

Hotel Booking EDA Project



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Summary of Project

The Project is given by the Abhishek Wahwal Sir From the Arbor Accademy For the EDA Process.

This project helps us understand hotel booking patterns using EDA. By analyzing Resort and City hotels data from 2015–2017, we can see trends in revenue, bookings, cancellations, guest types, and stay duration. Data cleaning and wrangling improve data quality, which leads to more accurate comparisons between hotel types. The insights help hotels make better decisions about pricing, guest management, meal planning, and booking strategies, ultimately improving business performance and customer satisfaction.



PROJECT PHASE -1

Data Cleansing

PROJECT PHASE -2

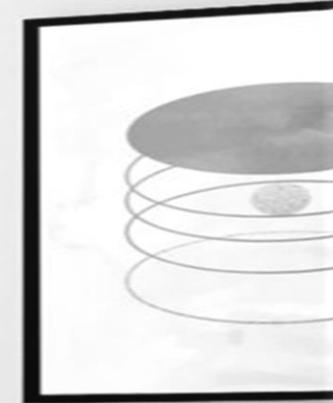
Data Wrangling

PROJECT PHASE -3

Know your Variable

PROJECT PHASE -4

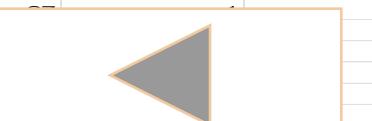
Data Visualization and Anaylsis



Data Set

hotel	is_canceled	lead_time	arrival_date_ye	arrival_date_mc	arrival_date_we	arrival_date_da	stays_in_weeks	stays_in_week	adults	children	babies	meal	country
Resort Hotel	0	342	2015 July		27	1	0	0	2	0	0	BB	PRT
Resort Hotel	0	737	2015 July		27	1	0	0	2	0	0	BB	PRT
Resort Hotel	0	7	2015 July		27	1	0	1	1	0	0	BB	GBR
Resort Hotel	0	13	2015 July		27	1	0	1	1	0	0	BB	GBR
Resort Hotel	0	14	2015 July		27	1	0	2	2	0	0	BB	GBR
Resort Hotel	0	14	2015 July		27	1	0	2	2	0	0	BB	GBR
Resort Hotel	0	0	2015 July		27	1	0	2	2	0	0	BB	PRT
Resort Hotel	0	9	2015 July		27	1	0	2	2	0	0	FB	PRT
Resort Hotel	1	85	2015 July		27	1	0	3	2	0	0	BB	PRT
Resort Hotel	1	75	2015 July		27	1	0	3	2	0	0	HB	PRT
Resort Hotel	1	23	2015 July		27	1	0	4	2	0	0	BB	PRT
Resort Hotel	0	35	2015 July		27	1	0	4	2	0	0	HB	PRT
Resort Hotel	0	68	2015 July		27	1	0	4	2	0	0	BB	USA
Resort Hotel	0	18	2015 July		27	1	0	4	2	1	0	HB	ESP
Resort Hotel	0	37	2015 July		27	1	0	4	2	0	0	BB	PRT
Resort Hotel	0	68	2015 July		27	1	0	4	2	0	0	BB	IRL
Resort Hotel	0	37	2015 July		27	1	0	4	2	0	0	BB	PRT
Resort Hotel	0	12	2015 July		27	1	0	1	2	0	0	BB	IRL
Resort Hotel	0	0	2015 July		27	1	0	1	2	0	0	BB	FRA
Resort Hotel	0	7	2015 July		27	1	0	4	2	0	0	BB	GBR
Resort Hotel	0	37	2015 July		27	1	1	4	1	0	0	BB	GBR
Resort Hotel	0	72	2015 July		27	1	2	4	2	0	0	BB	PRT
Resort Hotel	0	72	2015 July		27	1	2	4	2	0	0	BB	PRT
Resort Hotel	0	72	2015 July		27	1	2	4	2	0	0	BB	PRT
Resort Hotel	0	127	2015 July		27	1	2	5	2	0	0	HB	GBR
Resort Hotel	0	78	2015 July		27	1	2	5	2	0	0	BB	PRT
Resort Hotel	0	48	2015 July		27	1	2	5	2	0	0	BB	IRL
Resort Hotel	1	60	2015 July	17	1	2	5	2	2	0	0	BB	PRT
Resort Hotel	0	77	2015 July	1	2	5	2	2	0	0	0	BB	PRT
Resort Hotel	0	99	2015 July	27	1	2	5	2	0	0	0	BB	PRT
Resort Hotel	0	118	2015 July	27	1	4	10	1	0	0	0	BB	NULL
Resort Hotel	0	95	2015 July	27	1	4	11	2	0	0	0	BB	GBR
Resort Hotel	1	96	2015 July	27	1	2	8	2	0	0	0	BB	PRT
Resort Hotel	0	69	2015 July	27	1	2	4	2	0	0	0	BB	IRL
Resort Hotel	1	45	2015 July	27	1	3	3	0	0	0	0	BB	PRT
Resort Hotel	1	40	2015 July	27	1	3	3	0	0	0	0	BB	PRT
Resort Hotel	0	15	2015 July	27	1	3	2	0	0	0	0	BB	ESP
Resort Hotel	0	36	2015 July	27	1	3	3	0	0	0	0	BB	PRT
Resort Hotel	1	43	2015 July	27	1	3	3	0	0	0	0	BB	PRT
Resort Hotel	0	70	2015 July	27	2	2	3	2	0	0	0	HB	ROU
Resort Hotel	1	45	2015 July	27	2	2	3	2	0	0	0	BB	PRT
Resort Hotel	0	45	2015 July	27	2	2	3	2	0	0	0	BB	IRL
Resort Hotel	0	16	2015 July	27	2	2	3	2	0	0	0	BB	ESP
Resort Hotel	0	70	2015 July	27	2	2	3	2	0	0	0	HB	ROU
Resort Hotel	0	107	2015 July	27	2	2	5	2	0	0	0	BB	PRT
Resort Hotel	1	47	2015 July	27	2	2	5	2	0	0	0	BB	PRT
Resort Hotel	0	96	2015 July	27	2	2	5	2	0	0	0	BB	ESP
Resort Hotel	0	113	2015 July	27	2	2	5	2	0	0	0	BB	NOR
Resort Hotel	0	90	2015 July	27	2	2	5	2	0	0	0	HB	GBR
Resort Hotel	0	50	2015 July	27	2	2	5	2	0	0	0	HB	IRL
Resort Hotel	0	113	2015 July	27	2	2	5	2	0	0	0	BB	NOR
Resort Hotel	0	93	2015 July	27	2	3	8	2	0	0	0	BB	IRL
Resort Hotel	0	76	2015 July	27	2	4	10	2	0	0	0	BB	OMN
Resort Hotel	0	3	2015 July	27	2	0	1	2	0	0	0	BB	ESP
Resort Hotel	0	1	2015 July	27	2	0	1	2	0	0	0	BB	PRT
Resort Hotel	0	1	2015 July	27	2	0	1	2	0	0	0	BB	ESP
Resort Hotel	0	0	2015 July	27	2	0	1	2	0	0	0	BB	PRT
Resort Hotel	0	0	2015 July	27	2	0	1	2	0	0	0	BB	PRT
Resort Hotel	0	0	2015 July	27	2	0	1	2	0	0	0	BB	PRT

Double Tap to View Data



What did you know about your dataset?



- This is about the hotel bookings.
- The hotel types are “City Hotel” and “Resort Hotel”
- It contains 119390 records with Duplicate, nulls, blanks records
- It has 32 columns which are giving the information about guests, ADR, Hotel countries, Reservations of guest, Reservations type, Date of reservation and so on.
- It Contains the data of 2015,2016,2017 Years data.

Problem Statement

This data set contains booking information for a city hotel and a resort hotel, and includes information such as when the booking was made, the number of adults, children, and/or babies, and the number of available parking spaces, which agent made the booking, among other things.

The objective of this project is Explore and analyze the data to discover important factors that govern the bookings.



Data Cleaning

To clean the data I have applied below step.

1. Exported Data
2. Check Data Types
3. Remove Duplicates
4. Remove Errors
5. Remove Blanks/Null Records
6. Replace the Null values to the Undefined values



Exported Row Count = 119390



Exported Column Count = 32



Null Column Count = 4



Remove Records = 31994



Unique Records = 87392

Data Cleaning

To transform the data I have applied below step.

1. Added the Primary Keys
2. Added the "Arrival_date" Column for the know the exact date of Reservation
3. Remove the unnecessary column called "arrival_date_week_number"
4. Added "Total_people" columns for know the allover guest.
5. To know the Satisfaction level of guest I added "Satisfaction level"
6. To know the Total stay of specific guest Added the "Total_stay".



