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Module 4: Forecasting & Cancellation Trends

Module 4 focuses on analyzing hotel booking cancellations, no-show patterns, refund behavior, and forecasting future booking demand. This module introduces analytical attributes such as CancellationFlag, CancellationRate, LeadTime, RefundAmount, and NoShow indicators to identify unreliable bookings and understand guest behavior.

Using Power BI, DAX, and built-in forecasting tools, the module helps hotels estimate future occupancy, measure cancellation risk, and make informed pricing and operational decisions. This forecasting and cancellation analytics layer strengthens revenue planning and identifies trends that directly impact business performance.

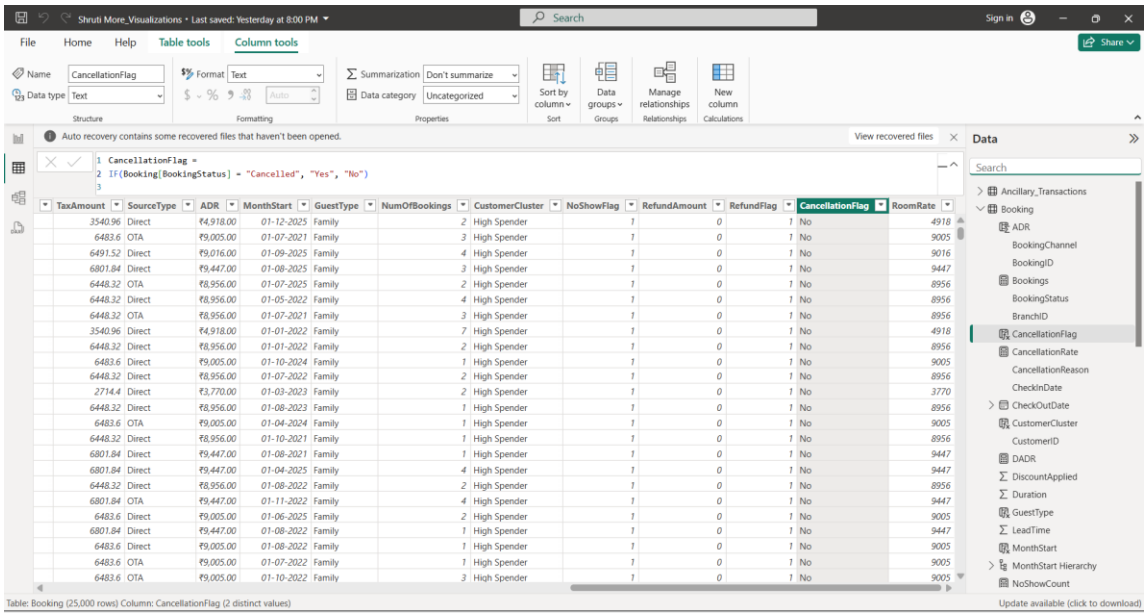
Creating CancellationFlag (Identifying Cancelled Bookings)

To differentiate cancelled bookings from completed stays, a new analytical column called **CancellationFlag** was created.
This column classifies each booking as “Yes” (Cancelled) or “No” (Not Cancelled).

DAX Formula Used

CancellationFlag =

IF(Booking[BookingStatus] = "Cancelled", "Yes", "No")



This field helps segment cancellations for deeper analysis and supports calculation of cancellation ratios, refund rates, and forecasting cancellations over time.

LeadTime (Understanding Booking Behavior)

