Hotel Revenue Analysis Project

Power BI Project

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Project Statement -

Revenue Analysis for Hotels project focuses on helping hotels improve revenue through data-driven insights. Hotels often struggle to understand occupancy patterns, pricing effectiveness, guest behavior, and seasonal demand fluctuations. This project develops an interactive analytics solution using Microsoft Power BI to monitor key performance indicators such as Occupancy Rate, ADR, and RevPAR. It analyzes booking trends across different room types, branches, and booking channels like Direct and OTA. The system also segments guests into Business, Family, and Solo categories to better understand customer behavior and loyalty patterns. Additionally, it incorporates forecasting techniques to predict future occupancy and cancellation trends. The final dashboard supports strategic decisions related to pricing, promotions, upselling opportunities, and overall revenue optimization.

Project Outcomes -

- Interactive Occupancy & Revenue dashboard with KPI tracking
- Accurate calculation of ADR and RevPAR metrics
- Guest segmentation (First-timers, Loyal Guests, High Spenders)
- Seasonal trend and booking source performance analysis
- Forecasting of occupancy and cancellation patterns
- Lead time and refund behaviour insights
- Branch-level performance comparison
- Strategic pricing and upselling recommendations
- Scalable model applicable to multiple hotel chains

Software Requirements

1. **Microsoft Power BI Desktop** – For data modeling, DAX calculations, and dashboard development
2. **Microsoft Excel** – For initial data cleaning and preprocessing
3. Windows 10/11 Operating System

Hardware Requirements

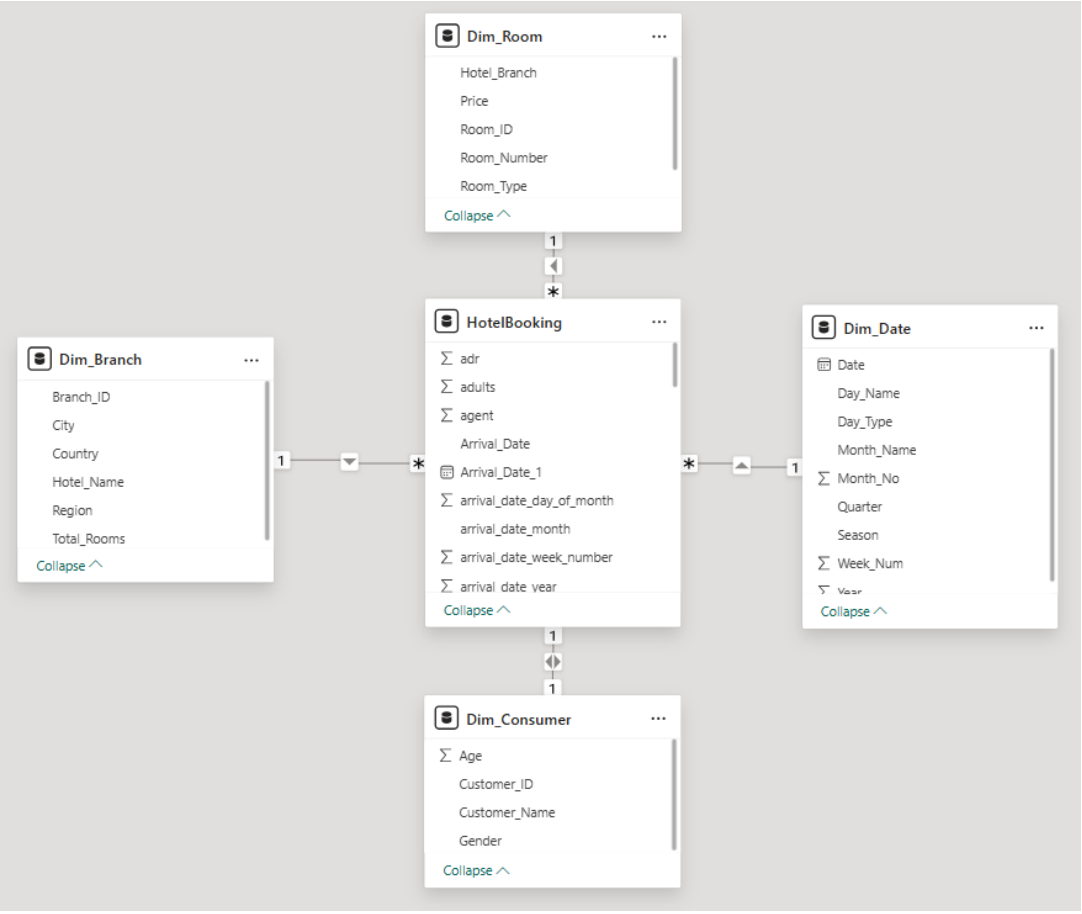
1. **Processor:** Intel i5 / Ryzen 5 or higher
2. **RAM:** Minimum 8 GB (Recommended 16 GB for smooth performance)
3. **Storage:** Minimum 256 GB SSD
4. Stable internet connection (for dataset download and dashboard publishing)