Added Primary Key =
BookingID



(arrival_date_year+arrival_date_month+arrival_date_day) =
Arrival_date



stay_in_weekend_nights
+stay_in_weekdays =
Total_people



reserved_room_type +
assign_room_type =
Satisfaction_Level

Understanding the Variable

1. Booking Information:

- **Hotel Type:** Resort hotel or City hotel
- **Cancellation Status:** Booked (0) or Cancelled (1)
- **Lead Time:** Number of days between booking and arrival
- **Arrival Details:** Year, Month, Day, Week
- **Duration of Stay:** Number of nights for weekends, number of nights for weekdays

3. Booking History:

- **Previous Cancellations:** Number of past cancellations
- **Number of confirmed bookings:** Number of past non-cancelled bookings

2. Guest Details:

- **Guest Breakdown:** Adults, Childrens, Babies
- **Country :** Guest's coming from which country
- **Returning Guest:** Yes (1) or No (0)
- **Meal :** Meal type reserved which like eaten by the guest
- **Satisfaction Level:** Giving the how satisfied the guests are.

4. Room Information:

- **Type of Room Reserved:** Code for the room type that was reserved
- **Type of Room Assigned:** Code for the room type that was assigned
- **Changes to Booking:** Total number of modifications made to the reservation

Understanding the Variable

5. Reservation Status:

- **Number of Days in Waiting List:** Duration on the waiting list
- **Current Reservation Status:** Present booking status
- **Last Update of Reservation Status:** Date of the most recent status change

7. Booking Segment:

- **Market Segment:** Classification based on booking trends
- **Distribution Channel:** Method of distributing bookings
- **Agent/Company ID:** Unique identifier for booking agents or companies.

6. Financials & Extras:

- **Average Daily Rate (ADR):** Calculated price per day
- **Deposit Type:** Type of deposit made
- **Required Extras:** Number of car parking spaces, specific requests

8. Room Information:

- **Type of Room Reserved:** Code for the room type that was reserved
- **Type of Room Assigned:** Code for the room type that was assigned
- **Changes to Booking:** Total number of modifications made to the reservation.

Expected Outcomes



Improved Decision-Making:

- The project aims to assist hotels in making more informed choices to enhance guest experiences.



Decreased Cancellations:

- It will identify the reasons behind guest cancellations and work towards minimizing them.



Enhanced Profit Margins:

- By analyzing guest booking patterns, hotels can strategically price their services to boost profitability.



Stay Competitive:

- By understanding guest preferences, hotels can tailor their advertising to attract more customers and stay competitive.

Data Visualization & Analysis

BOOKINGS

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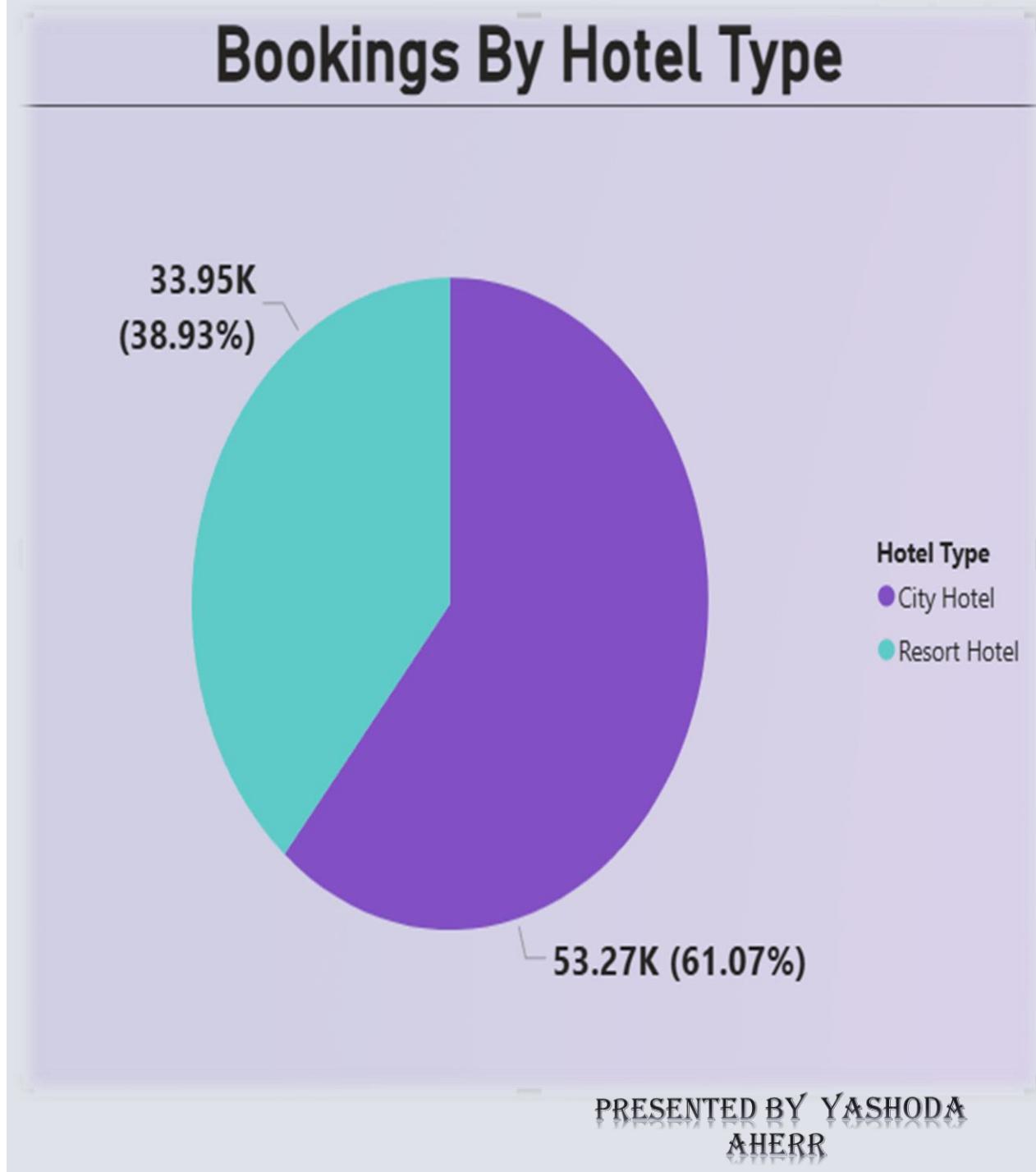
Which hotel type(City/Resort) has more bookings.

I pick this pie chart for showing the percentage of the Hotel type which held by the guests or reservation.

Here the categories, So using pie chart helpful for less categories and giving the clear percentage insights.

Using pie chart for the analysis of the Hotel booking data. It's showing the 61.07% bookings are for the CITY Hotel type means the 53.27K guests are included.

The RESORT Hotel have 38.93% of the bookings type means the 33.95K guests are included.



Insights

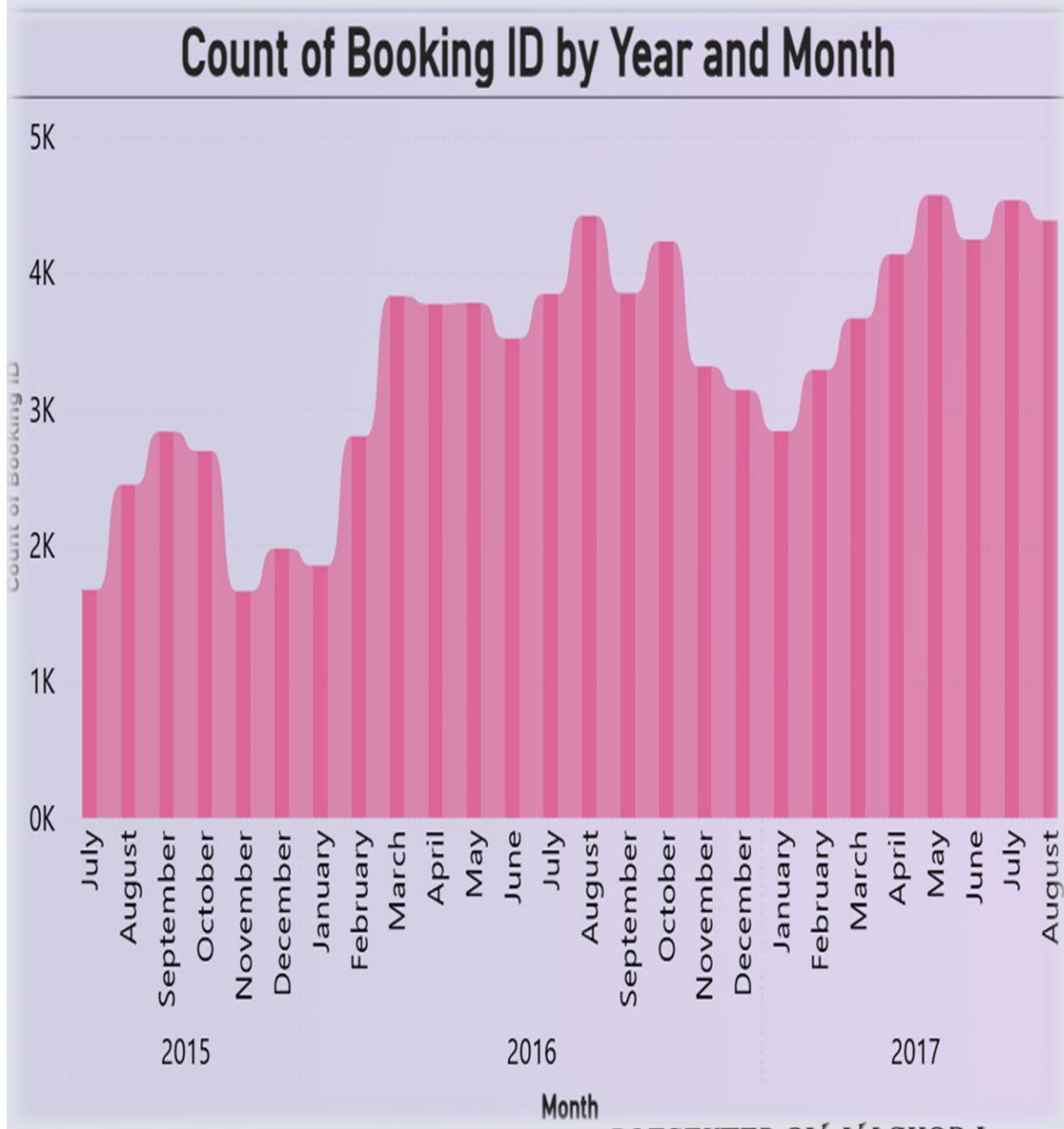


Yes, these insights directly help improve revenue, marketing efficiency, operational planning, and long-term strategy, leading to a strong positive business impact.