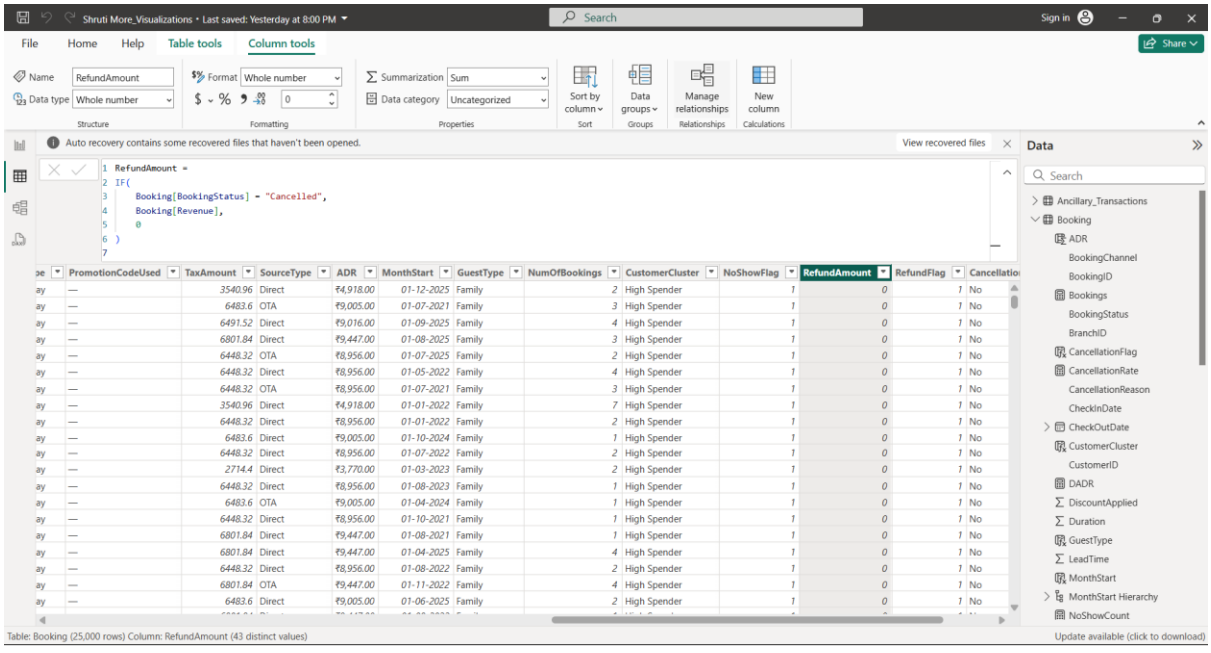
LeadTime measures the number of days between the booking date and the check-in date. It is a critical variable for forecasting cancellations because bookings made too early or too late tend to cancel more frequently.

RefundAmount (Financial Impact of Cancellations)

RefundAmount calculates the value refunded when a booking gets cancelled. This metric helps assess revenue loss caused by cancellations.

DAX Formula Used

```
RefundAmount =
IF(
    Booking[BookingStatus] = "Cancelled",
    Booking[Revenue],
    0
)
```



This helps track total refunded value and supports visualizations showing cancellation cost trends.

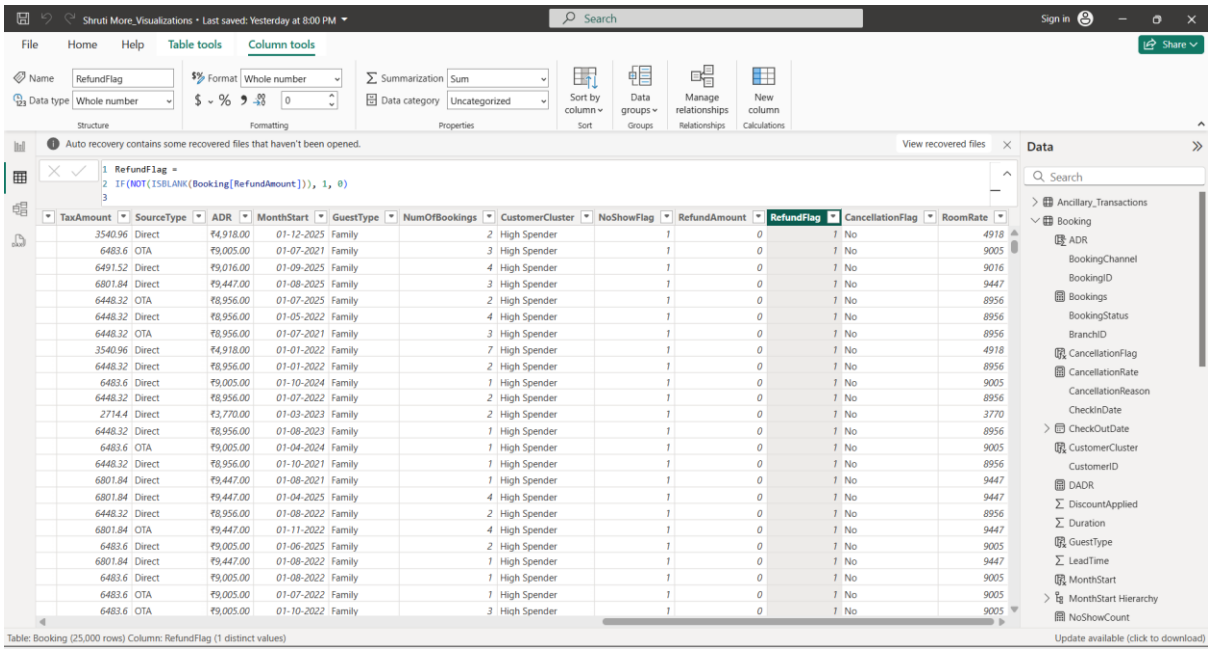
RefundFlag

RefundFlag shows whether a booking resulted in a refund.
It is used for segmenting cancellations based on financial impact.