Module 1: Data Modeling and Ingestion

Module 1 focuses on building a strong data foundation for the Hotel Revenue Analysis project. In this phase, raw booking, customer, and room datasets are collected, cleaned, and transformed into a structured format. Using Microsoft Power BI Desktop, data is processed through Power Query to remove inconsistencies, handle missing values, and create calculated columns such as booking duration and stay type.

A star schema model is then designed by establishing relationships between fact tables (Bookings) and dimension tables (Date, Customer, Room, and Hotel Branch). Proper data modeling ensures accurate KPI calculations like Occupancy %, ADR, and RevPAR in later modules. This module creates a scalable and efficient data architecture that supports advanced analytics, forecasting, and dashboard development in subsequent stages.

Star schema Data Model –



Module 2: Occupancy & Revenue Metrics

Module 2 focuses on analyzing key performance indicators that impact hotel revenue and efficiency. It calculates important metrics like Occupancy Rate, ADR, and RevPAR using structured data from Module 1. Interactive dashboards are created in Microsoft Power BI to visualize daily, weekly, and seasonal trends. The module also compares booking channels such as Direct, OTA, Corporate, and GDS to measure their effectiveness. Drill-down analysis helps evaluate performance by branch, room type, and time period. This module supports better revenue monitoring and pricing decisions.

Calculated columns and measures –

Total Revenue

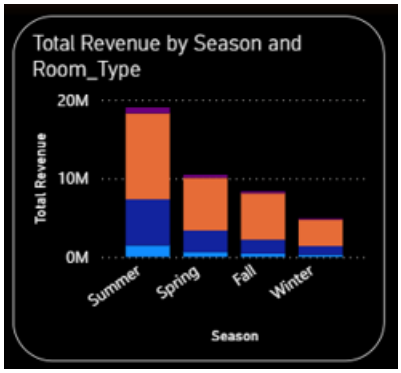
```
Total Revenue =
SUMX(
    'HotelBooking',
    'HotelBooking'[adr] *
    ('HotelBooking'[stays_in_weekend_nights] +
     'HotelBooking'[stays_in_week_nights])
)
```

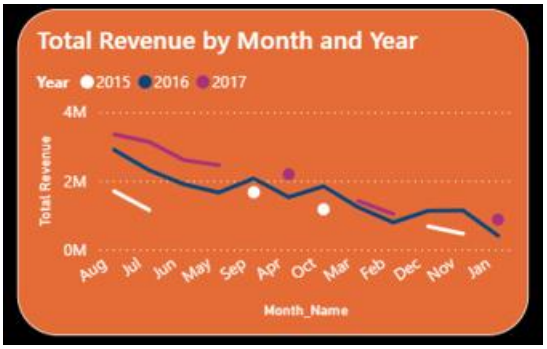
Occupancy %

```
Occupancy % =
DIVIDE([Occupied Bookings], [Total Bookings], 0)
```

RevPAR

```
RevPAR =
DIVIDE([Total Revenue], [Total Bookings], 0)
```





Module 3: Guest Analysis Module

Module 3 focuses on analyzing guest behavior and customer segmentation to improve revenue strategies. Guests are categorized into Business, Family, and Solo segments based on booking patterns and stay duration. Interactive dashboards in Microsoft Power BI visualize nationality, booking sources, and average stay duration. Customers are further grouped into First-timers, Loyal Guests, and High Spenders to identify valuable segments. These insights help hotels create targeted marketing, loyalty programs, and personalized promotions to increase customer satisfaction and profitability.