- Revenue Optimization
- Targeted Marketing Strategy
- Resource & Capacity Planning
- Strategic Decision-Making
- Dashboard Value

Check booking Trend by for each year and Month.

- I picked the **Ribbon chart** because it shows how booking counts change over time in a clear way.
It helps compare different months and years while also showing which period has higher or lower bookings.
- There is a repeating pattern, which shows **seasonal behavior** in bookings.
Bookings are generally **higher in the middle of the year** and lower at the beginning and end.
Each year shows an **overall increase in bookings** compared to the previous year.
This indicates that the business is **growing year by year**.



Insights



- Gained insights will help create a positive business impact.
- By understanding peak and low booking months, the business can plan better marketing strategies. High-demand periods can be used to increase prices and
- maximize revenue. Low-demand months can be improved with offers and discounts. Staffing and resource planning can be done more efficiently. Overall, these insights help in better decision-making and
- business growth.

Check booking from different countries

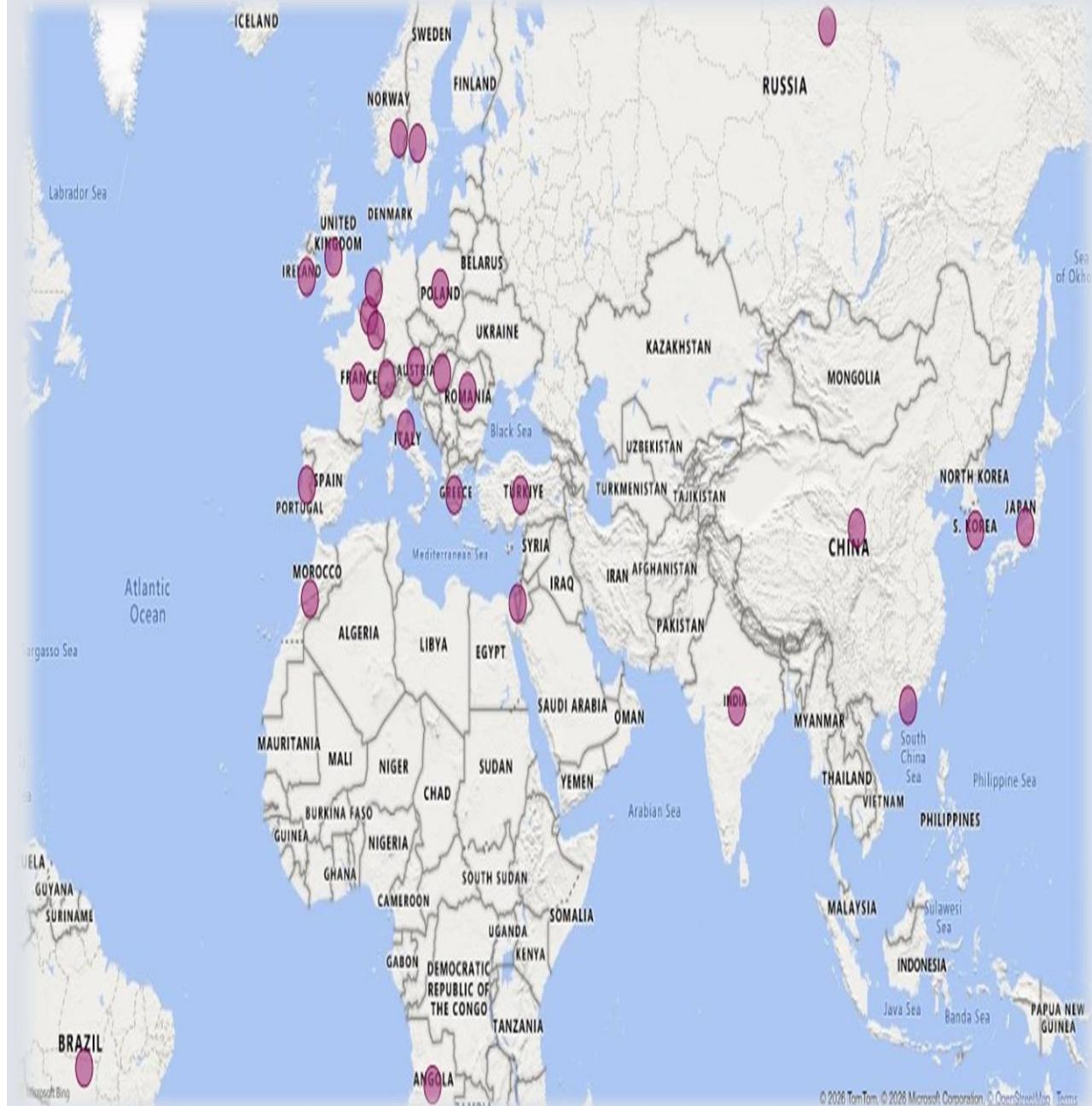
- The Map shows from which country the maximum number of guests visit.
- Based on the map, we can say that most guests visit from **Portugal, the UK and France, i.e., approx. 27.45K, 10K and 9K** people respectively.

Insights

Yes, It's giving the insights as below

- They can guide better decisions.
- They show where to focus effort.
- They help target the right markets.
- They reduce wasted resources.
- They support growth planning.

Impact happens when you act on them.



Hotel Booking Analysis

Bookings by Year & Quarter

Year, Quarter

2015

Qtr 1

Qtr 2

Qtr 3

Qtr 4

2016

Qtr 1

Total Bookings

87.22K

Count of Booking ID

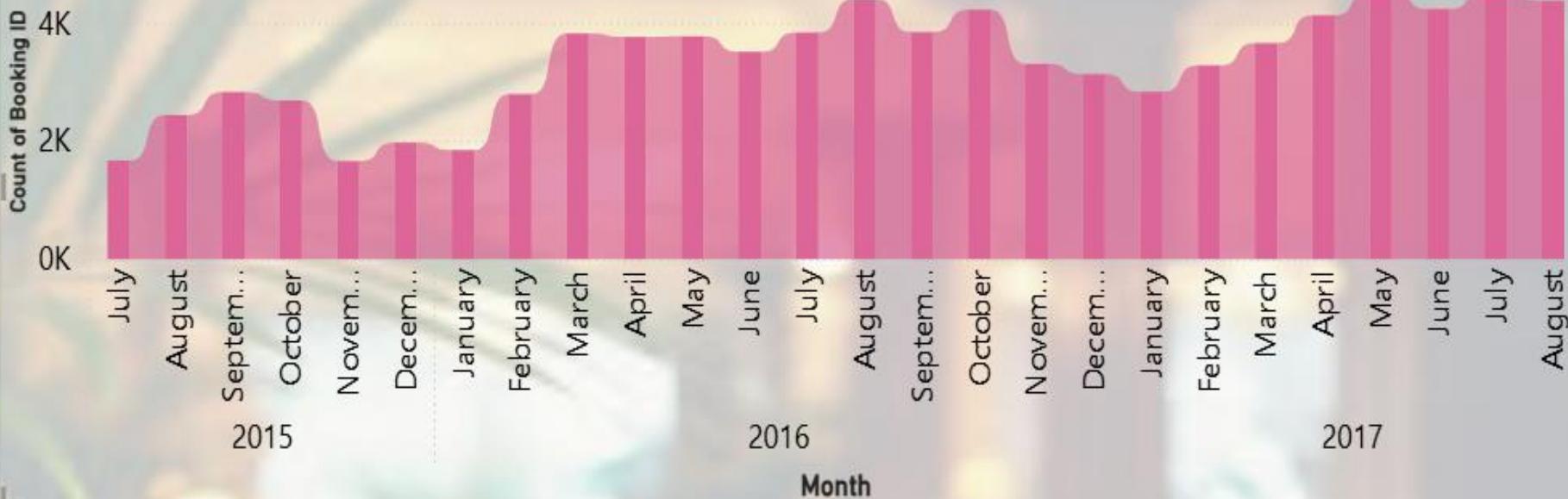
Hotel Types

hotel

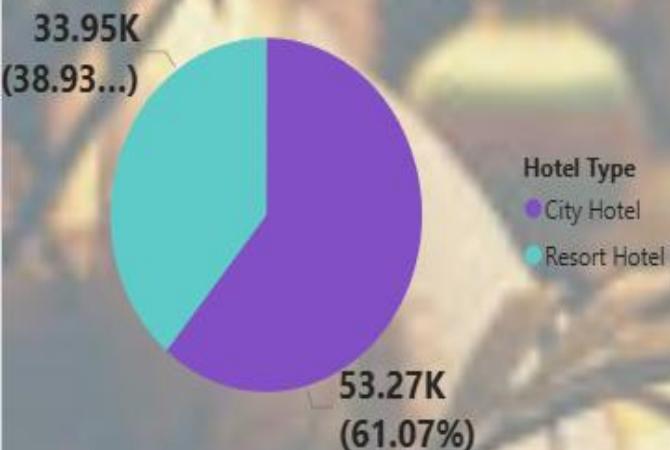
City Hotel

Resort Hotel

Booking Trend by Year and Month



Bookings By Hotel Type



Peoples by Hotels

City Hotel

108K

Sum of...