DAX Formula Used

RefundFlag =

IF(NOT(ISBLANK(Booking[RefundAmount])), 1, 0)



This field allows analysis of how many cancellations result in financial loss vs. zero-loss cancellations.

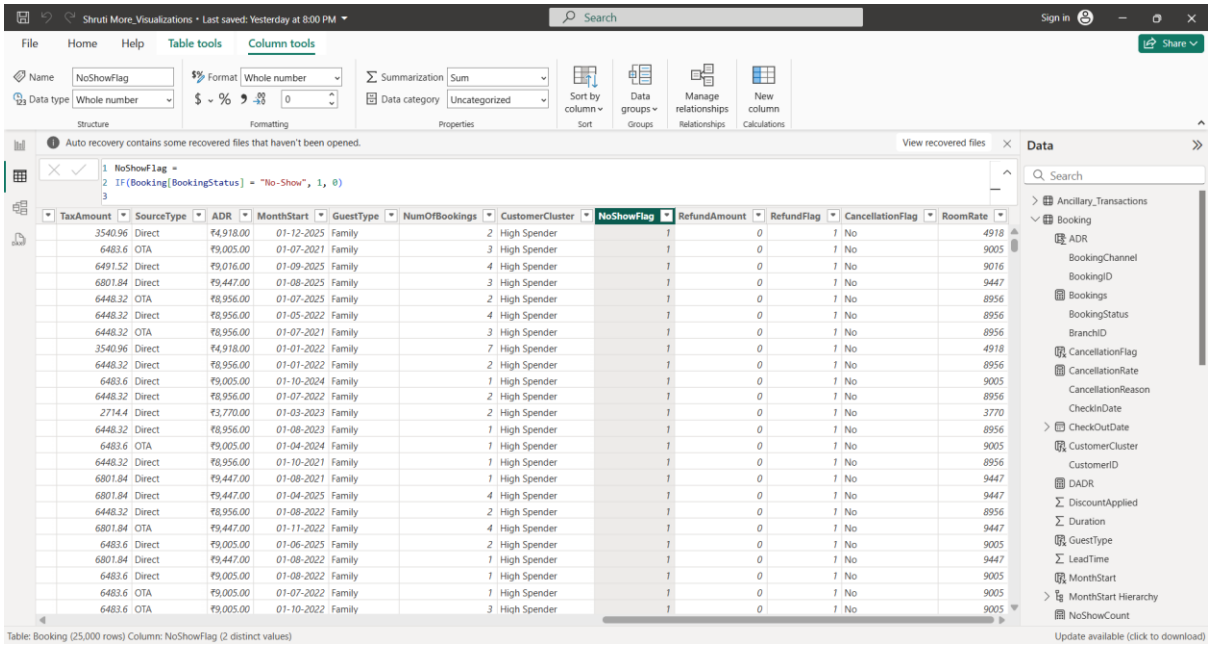
NoShowFlag (Identifying No-Show Guests)

No-shows reduce hotel revenue and operational efficiency.
A **NoShowFlag** column identifies guests who did not arrive despite having a confirmed booking.

DAX Formula Used

NoShowFlag =

IF(Booking[BookingStatus] = "No-Show", 1, 0)



TaxAmount	SourceType	ADR	MonthStart	GuestType	NumOfBookings	CustomerCluster	NoShowFlag	RefundAmount	RefundFlag	CancellationFlag	RoomRate
3540.96	Direct	₹4,918.00	01-12-2025	Family	2	High Spender	1	0	1	No	4918
6483.6	OTA	₹9,005.00	01-07-2021	Family	3	High Spender	1	0	1	No	9005
6491.52	Direct	₹9,016.00	01-09-2025	Family	4	High Spender	1	0	1	No	9016
6801.84	Direct	₹9,447.00	01-08-2025	Family	3	High Spender	1	0	1	No	9447
6448.32	OTA	₹8,956.00	01-07-2025	Family	2	High Spender	1	0	1	No	8956
6448.32	Direct	₹8,956.00	01-05-2022	Family	4	High Spender	1	0	1	No	8956
6448.32	OTA	₹8,956.00	01-07-2021	Family	3	High Spender	1	0	1	No	8956
3540.96	Direct	₹4,918.00	01-01-2022	Family	7	High Spender	1	0	1	No	4918
6448.32	Direct	₹8,956.00	01-01-2022	Family	2	High Spender	1	0	1	No	8956
6483.6	Direct	₹9,005.00	01-10-2024	Family	1	High Spender	1	0	1	No	9005
6448.32	Direct	₹8,956.00	01-07-2022	Family	2	High Spender	1	0	1	No	8956
2714.4	Direct	₹3,770.00	01-03-2023	Family	2	High Spender	1	0	1	No	3770
6448.32	Direct	₹8,956.00	01-08-2023	Family	1	High Spender	1	0	1	No	8956
6483.6	OTA	₹9,005.00	01-04-2024	Family	1	High Spender	1	0	1	No	9005
6448.32	Direct	₹8,956.00	01-10-2021	Family	1	High Spender	1	0	1	No	8956
6801.84	Direct	₹9,447.00	01-08-2021	Family	1	High Spender	1	0	1	No	9447
6801.84	Direct	₹9,447.00	01-04-2025	Family	4	High Spender	1	0	1	No	9447
6448.32	Direct	₹8,956.00	01-08-2022	Family	2	High Spender	1	0	1	No	8956
6801.84	OTA	₹9,447.00	01-11-2022	Family	4	High Spender	1	0	1	No	9447
6483.6	Direct	₹9,005.00	01-06-2025	Family	2	High Spender	1	0	1	No	9005
6801.84	Direct	₹9,447.00	01-08-2022	Family	1	High Spender	1	0	1	No	9447
6483.6	Direct	₹9,005.00	01-08-2022	Family	1	High Spender	1	0	1	No	9005
6483.6	OTA	₹9,005.00	01-07-2022	Family	1	High Spender	1	0	1	No	9005
6483.6	OTA	₹9,005.00	01-10-2022	Family	3	High Spender	1	0	1	No	9005

