Airline Passenger Satisfaction Project

I/ Overview Summary

1. What is the total number of passengers in the dataset?

total_passengers
103904

⇒ Showing a total of **103,904** passengers, providing a large dataset for analysis.

2. What percentage of passengers are Satisfied and Dissatisfied?

satisfaction	Percentage
Dissatisfied	57.000000000000
Satisfied	43.000000000000

⇒ Showing that **57%** of passengers are **dissatisfied**, highlighting potential service improvement needs.

3. How does the Satisfaction Rate vary by Age Group?

age_group	satisfaction_rate_percentage	total_passengers
36-50	53.780000000000	35698
51-65	51.300000000000	22739
20-35	36.860000000000	31648
65+	18.370000000000	4006
<20	17.950000000000	9813

⇒ Showing higher satisfaction among **middle-aged passengers (36–50)** and lower satisfaction among the youngest and oldest groups.

4. How many passengers travel for Business compared to Personal reasons?

travel_Type	total_passengers
Business Travel	71655
Personal Travel	32249

⇒ Showing that **Business Travel** accounts for over **twice** as many passengers as Personal Travel.

5. How many passengers are in each Travel Class?

travel_class	total_passengers
Business	49665
Economy	46745
Economy Plus	7494

⇒ Showing an almost even split between **Business** and **Economy** passengers, with a small share in **Economy Plus**.

6. How is the passenger count distributed by Gender?

gender	total_passengers
Female	52727
Male	51177

⇒ Showing a nearly **balanced** gender distribution, with a slight female majority.

7. How does the Satisfaction Rate vary by the combination of Travel Class and Age Group?

travel_class	age_group	satisfaction_rate
Business	51-65	78.380000000000
Business	36-50	74.180000000000
Business	20-35	60.520000000000
Business	<20	43.130000000000
Business	65+	33.150000000000
Economy Plus	36-50	31.420000000000
Economy Plus	20-35	25.250000000000
Economy Plus	51-65	24.050000000000
Economy	36-50	23.530000000000
Economy	51-65	20.090000000000
Economy	20-35	17.640000000000
Economy Plus	65+	16.370000000000
Economy Plus	<20	13.440000000000
Economy	65+	12.410000000000
Economy	<20	12.230000000000

⇒ Showing that **Business Class** passengers across **all age groups** tend to have higher satisfaction, with the highest rates among older travelers.

8. Are passengers who experienced any departure or arrival delay significantly less satisfied?

delay_status	satisfaction_rate
No Delay	46.940000000000
Delayed	40.300000000000

⇒ Showing that delays, whether at departure or arrival, are strongly linked to **lower satisfaction levels**.

II/ Customer Segments Analysis

1. How does the satisfaction rate compare between Loyal and Disloyal customers?

customer_type	satisfaction_rate_percentage
Loyal Customer	47.730000000000
Disloyal Customer	23.670000000000

⇒ Showing that **loyal customers** report significantly **higher satisfaction** compared to disloyal customers.

2. Which combinations of Age Group and Travel Type have the highest dissatisfaction rate?

age_group	travel_type	dissatisfaction_rate_percentage
65+	Personal Travel	90.980000000000
36-50	Personal Travel	89.940000000000
20-35	Personal Travel	89.820000000000
51-65	Personal Travel	89.600000000000
<20	Personal Travel	89.560000000000
65+	Business Travel	66.730000000000
<20	Business Travel	65.860000000000
20-35	Business Travel	53.970000000000
36-50	Business Travel	34.580000000000
51-65	Business Travel	28.650000000000

⇒ Showing that **Personal Travel** passengers, especially in older and middle age groups, consistently have the **highest dissatisfaction rates**.

3. What is the most common Travel Class for each Age Group?

age_group	travel_class	total_passengers
36-50	Business	20983
20-35	Economy	15519
51-65	Business	12072
<20	Economy	7010
65+	Economy	2489

⇒ Showing that **Business Class** is most common among mid-age groups, while **Economy** dominates among younger and older passengers.

4. What is the Male–Female satisfaction gap within each Customer Type?

customer_type	gender	satisfaction_rate_percentage
Disloyal Customer	Male	24.910000000000
Disloyal Customer	Female	22.610000000000
Loyal Customer	Male	47.850000000000
Loyal Customer	Female	47.600000000000

⇒ Showing that gender differences in satisfaction are **minimal** for both Loyal and Disloyal customers, with males having a slightly higher rate among Disloyal customers.

