Passenger Satisfaction in Air Travel: What the Data Tells Us

The dataset I used for this project contains airline passengers' ratings of their travel experience. It includes 23 columns, with 129,880 entries for most columns. One column, “Arrival Delay in Minutes”, has slightly fewer with 129,487 entries. The three key areas of service are “Online Experience, Inflight Experience, and Flight Experience”. We’ll look at whether the passengers were satisfied or dissatisfied with each area.

The goal of this analysis is to identify key factors that influenced satisfaction, understand how different types of services shaped perception, and see whether distinct passenger groups exist based on their preferences and experiences. These findings aim to offer workable insights to help airlines improve service quality and increase overall customer satisfaction.

To start my analysis, I explored the dataset to reveal some key characteristics. It contained a balanced representation of different travel classes, with some more common than others. Passenger satisfaction is skewed, with many respondents expressing dissatisfaction with certain services, especially delays and food/drinks. Ratings across features such as inflight entertainment, seat comfort, and online booking showed clear variation, with some areas showing uneven performance.

Visualizations such as bar charts, boxplots, and correlation heatmaps were used to support these observations. For example, satisfied passengers consistently rated online services, inflight comfort, and food higher than dissatisfied passengers. A correlation heatmap showed a strong positive relationship between inflight service quality and overall satisfaction.

The next part of my analysis looked at the three key areas using high level analysis. The first key area Online Experience, focused on these three questions:

1. What are the average ratings for **[Ease of Online Booking, Online Support, Online Boarding]** among satisfied vs. dissatisfied customers?
2. Is there a significant difference in **[Ease of Online Booking]** ratings between satisfied and dissatisfied customers?
3. Does Ease of Online Booking predict overall satisfaction?

I noticed that satisfied passengers gave higher average ratings for Ease of Online Booking, Online Support, and Online boarding compared to dissatisfied ones. This was visualized using grouped bar charts. A t-test compared ratings of Ease of Online Booking between the two groups revealed a statistically significant difference with satisfied passengers rating it higher, meaning we reject the null hypothesis. A boxplot shows the difference in distribution. I also performed a linear regression showing that Ease of Online Booking positively predicts overall satisfaction. The slope was positive and statistically significant, indicating a meaningful relationship between the two and it's not due to random chance.

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T-statistic: 172.3726854018023
P-value: 0.0
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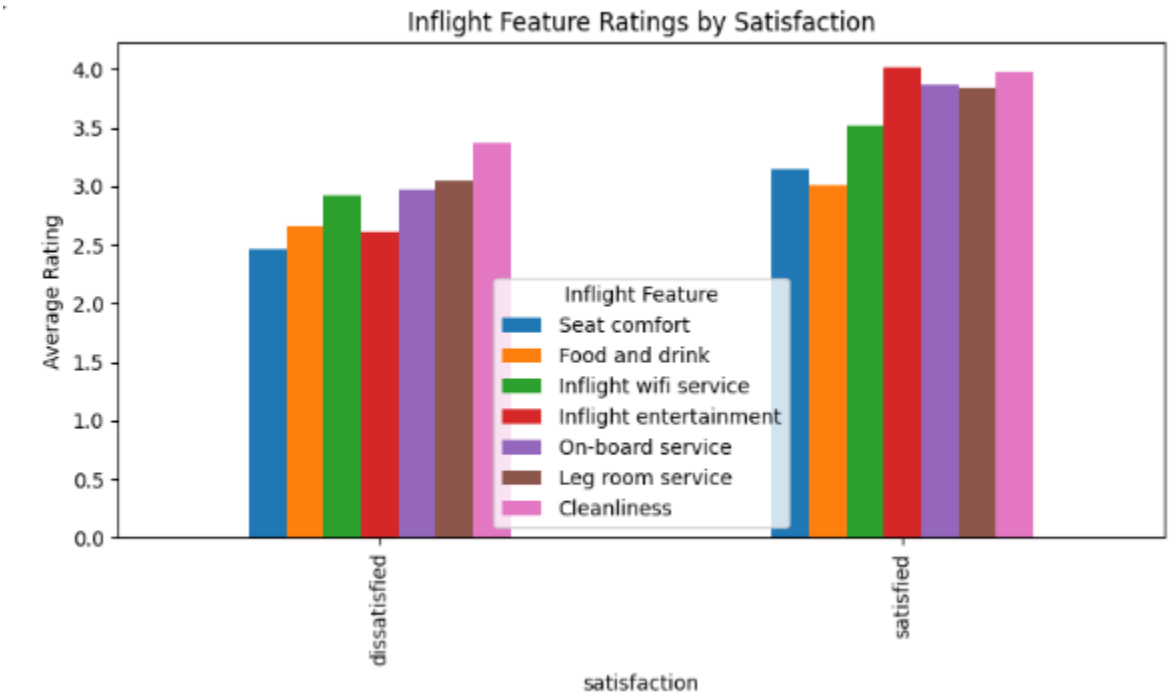
The second key area Inflight Experience, focused on these three questions:

1. Can we group passengers into clusters based on inflight experience factors, and what do these clusters reveal about satisfaction?
2. Is there a significant difference in Seat Comfort between Classes?
3. Do satisfied and dissatisfied passengers rate inflight features **[Wi-Fi, Food and Drink, Entertainment, etc.]** differently?

After performing the k-means clustering, the results revealed three passenger types: one group with higher ratings across all features (very satisfied), one with mixed ratings (neutral) and one with low ratingsin food and delays (dissatisfied).

A t-test was performed to compare seat comfort across travel classes, revealing significant differences, with Business class receiving the highest comfort ratings. To compare ratings between inflight features and satisfaction, I used a bar plot and a statistical test, which showed

that satisfied passengers consistently gave higher ratings for inflight features compared to dissatisfied passengers.



In the third area, we look at the Flight Experience and asked three questions:

1. Can we predict passenger satisfaction from flight experience data?
2. Do longer Flight Distances lead to longer Arrival Delays?
3. Which class has the highest average satisfaction?

A chi squared test of independence was conducted to examine the relationship between satisfaction and flight delays. These results were statistically significant, suggesting a strong association between the two. Satisfied passengers were more likely to have experienced no delays, compared to dissatisfied passengers. While some dissatisfied passengers also had no delays, others did experience delays, indicating that delays are more common among dissatisfied passengers.

A linear regression showed a positive correlation between flight distance and arrival delays, meaning longer flights tend to be more prone to delays, though the relationship was mild. I also looked at satisfaction across the classes and found that business class passengers had the highest share of satisfied responses. A visualization of satisfaction rates by class confirmed this trend

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Satisfaction Rate by Class:
      Class  Satisfaction Rate
0  Business               0.71
2  Eco Plus               0.43
1       Eco               0.39
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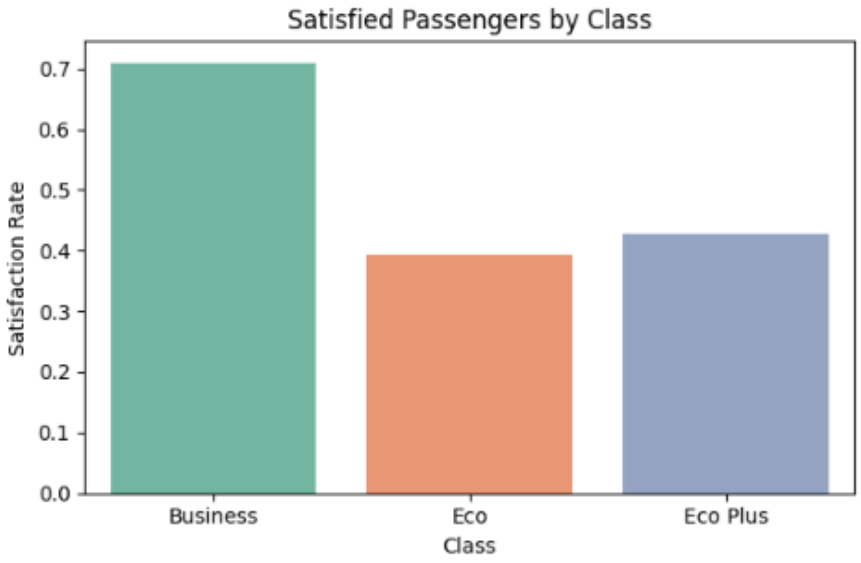

This project revealed several important insights into airline passenger satisfaction. High ratings in digital services, inflight comfort, and operational efficiency all correlate strongly with satisfaction. In contrast, delays, poor food service, and uncomfortable seating are major contributors to dissatisfaction.

Clustering analysis provided an additional layer of insight, revealing distinct passenger personas that airlines can target for service improvements. Statistics and hypothesis testing models also show how practical it is to predict satisfaction using available data.

In the end, the findings suggest that airlines should invest in consistent inflight quality and improve online service. They should also minimize delays to enhance customer loyalty and satisfaction.