This enables no-show trend analysis and supports operational decisions such as overbooking strategies.

RoomRate and DADR

RoomRate is pulled from the RoomType table and represents the base price of each room category.

DAX Formula Used

RoomRate =

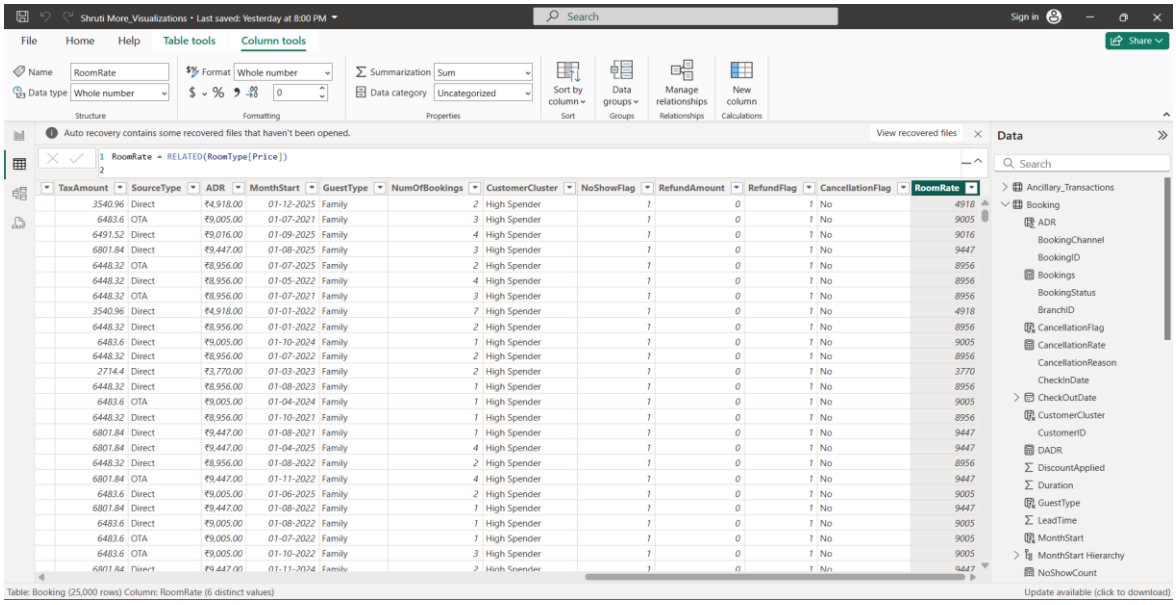
RELATED(RoomType[Price])