Resort Hotel

69K

Sum of...

Average Total People

2.03

Average of...

Average Total Stay

3.63

Average of...

Hotels bookings by countries



Data Visualization & Analysis

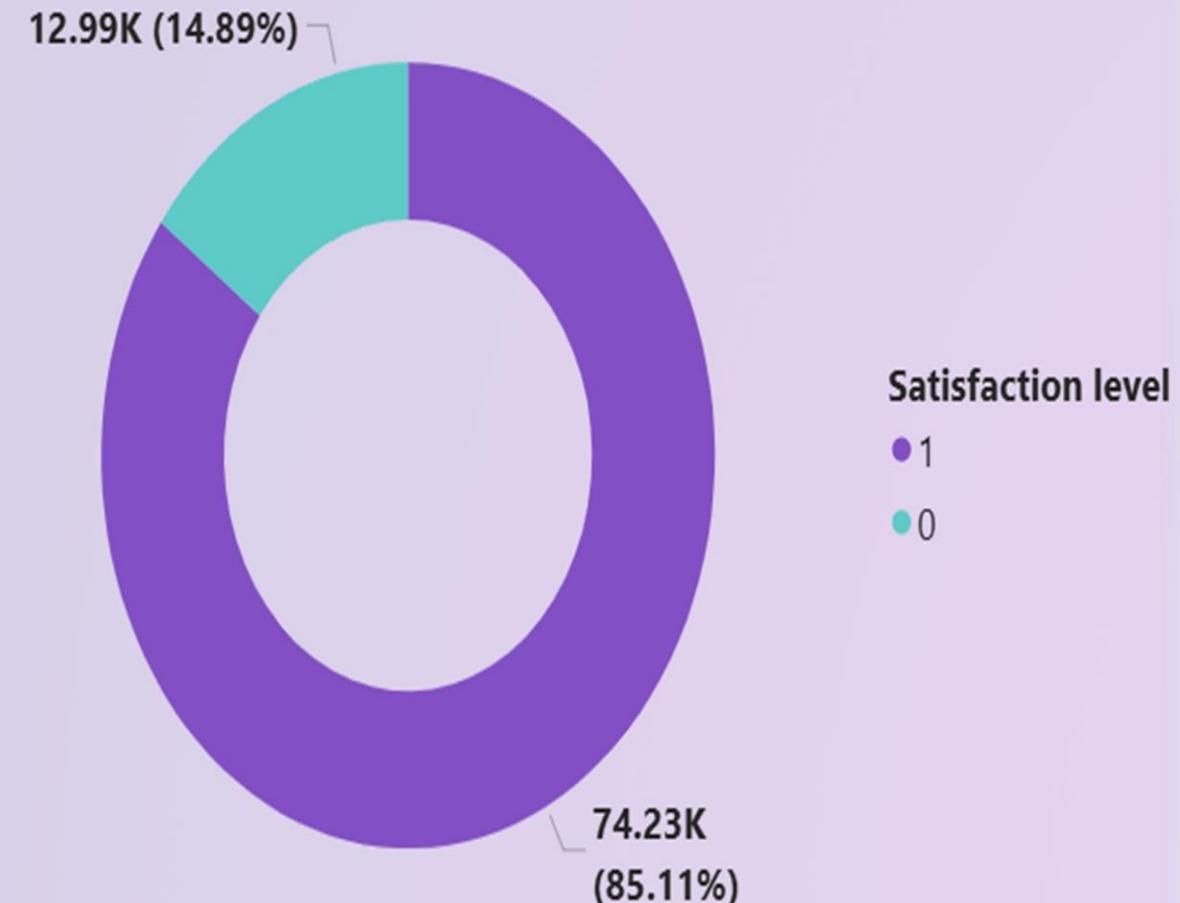
Reservation & Cancellations

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Check Satisfied guests for each hotel type

- This chart clearly shows customer satisfaction levels.
 - It makes it easy to compare satisfied and unsatisfied customers.
 - Percentages help understand the data at a glance.
 - It is simple and effective for decision-making.
 - It works well for presentations and reports.
-
- A large majority of customers are satisfied (about **85%**).
 - A smaller portion of customers are not satisfied (about **15%**).
 - Overall customer satisfaction is strong.
 - The dissatisfied group highlights areas needing improvement.
 - Even a small unhappy group can impact business reputation.

Satisfaction level Of Customer



Insights

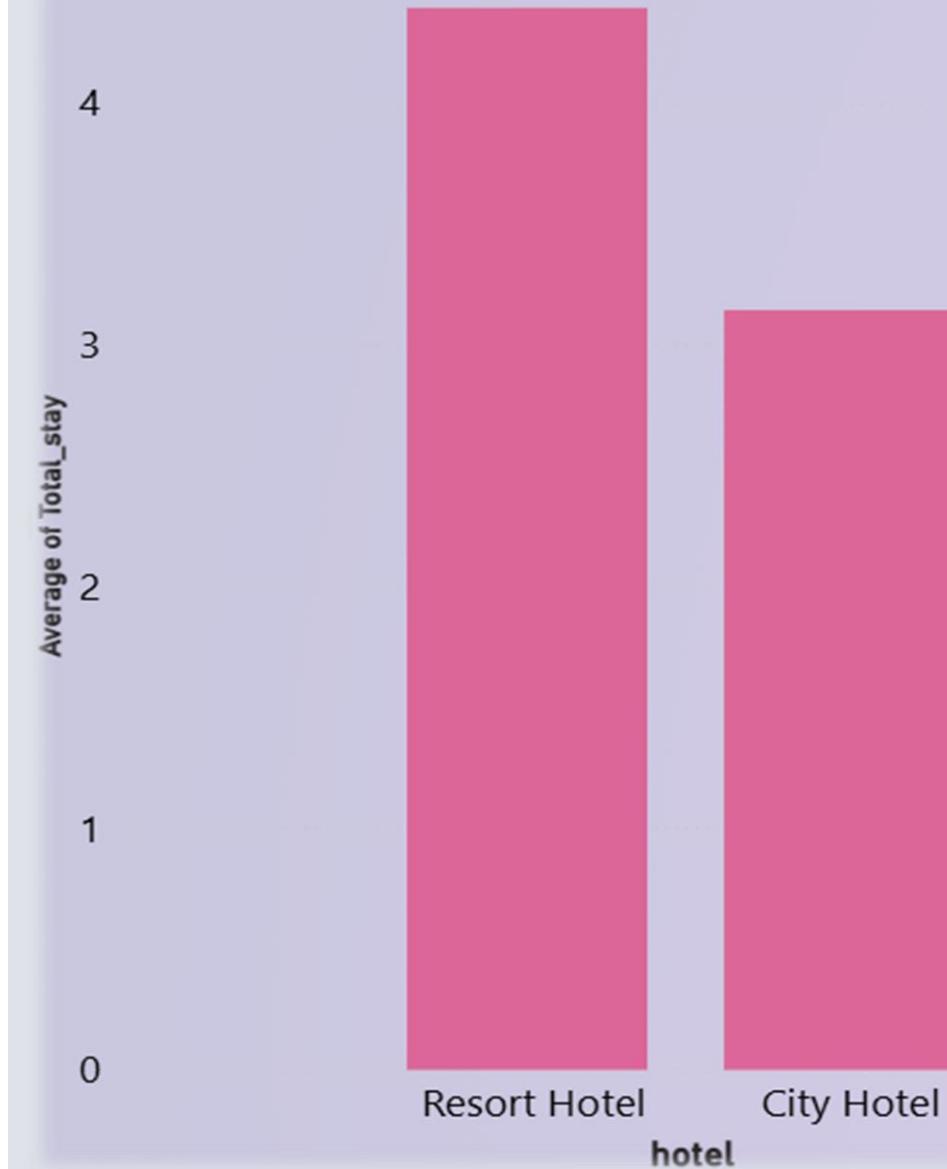


- Yes, these insights are very useful.
- High satisfaction shows the business is performing well.
- The company can focus on improving issues faced by unhappy customers.
- Improving satisfaction can increase customer loyalty.
- Happy customers lead to repeat business and positive word-of-mouth.

