cherepovets Airport	3184500
55	Penza Airport	3231600
18	Donskoye Airport	3691600
21	Gorno-Altaysk Airport	3763800
32	Kogalym International Airport	5518000

Fig 7

Routes with low revenue generation can significantly impact an airline's overall profitability. These routes may have low passenger demand, high operational costs, or stiff competition, making them less profitable. Airlines should analyse the factors contributing to the low revenue of these routes. Strategies to improve profitability might include adjusting pricing strategies, offering promotions, optimizing flight schedules to match demand patterns, or enhancing the customer experience on these routes. In some cases, it may be necessary to discontinue unprofitable routes and reallocate aircraft and crew to more profitable ones. Below bar graph show 10 lowest revenue generating routes.

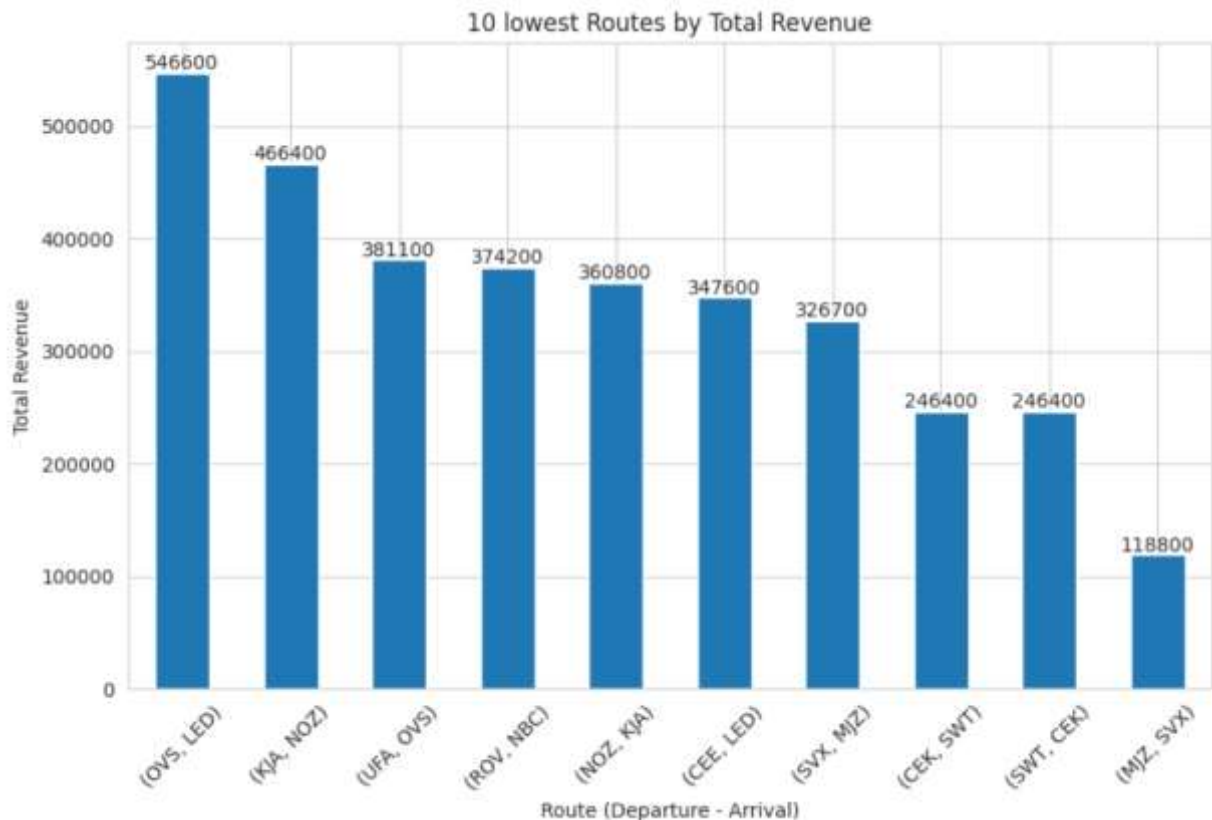


Fig 8

To summarize, analysing 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 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 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.

1.7 Suggestions

1. **Implement Dynamic Pricing:** Adjust ticket prices based on real-time demand, competition, and booking trends to maximize seat occupancy.
2. **Route Diversification:** Explore alternative routes or add stopovers that could potentially increase passenger traffic and make the routes more profitable.
3. **Target Low Revenue Airports:** Focus marketing and promotional efforts on underperforming airports to boost passenger numbers, or reduce services to reallocate resources effectively.
4. **Tailored Marketing Campaigns:** Use passenger demographic insights to create targeted marketing campaigns that highlight specific conveniences and attract different customer segments.
5. **Offer Promotions and Discounts:** Introduce promotions and discounts during off-peak seasons to attract more passengers and increase occupancy rates.