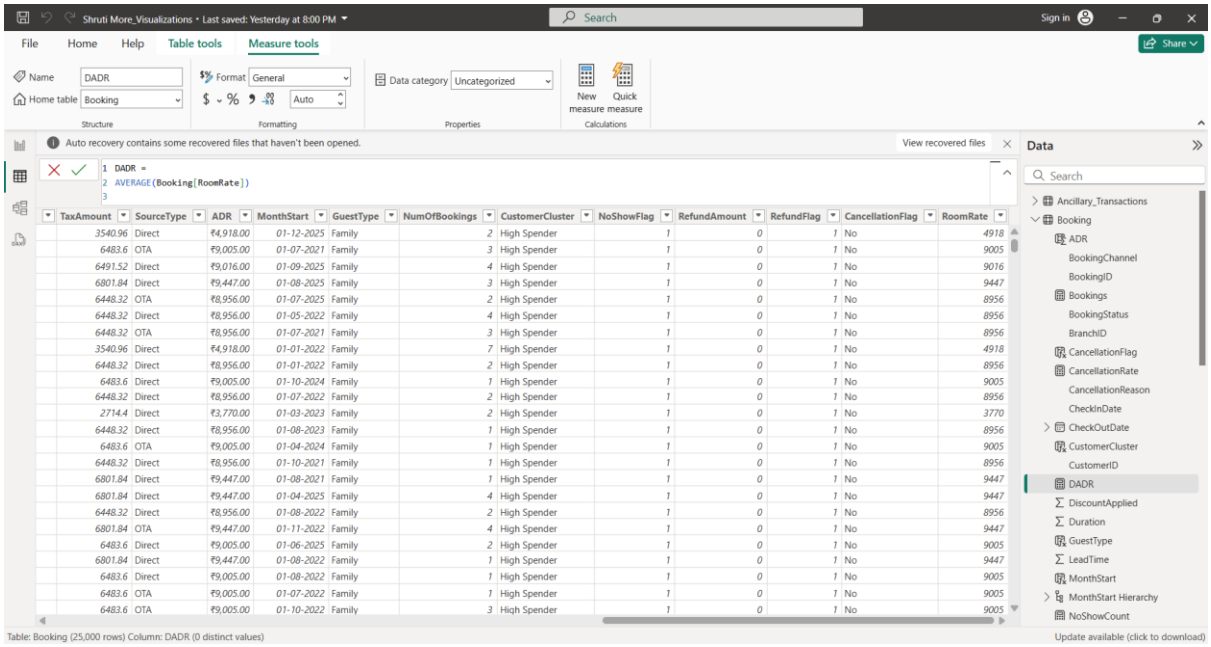
DADR (Derived ADR) calculates the average daily rate based on available room pricing.

DAX Formula Used

DADR =

AVERAGE(Booking[RoomRate])





These metrics are important for forecasting revenue and supporting price optimization analytics.

Recommended Price (Dynamic Price Forecasting Output)

A pricing model was created using variables such as seasonality adjustment, price uplift, and occupancy elasticity.
The **Recommended Price** column calculates an optimized room price for future demand forecasting.

DAX Formula Used

Recommended Price =

VAR BaseADR = [DADR]

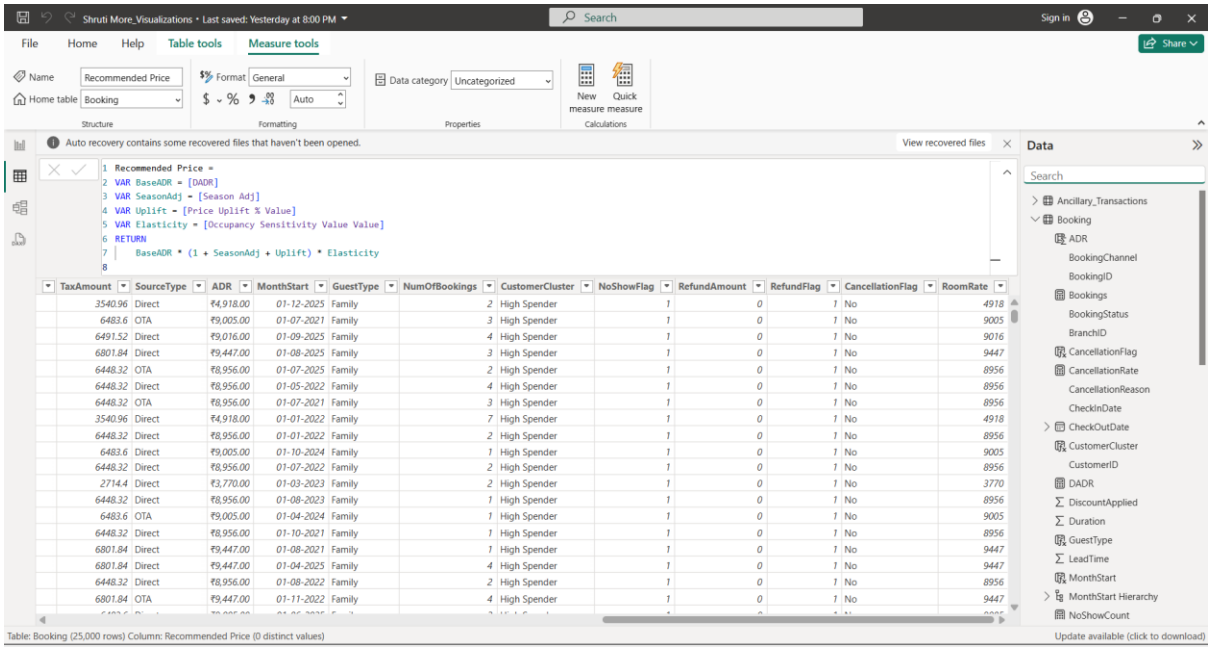
VAR SeasonAdj = [Season Adj]

VAR Uplift = [Price Uplift % Value]

VAR Elasticity = [Occupancy Sensitivity Value]

RETURN

BaseADR * (1 + SeasonAdj + Uplift) * Elasticity



This helps simulate how price changes influence future occupancy and supports revenue management decisions.