Average stay of Guests/Customers for hotel type

- A **bar chart** is ideal here because:
- It's comparing a **single metric** (average total stay) across **two discrete categories** (Resort Hotel vs City Hotel).
- It makes **magnitude differences** easy to spot at a glance.
- Guests stay **longer in Resort Hotels**.
- Guests stay **for fewer days in City Hotels**.
- This means resorts are mostly used for **vacations**, while city hotels are used for **short trips or work travel**.

Average of Total_stay by hotel



Insights



- Resorts can focus on **long-stay offers and holiday packages**.
- City hotels can focus on **short stays and quick check-in/check-out guests**.
- This helps hotels **earn more money and plan better**.

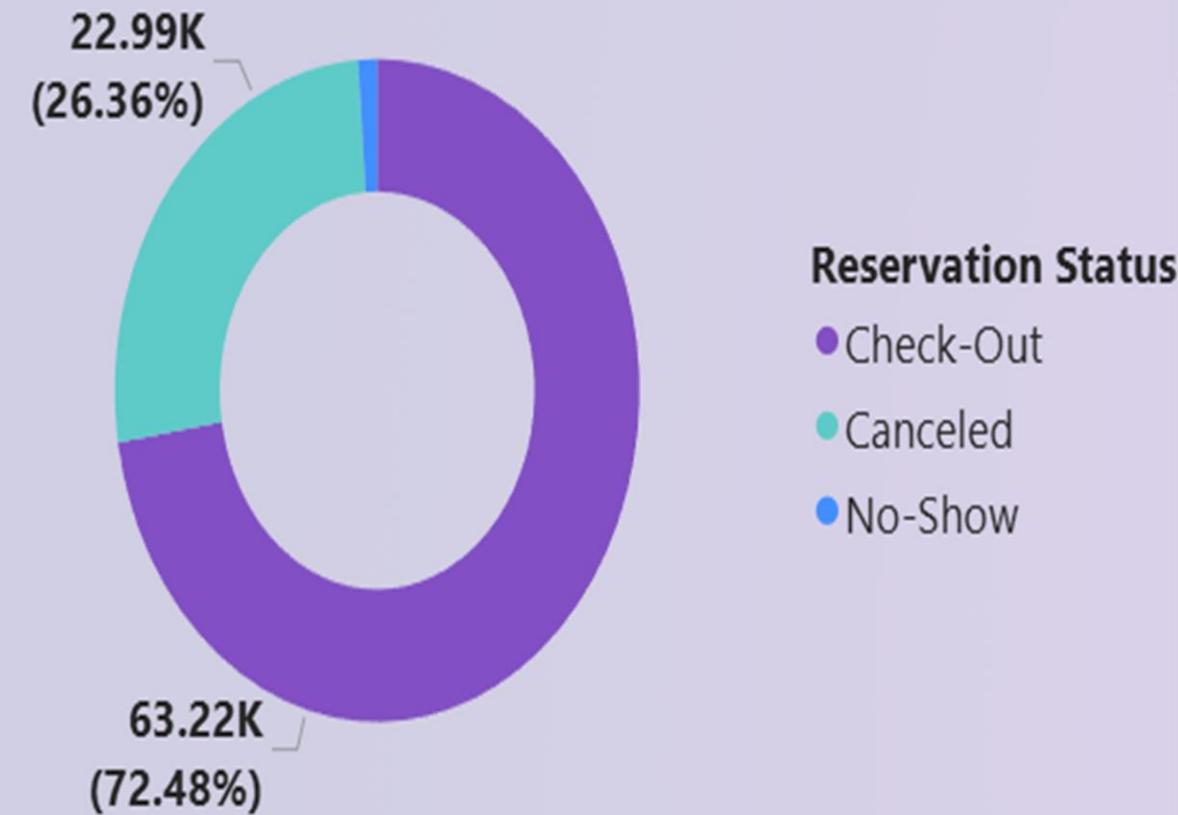
Check Reservation Status for each Hotel type

This is a **donut (pie) chart**, which is good for showing **how a total is divided into parts**.

It clearly shows how many reservations were:

- Completed
 - Cancelled
 - No-show
-
- **Most bookings are successful** → about 72% guests check out normally.
 - **Around 26% bookings are cancelled**, which is quite high.
 - **Very few guests don't show up.**
 - **So, cancellations are the main problem**, not no-shows.

Reservation Status for Hotel type



Insights

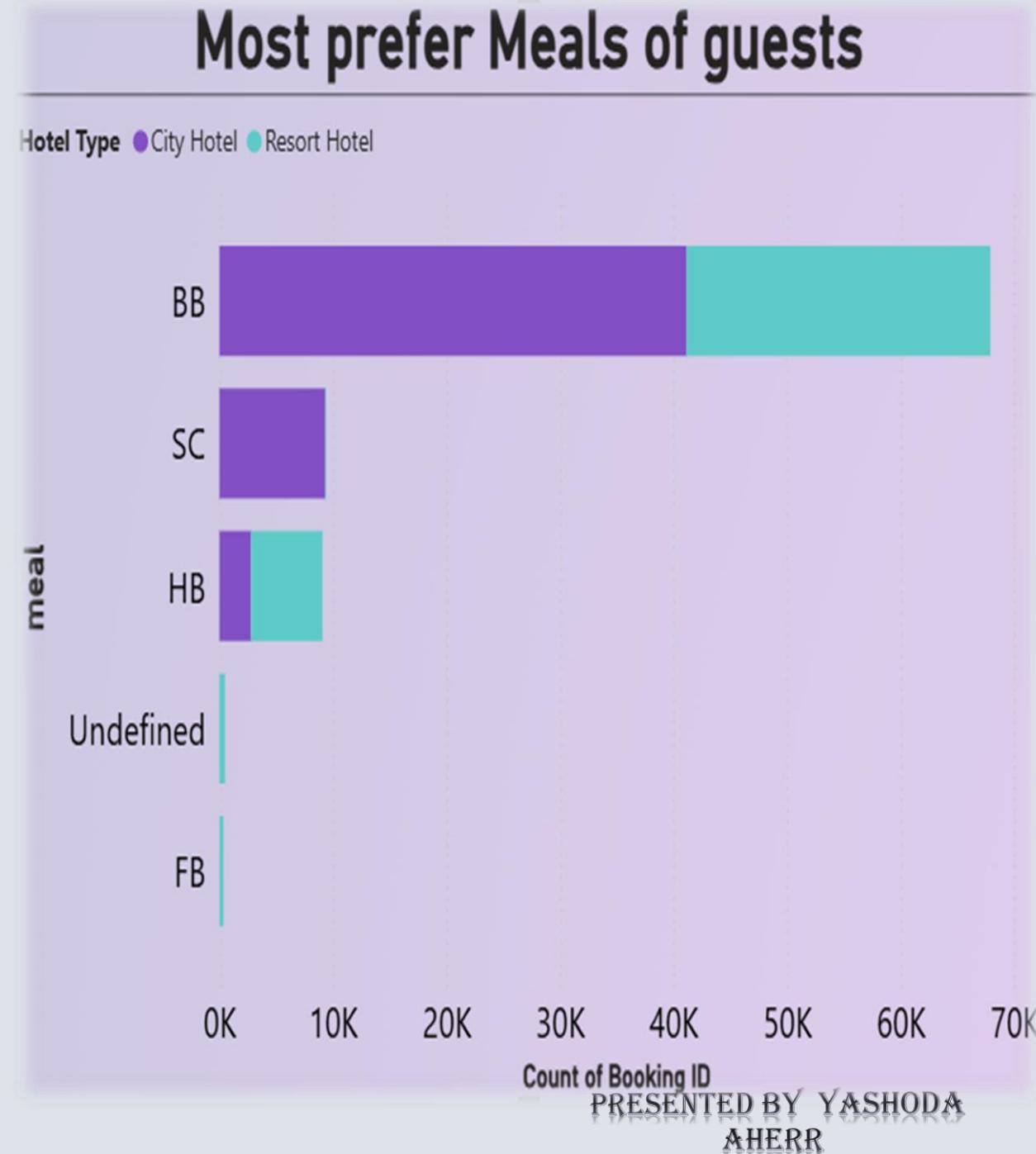


- Hotels can work on **reducing cancellations** for better policies, reminders, small deposits.
- Since most guests do stay, hotels can **focus on improving guest experience**.
- Fewer cancellations = **more stable revenue**.

Check Most Prefer Meals by the Guests for each Hotel type

A stacked bar chart is used because it:

- Compares meal choices and hotel types together
 - Shows which hotel type prefers which meal
 - Makes differences easy to see in one view
-
- BB (Bed & Breakfast) is the most preferred meal in both City and Resort hotels.
 - Resort hotel guests choose BB more than city hotel guests.
 - SC (Self Catering) is mainly chosen by city hotel guests.
 - HB (Half Board) is more common in resort hotels.
 - FB and Undefined meals are very rarely chosen.