5. How does the satisfaction rate change across Flight Haul Types for each Customer Type?

	customer_type	flight_haul_type	satisfaction_rate_percentage	total_passengers
1	Disloyal Customer	Long-haul	28.570000000000	14
2	Disloyal Customer	Short-haul	23.970000000000	17784
3	Disloyal Customer	Medium-haul	19.100000000000	1183
4	Loyal Customer	Long-haul	77.860000000000	4192
5	Loyal Customer	Medium-haul	66.130000000000	26121
6	Loyal Customer	Short-haul	36.610000000000	54610

⇒ Showing that **Loyal Customers** are most satisfied on long-haul flights, while **Disloyal Customers** maintain **low satisfaction** across **all haul types**.

6. Which combinations of Age Group, Travel Type, and Customer Type have the highest share of highly satisfied passengers (Service Level Category = 'Excellent')?

age_group	travel_class	customer_type	total_passengers	excellent_passengers	excellent_share_percentage	rank_by_excellent_share
51-65	Business	Loyal Customer	11755	3355	28.540000000000	1
36-50	Business	Loyal Customer	18356	5152	28.070000000000	2
20-35	Business	Loyal Customer	9663	2021	20.910000000000	3
<20	Business	Disloyal Customer	240	39	16.250000000000	4
51-65	Business	Disloyal Customer	317	45	14.200000000000	5
36-50	Business	Disloyal Customer	2627	347	13.210000000000	6
<20	Business	Loyal Customer	1536	197	12.830000000000	7
20-35	Business	Disloyal Customer	4106	490	11.930000000000	8
65+	Business	Loyal Customer	999	116	11.610000000000	9
36-50	Economy Plus	Loyal Customer	1923	179	9.310000000000	10
20-35	Economy Plus	Loyal Customer	1961	166	8.470000000000	11
36-50	Economy	Loyal Customer	10513	842	8.010000000000	12
51-65	Economy Plus	Loyal Customer	1485	115	7.740000000000	13
51-65	Economy	Loyal Customer	8697	647	7.440000000000	14
20-35	Economy	Loyal Customer	8514	597	7.010000000000	15
<20	Economy	Loyal Customer	5720	363	6.350000000000	16
65+	Economy	Loyal Customer	2391	151	6.320000000000	17
<20	Economy Plus	Loyal Customer	965	60	6.220000000000	18
<20	Economy	Disloyal Customer	1290	67	5.190000000000	19
65+	Economy Plus	Loyal Customer	445	18	4.040000000000	20

⇒ Showing that **loyal Business travelers** aged **51–65** lead in excellence ratings, suggesting this segment experiences the most premium service quality, while younger or non-business travelers show noticeably lower satisfaction, highlighting a potential opportunity to elevate experiences for less satisfied segments.

III/ Service Quality

1. How do the average ratings of all In-flight services differ between satisfied and dissatisfied passengers?

satisfaction	average_inflight_service	average_baggage_handling	average_seat_comfort	average_onboard_service	average_entertainment	average_legroom	average_cleanliness	average_food_drink	average_wifi
Dissatisfied	3.39	3.38	3.04	3.02	2.89	2.99	2.94	2.96	2.4
Satisfied	3.97	3.97	3.97	3.86	3.96	3.82	3.74	3.52	3.16

⇒ Showing that satisfied passengers rate every in-flight service category higher, especially seat comfort, onboard service, entertainment, and Wi-Fi, suggesting these areas are strong drivers of overall satisfaction and key targets for improvement among dissatisfied travelers.

2. How do the average ratings of all Pre-flight services differ between satisfied and dissatisfied passengers?

satisfaction	average_checkin	average_online_boarding	average_dep_time_convenience	average_gate_location	average_online_booking
Dissatisfied	3.04	2.66	3.13	2.98	2.55
Satisfied	3.65	4.03	2.97	2.98	3.03

⇒ Showing that satisfied passengers consistently rate pre-flight services higher, with the largest gap in online boarding and booking, highlighting these as potential priority areas for reducing dissatisfaction.