MEASURES

CancellationRate (Percentage of Cancelled Bookings)

CancellationRate is the key performance indicator for understanding booking reliability. This measure calculates the ratio of cancelled bookings to total bookings.

DAX Formula Used

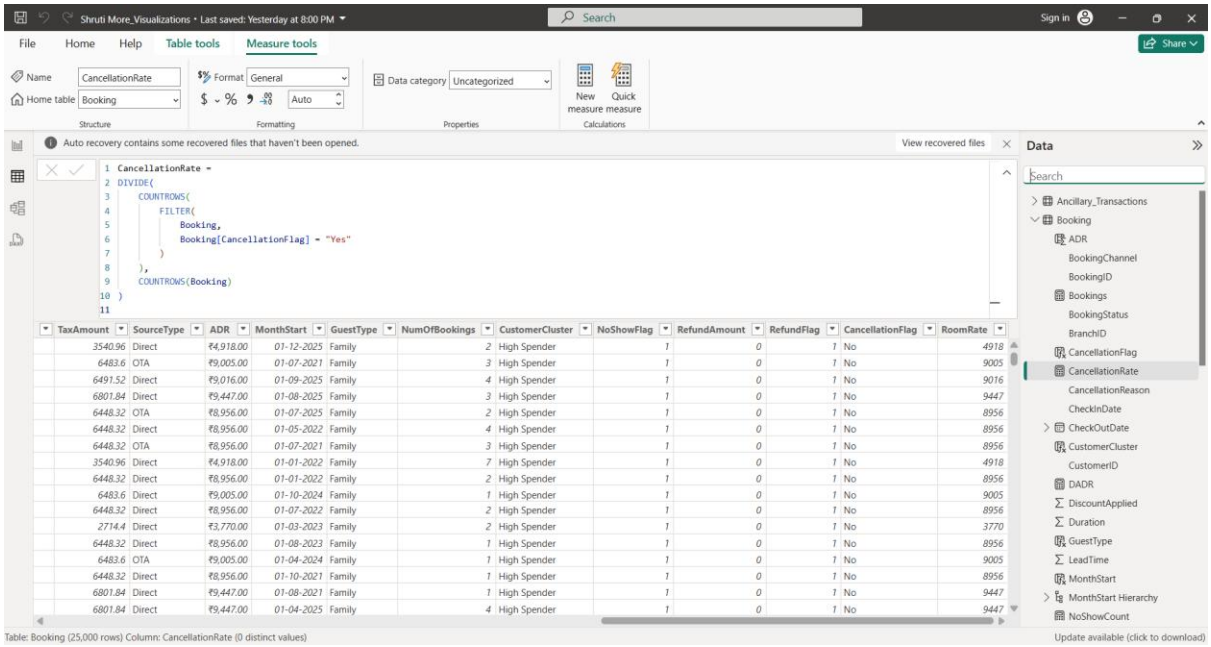
CancellationRate =

DIVIDE(

COUNTROWS(

FILTER(

```
        Booking,
        Booking[CancellationFlag] = "Yes"
    )
  ),
  COUNTROWS(Booking)
)
```