Insights



- Hotels can **focus more on BB and HB meal plans.**
- City hotels can promote **SC and quick meals.**
- Resort hotels can offer **better breakfast and half-board packages.**
- Less focus on unpopular meals helps **reduce food cost and waste.**

Average of Total_stay by hotel

Reservations and Cancellation Analysis

316K

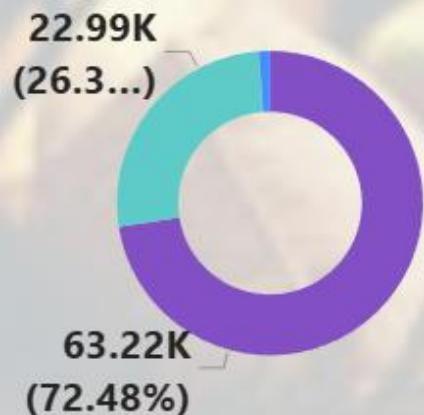
Sum of Total_stay

hotel
City Hotel
Resort Hotel

Total Peoples

177K

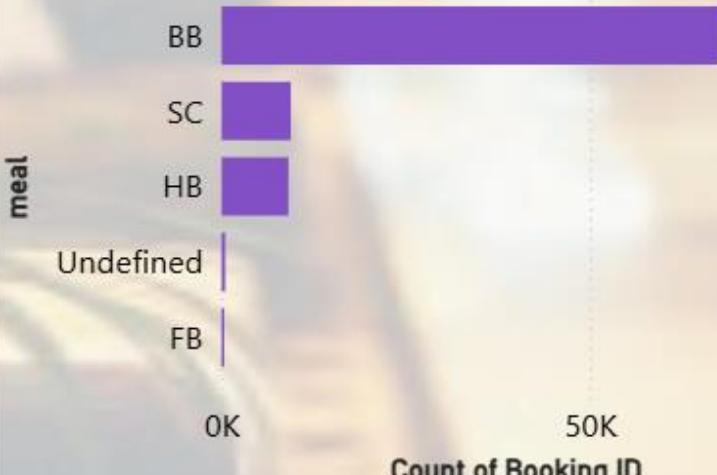
Reservation Status for Hotel type



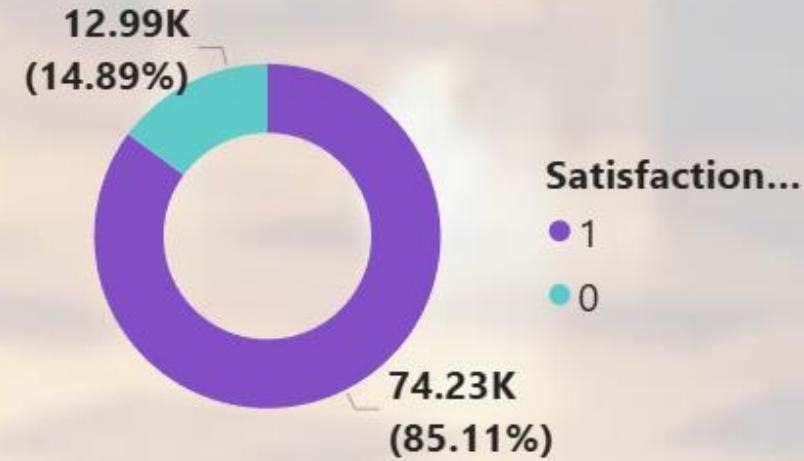
Reservation...
Check-O...
Canceled
No-Show



Count of Booking ID by meal



Satisfaction level Of Customer



Satisfaction...
1
0

Data Visualization & Analysis

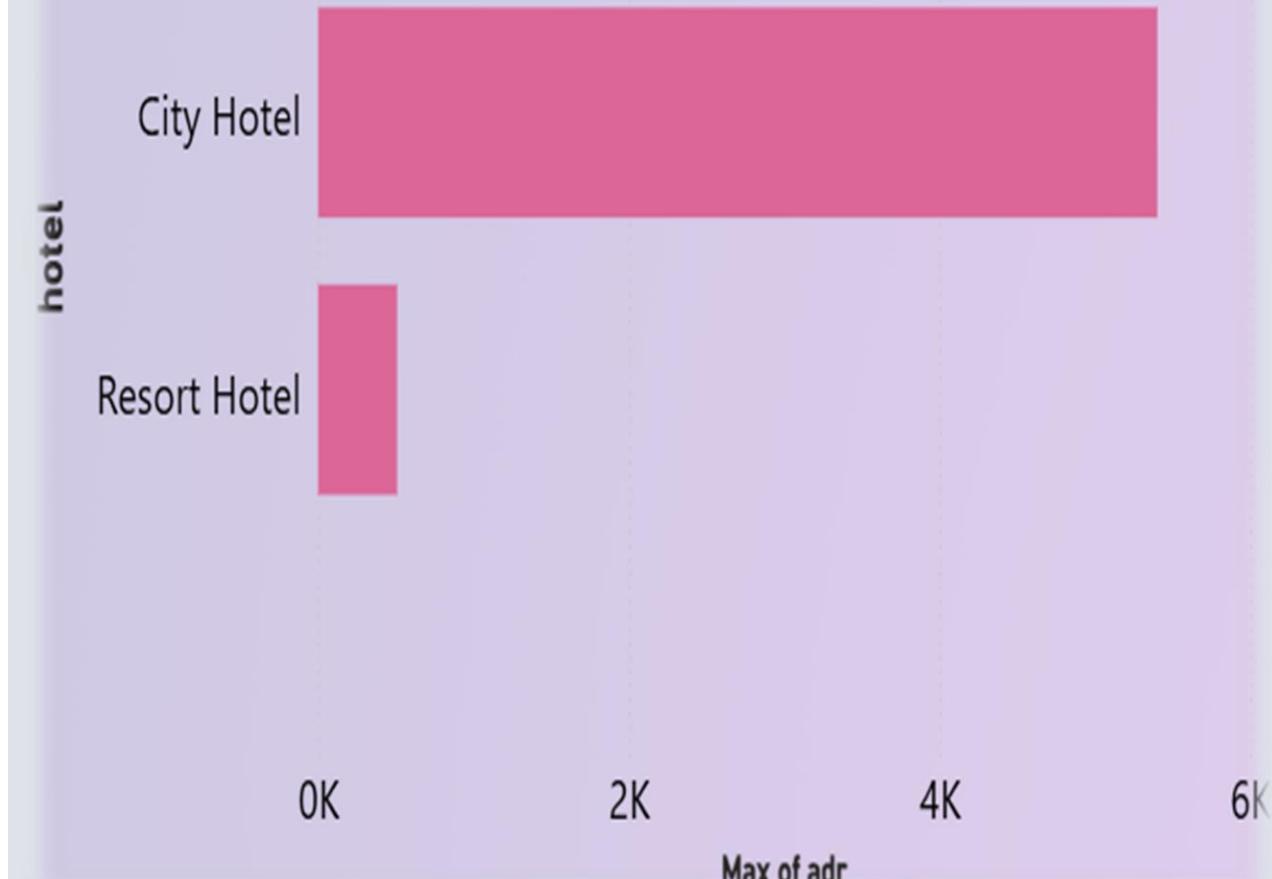
Revenue

Check Maximum ADR for Hotel type

- A **bar chart** is used because it clearly compares the **maximum room price (ADR)** between:
- City Hotel
- Resort Hotel
- It makes it easy to see **which hotel type charges higher prices.**

- **City Hotels have a much higher maximum ADR than Resort Hotels.**
- This means city hotels sometimes charge **very high prices**, likely during busy seasons or events.
- Resort hotels have a **lower maximum price** in comparison.

Max of adr by hotel



Insights



Yes.