3. Which Top 3 In-flight and Pre-flight service pairs co-occur most frequently among satisfied passengers (both scores ≥ 4)?

inflight_feature	preflight_feature	total_satisfied_passengers
Seat_Comfort	Online_Boarding	32073
Inflight_Entertainment	Online_Boarding	29656
Baggage_Handling	Online_Boarding	28768

⇒ Showing that **"Seat Comfort + Online Boarding"** is the most common high-rated service pair among satisfied passengers, emphasizing the link between comfort and streamlined boarding.

4. What is the average bundle score of all In-flight services for satisfied versus dissatisfied passengers?

satisfaction	average_inflight_bundle
Satisfied	3.77
Dissatisfied	3

⇒ Showing that satisfied passengers score in-flight services notably **higher on average** than **dissatisfied** ones, indicating the critical role of onboard experience in driving satisfaction.

5. What is the average bundle score of all Pre-flight services by Travel Class?

travel_class	average_preflight_bundle
Business	3.21
Economy Plus	2.95
Economy	2.94

⇒ Showing that **Business Class** passengers rate pre-flight services highest, suggesting that premium service levels start before boarding.

6. What is the single weakest service aspect for each Travel Class?

travel_class	weakest_service	avg_score
Business	Wifi	2
Business	Gate	2
Economy	Gate	2
Economy	Wifi	2
Economy Plus	Wifi	2
Economy Plus	Gate	2

⇒ Showing that **Wi-Fi** and **gate services** consistently receive **the lowest ratings** across all travel classes, highlighting pre-boarding and connectivity as key improvement areas.

IV/ Flight Distance & Delay

1. What is the average total delay time by Flight Haul Type?

flight_haul_type	average_total_delay
Long-haul	30.79
Short-haul	30.24
Medium-haul	28.97

⇒ Showing that **delay times** are relatively **similar across haul types**, with long-haul flights experiencing the longest average delays.

2. How does the satisfaction rate differ for passengers with different Arrival Delay Status categories?

arrival_delay_status	satisfaction_rate_percentage	flights
On-time	47.280000000000	58159
Delay <15min	41.430000000000	20939
Delay >60min	35.720000000000	7327
Delay 15-60min	35.570000000000	17169

⇒ Showing that **satisfaction drops steadily as arrival delays increase**, with the sharpest drop occurring once delays **exceed 15 minutes**.

3. Which Travel Type within each class drives the highest delay compared to the class baseline?

travel_class	travel_type	delay_rate_percentage	gap_vs_class_avg_percentage
Economy Plus	Business Travel	47.620000	1.910000
Economy	Business Travel	45.940000	1.370000
Business	Personal Travel	45.000000	1.010000
Economy Plus	Personal Travel	43.800000	-1.910000
Economy	Personal Travel	43.200000	-1.370000
Business	Business Travel	42.980000	-1.010000

⇒ Showing that **Business Travel** in **Economy Plus** leads delays most significantly compared to its class average, suggesting that **premium economy business travelers may face more schedule disruptions.**

4. Which Customer Type within each Travel Class drives the highest delay compared to the class baseline?

travel_type	flight_haul_type	delay_rate_percentage	delay_diff_vs_type_average
Business Travel	Short-haul	44.870000	0.890000
Business Travel	Long-haul	44.040000	0.060000
Business Travel	Medium-haul	43.020000	-0.950000
Personal Travel	Long-haul	48.720000	4.150000
Personal Travel	Short-haul	43.950000	-0.630000
Personal Travel	Medium-haul	41.050000	-3.520000

⇒ Showing that within Travel Types, **short-haul** business travel has the **largest delay gap** over its average, while long-haul personal travel also stands out with notably higher delays compared to peers.

5. How does on-time performance vary by Age Group, and how does it change compared to the previous age band?

age_group	on_time_rate_percentage	change_vs_previous_percentage
<20	55.490000	NULL
20-35	55.510000	0.020000
36-50	56.410000	0.900000
51-65	56.670000	0.260000
65+	57.350000	0.680000

⇒ Showing that **on-time performance steadily improves with age**, rates increase from **55.49%** for passengers under 20 to **57.35%** for those aged 65+. The most notable jump is between the 36–50 and 51–65 age groups, suggesting that **older passengers may experience fewer delays** or **manage schedules more effectively.**