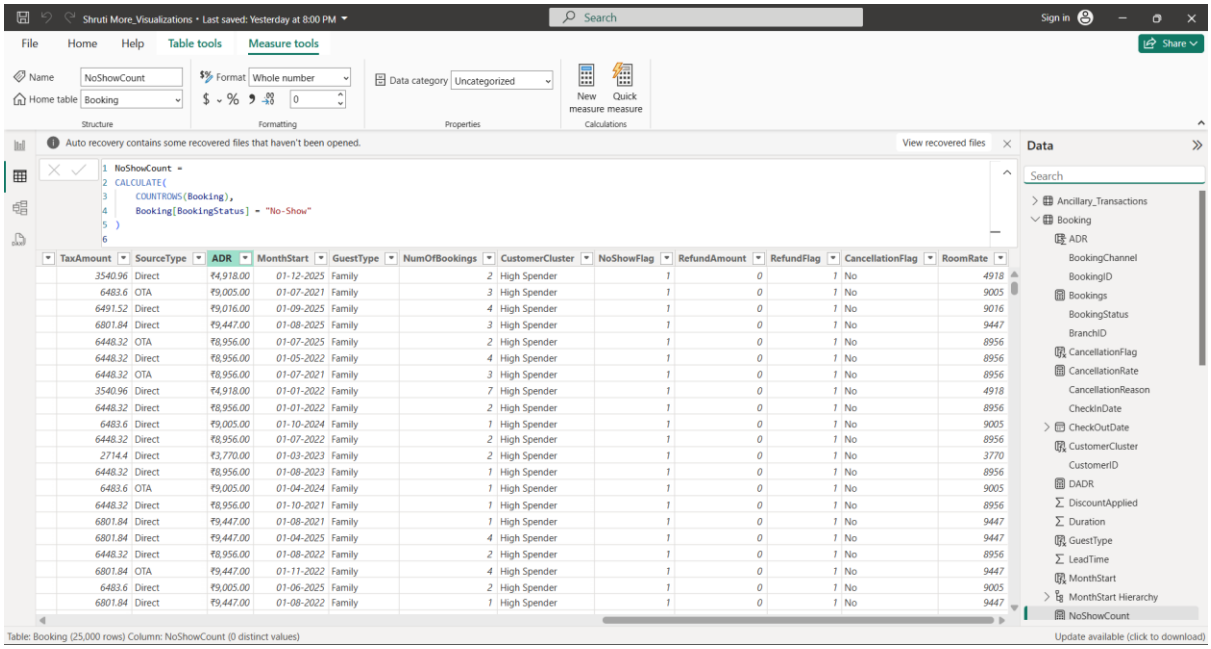
This gives insights into how often guests cancel and helps compare cancellation patterns across segments like booking channel, room type, or guest type.

NoShowCount (Measure to Count No-Shows)

A measure was created to calculate the total number of no-show bookings.

DAX Formula Used

```
NoShowCount =
CALCULATE(
  COUNTROWS(Booking),
  Booking[BookingStatus] = "No-Show"
)
```



This helps visualize no-show patterns by time period, booking channel, gender, or other segmentation fields.

Visualization and Analysis: (Output)

After creating analytical fields such as CancellationFlag, CancellationRate, LeadTime, NoShowFlag, RefundAmount, and forecasting metrics, several Power BI visualizations were developed to understand cancellation behavior, no-show patterns, refund impact, and future occupancy predictions.

These visuals help interpret operational risks, identify seasonal patterns, and provide data-driven insights for planning future demand.

a) Future Occupancy Forecast

A line chart was created to forecast future occupancy by applying Power BI's built-in forecasting model on historical occupancy trends.
The visual displays both actual historical occupancy and predicted future occupancy, along with a shaded confidence band showing the uncertainty range.

To generate the forecast, the following configuration was applied inside Power BI:

- Units: Months
- Forecast Length: 7 Months
- Ignore Last: 0 data points

- Seasonality: Auto-detected
- Confidence Interval: 95%

These settings allow Power BI to automatically detect repeating seasonal patterns and extend future occupancy values based on exponential smoothing.

The confidence interval (shaded grey area) highlights upper and lower bounds of expected occupancy.
This visualization helps hotels:

- anticipate upcoming high-demand months,
- plan staffing and room inventory,
- create proactive pricing strategies, and
- prepare for occupancy fluctuations.

b) Cancellation Rate Over Time

A line chart highlights the monthly and yearly cancellation rate using the *CancellationRate* measure.
This visualization shows how cancellations vary across seasons, allowing the hotel to identify patterns such as:

- months with peak cancellations,
- booking periods with unstable customer behavior, and
- seasonal cancellation spikes that may require policy adjustments.

Understanding cancellation volatility supports strategic planning and improves forecasting accuracy.

c) Lead Time Distribution

A horizontal bar chart was created to illustrate the distribution of LeadTime (days between booking and check-in).
This chart shows how far in advance guests typically book and reveals trends such as:

- last-minute bookings with very low lead time,
- early bookings with long lead time, and
- the most common lead-time window for reliable bookings.