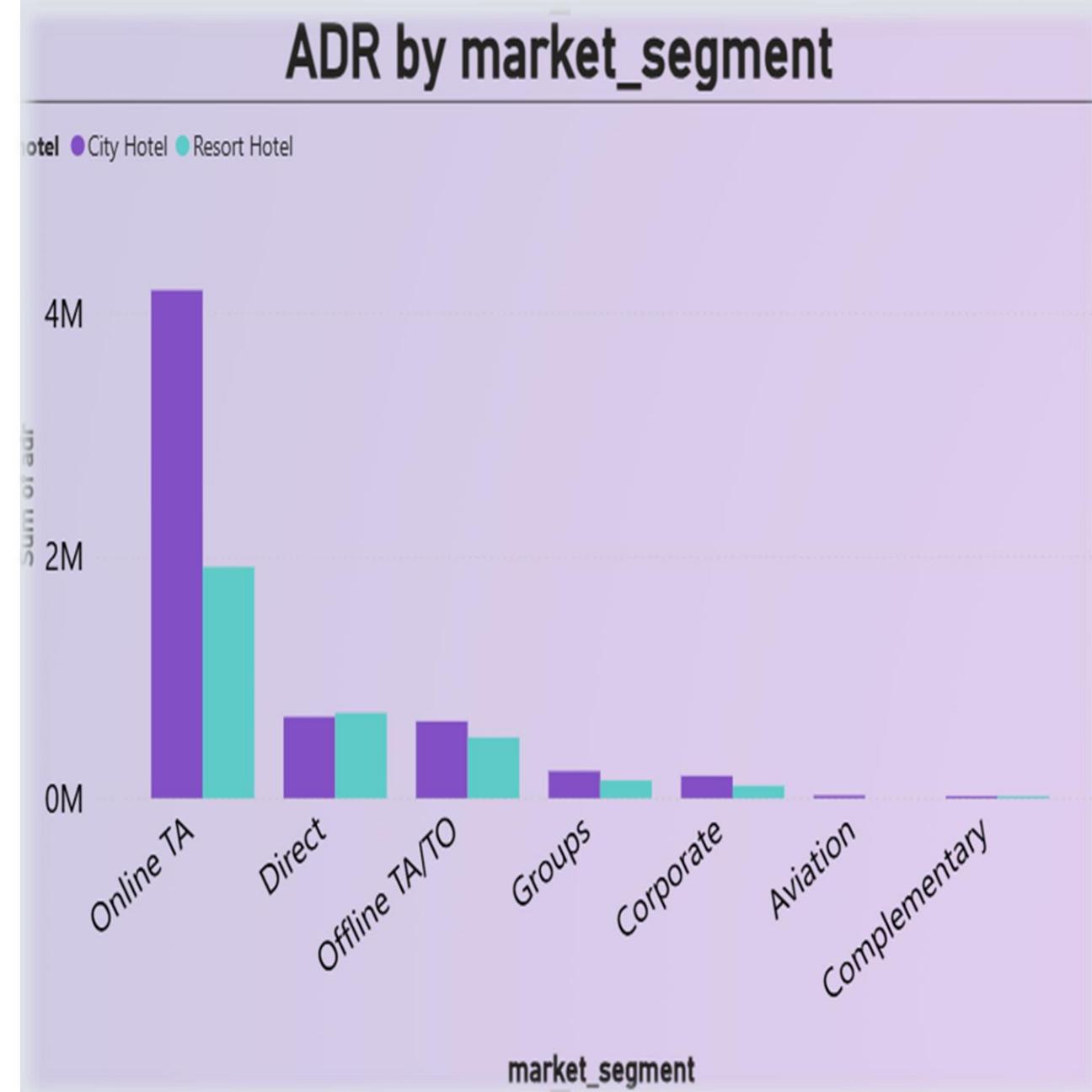
- City hotels can **use peak-demand pricing** to increase revenue.
- Resorts may **review pricing strategies** to see if premium pricing is possible.
- Helps management understand **where high-value bookings come from**.

Check ADR for each Hotel type by Market_segment

This chart is used because it:

- Compares ADR across different market segments
- Shows the difference between **City Hotel** and **Resort Hotel**
- Makes it easy to see **which segment earns more**

- **Online Travel Agents (Online TA)** bring the highest ADR for both hotel types.
- **City Hotels earn more ADR than Resort Hotels** in almost every segment.
- **Direct and Offline TA/TO** are the next important segments.
- **Groups and Corporate** give moderate ADR.
- **Aviation and Complementary** contribute very little ADR.



Insights



Yes.

- Hotels should **focus more on Online TA and Direct bookings**.
- City hotels can **maximize pricing in strong segments**.
- Low-performing segments can be **reworked or reduced**.

Show the Distribution channels and Market Segment Hotel type

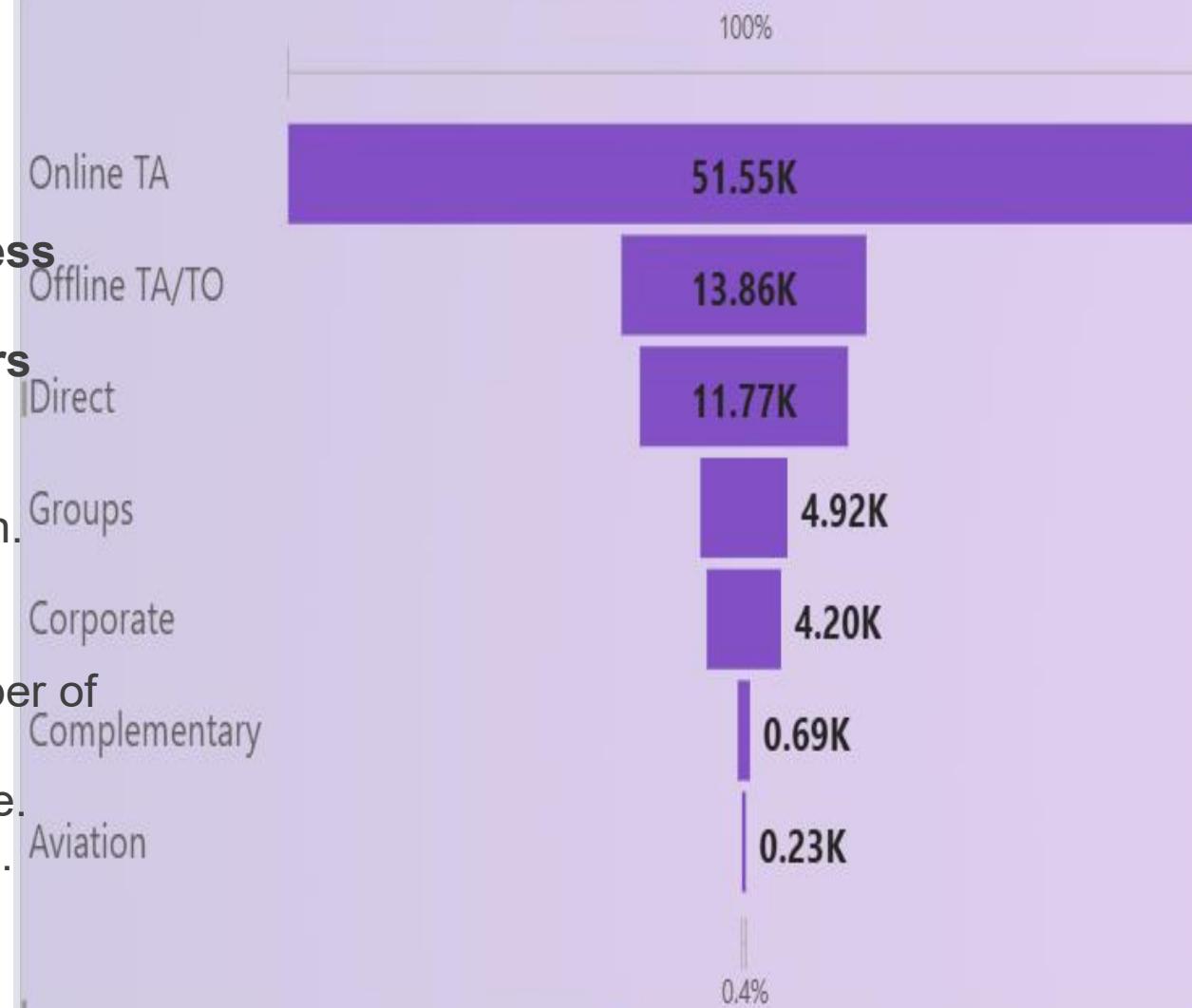
A funnel chart is used because it:

- Shows how bookings **reduce step by step** across market segments
- Helps compare **which channels bring more vs less bookings**
- Clearly highlights the **top and bottom contributors**

Online TA brings the **most bookings** by a big margin.

- **Offline TA/TO** and **Direct** are the next important channels.
- **Groups and Corporate** contribute a smaller number of bookings.
- **Complementary and Aviation** contribute very little.
- So, **most bookings come from online platforms.**