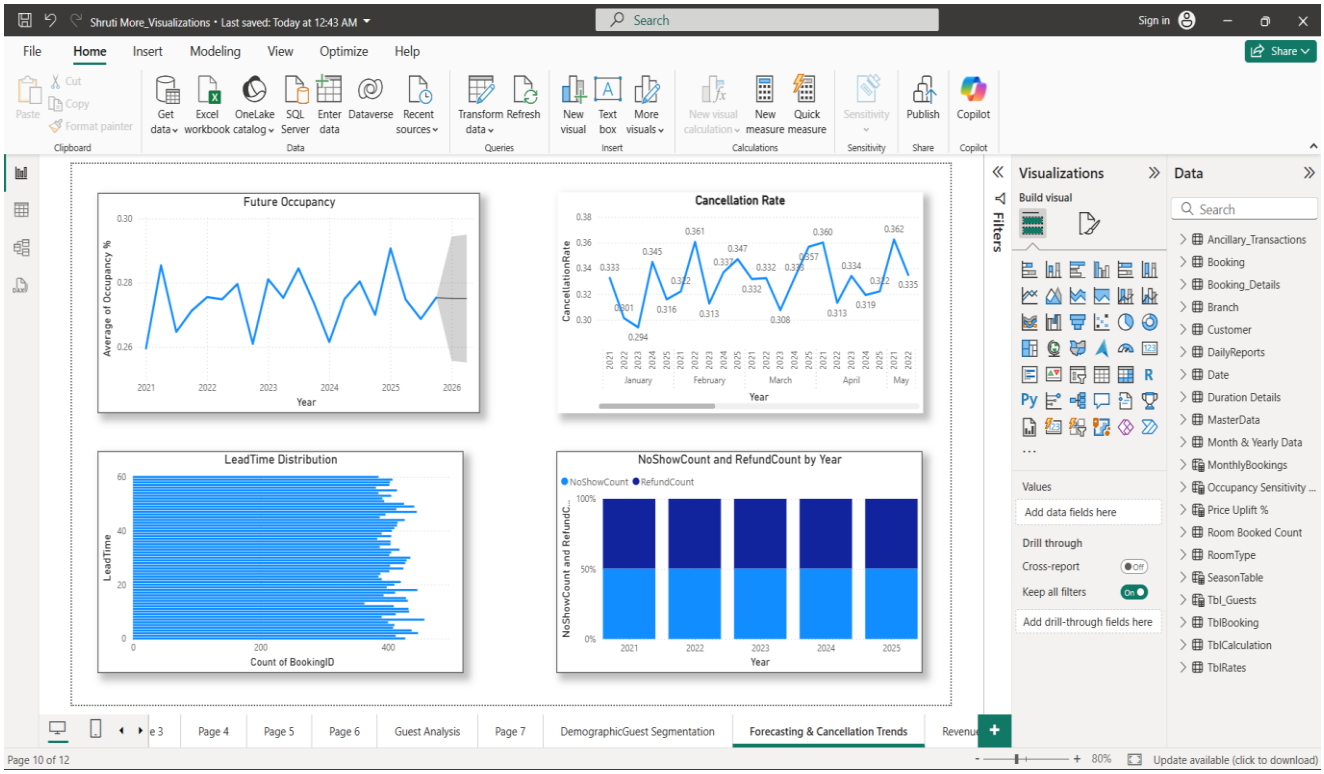
This helps identify which booking windows have a higher risk of cancellations and supports predictive modeling.

d) NoShowCount and RefundCount by Year

A stacked bar chart compares yearly NoShowCount and RefundCount.
This visualization highlights:

- the volume of no-shows per year,
- the total refunds issued due to cancellations, and
- whether customer reliability is improving or deteriorating over time.

This helps quantify the financial and operational impact of unreliable bookings and assists in creating mitigation strategies.



Insights and Learning from Module 4

- **Clear Cancellation Trends**
  Cancellation patterns varied by month and year, helping identify periods with high booking instability.
- **Lead Time Affects Reliability**
  Bookings made very early or very late showed higher cancellation likelihood, highlighting guest planning behavior.
- **Forecasting Improved Demand Visibility**
  Using Power BI's 7-month forecast with a 95% confidence interval provided reliable insight into future occupancy trends.

- **No-Show and Refund Patterns Identified**
  The analysis showed consistent no-show volumes and measurable refund impacts, helping quantify revenue loss.
- **Better Operational & Revenue Planning**
  Understanding cancellations, no-shows, and forecasting outputs supports more accurate staffing, pricing, and inventory decisions.
- **Foundation for Predictive Strategies**
  The metrics created (LeadTime, CancellationFlag, NoShowFlag, Forecast) prepare the system for advanced cancellation prediction and dynamic pricing models.

Conclusion

Module 4 provided valuable insights into booking reliability by analyzing cancellations, no-shows, lead time behavior, and refund patterns. Through forecasting techniques and key analytical metrics, the module helped identify periods of high cancellation risk and offered clear visibility into future occupancy trends.

The combined use of DAX calculations, cancellation indicators, and Power BI's forecasting model supports better operational planning, revenue management, and policy decisions. Overall, this module strengthens the hotel's ability to anticipate demand, minimize revenue loss, and make data-driven strategic improvements for future business growth.