Distribution channel and Hotel by market_segment



Insights

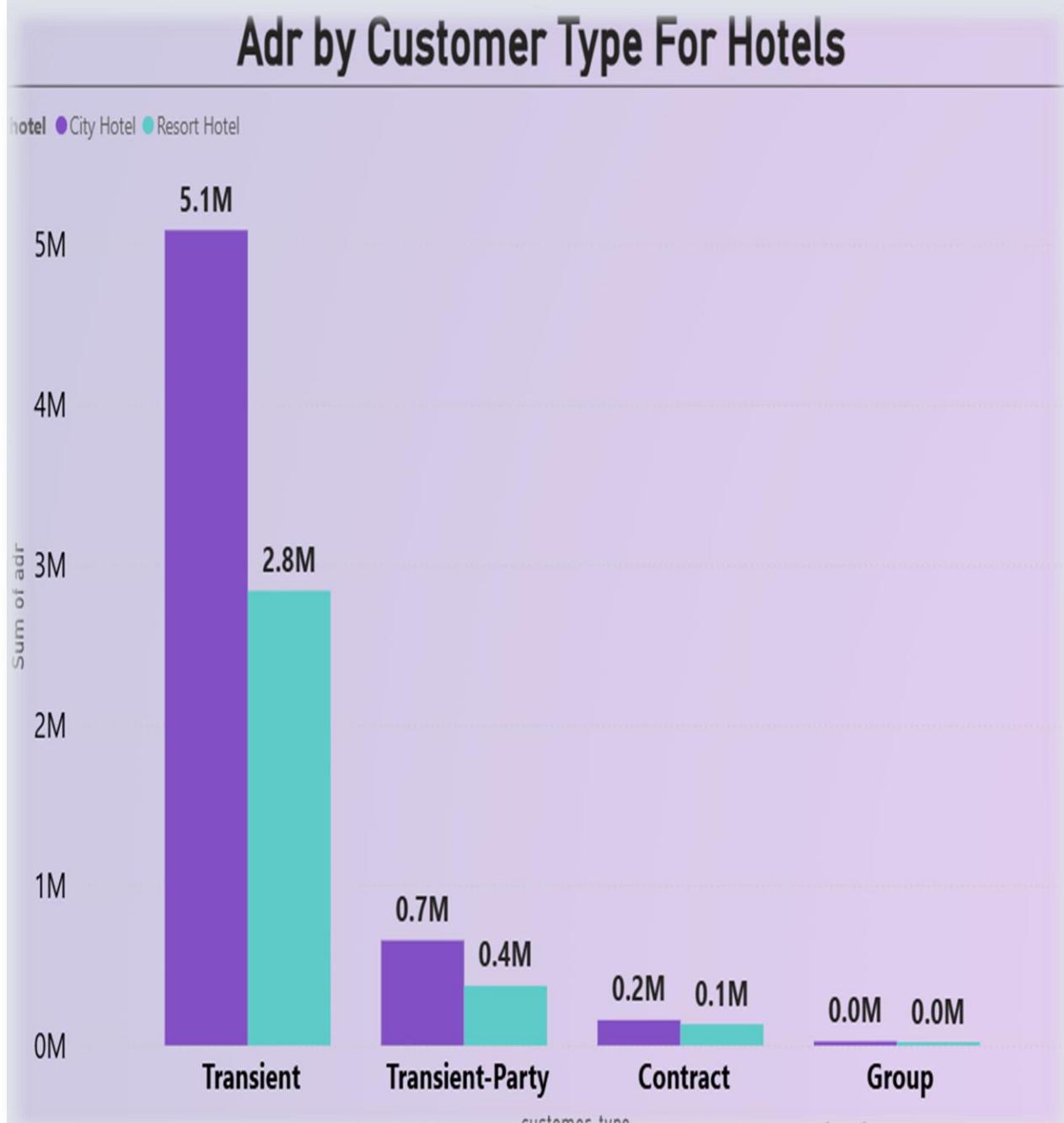


Yes.

- Hotels should **focus more on Online Travel Agents.**
- Direct bookings can be increased to **reduce commission costs.**
- Low-performing channels can be **reviewed or limited.**

Show the ADR by Customer type for each Hotel type

- A cluster column chart is easy to understand and compare values.
 - It clearly shows **ADR differences** across customer types.
 - It helps compare **City Hotel vs Resort Hotel** side by side.
-
- **Transient customers** generate the **highest ADR** for both hotels.
 - **City Hotels** earn more ADR than **Resort Hotels** in all customer types.
 - **Transient-Party** customers give moderate revenue.
 - **Contract and Group** customers contribute very less ADR.



Insights



Yes,

- Hotels can **focus more on Transient customers** to increase revenue.
- Marketing strategies can be improved for **high-value customer types**.
- Hotels can rethink pricing or offers for **low-performing segments**.

Total_Revenue by hotel



Revenue and ADR Analysis

Total Revenue

2.94T

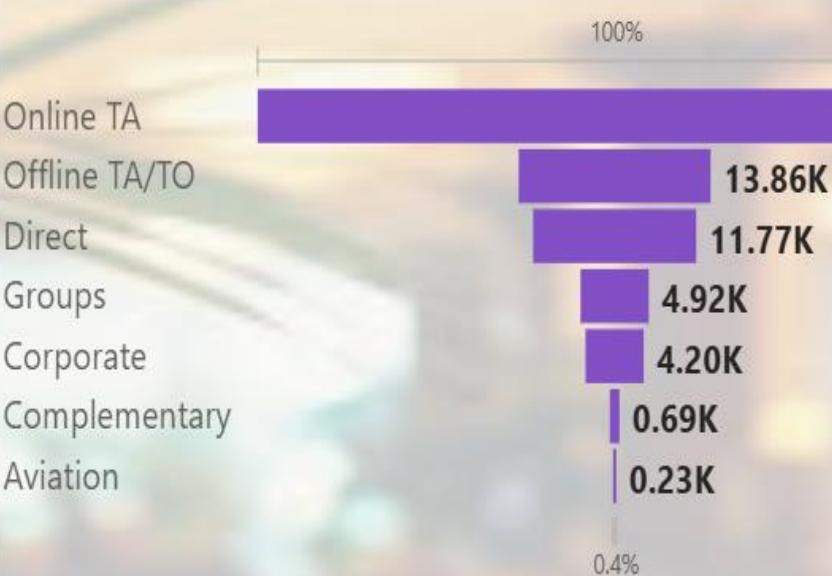
Total_Revenue

Average Lead Time

79.96

Average of...

Distribution channel and Hotel by market_segment



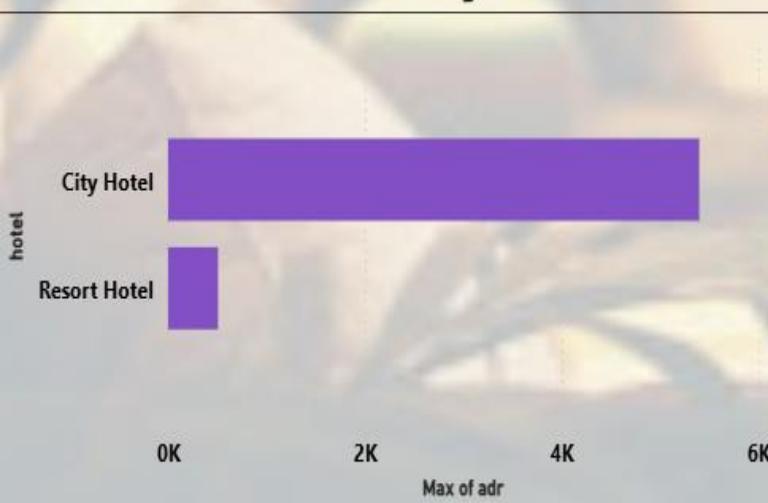
country

- ABW
- AGO
- AIA
- ALB
- AND
- ARE
- ARG
- ARM
- ASM
- ATA

Year, Quarter

- 2015
 - Qtr 1
 - Qtr 2
 - Qtr 3
 - Qtr 4
- 2016
 - Qtr 1
 - Qtr 2
 - Qtr 3
 - Qtr 4

Max of adr by hotel



Total ADR

9.29M

Sum of adr

Average ADR

106.53

Average of adr

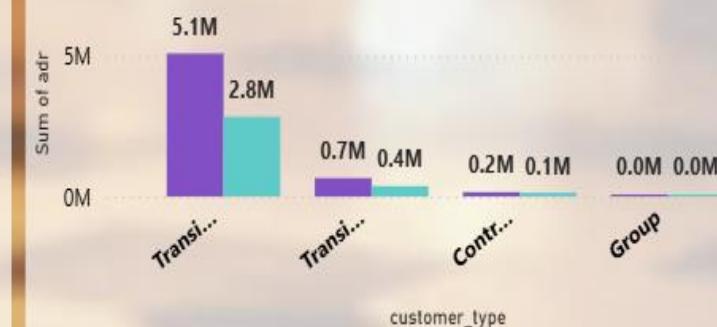
ADR by market_segment

hotel ● City Hotel ● Resort Hotel



Adr by Customer Type For Hotels

hotel ● City Hotel ● Resort Hotel



Data Visualization & Analysis

Conclusion



- **City Hotels** has a higher overall **booking rate** than **Resort Hotels**. To improve this, Resort Hotels should consider the **services** provided by City Hotels to boost the number of bookings.
- The City Hotel has a higher **rate of cancellations** than Resort Hotels. By implementing **focused strategies** to **retain guests**, the hotel could substantially decrease the impact on its revenue.
- **August** is one of the peak months for bookings. Hotels should **manage** their **resources** during these months and conduct **promotional activities** during months with **fewer bookings**.
- By promoting **early-bird specials**, hotels can encourage reservations well before the usual **lead time** of **75 to 85 days**, enhancing **financial liquidity** and diminishing the rates of last-minute room availability.
- Focusing on '**BB**' as the preferred **meal choice** and customizing the dining options and experiences could improve guest contentment.
- **Concentrating marketing efforts** specifically in **Portugal, the UK, and France**, where most guests come from, could increase reservation numbers.
- The **low rate** of returning guests highlights the opportunity for implementing **loyalty programs** to increase the number of **repeat stays**.
- A considerable volume of reservations is secured via **agents**, highlighting the need to cultivate **robust partnerships** with these intermediaries.



The background features a dense cluster of skyscrapers of various heights and architectural styles, all rendered in a light gray color. The buildings are tightly packed, creating a sense of a bustling urban environment.

Thank You

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