Calculated columns and measures –

High Value Guest

```
High Value Guest =
IF(
    [Revenue per Booking] > AVERAGE(HotelBooking[adr]) * 3,
    "High Spender",
    "Regular"
)
```

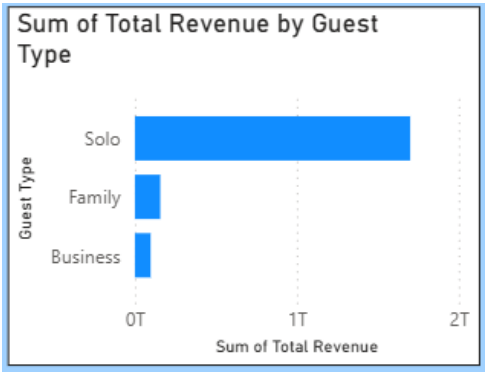
Guest Type

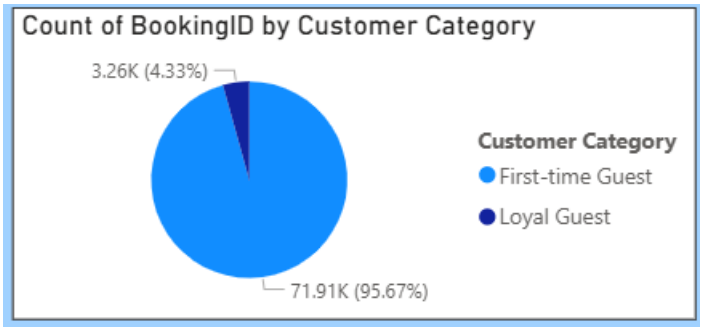
```
Guest Type =
SWITCH(
    TRUE(),

    Hotel[market_segment] = "Corporate"
        && Hotel[stays_in_week_nights] >= Hotel[stays_in_weekend_nights],
    "Business",

    (Hotel[children] + Hotel[babies]) > 0,
    "Family",

    "Solo"
)
```





Module 4: Forecasting and Cancellation Trends

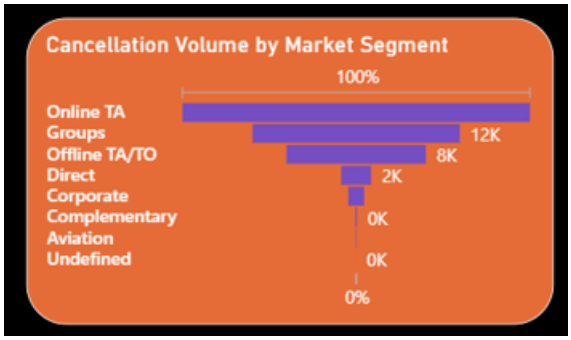
Module 4 focuses on predicting future occupancy and analyzing cancellation behavior to reduce revenue loss. In this phase, historical booking data is used to identify trends, seasonal patterns, and demand fluctuations. Using Microsoft Power BI Desktop, forecasting techniques and trend analysis visuals are implemented to estimate future occupancy levels.

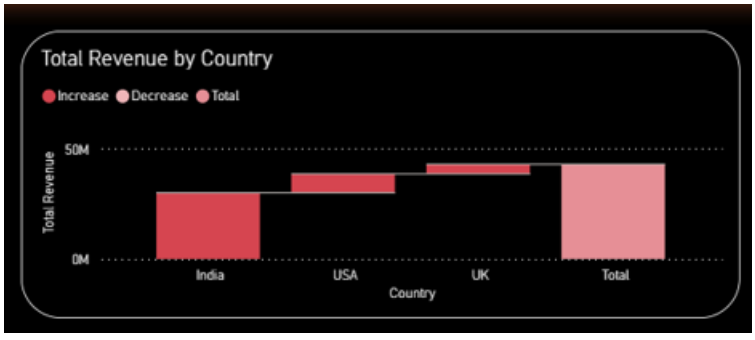
The module also evaluates cancellation rates, lead time distribution, and no-show patterns to understand revenue risks. Time-based charts help identify peak cancellation periods and high-risk booking segments. These insights enable hotel management to implement preventive strategies such as flexible pricing, overbooking control, and targeted confirmation policies. Overall, this module supports proactive decision-making to stabilize occupancy and improve revenue predictability.

Calculated columns and measures –

Cancellation Count

```
Cancellation Count =
CALCULATE(
    COUNT('HotelBooking'[Customer_ID]),
    'HotelBooking'[is_canceled]= 1
)
```

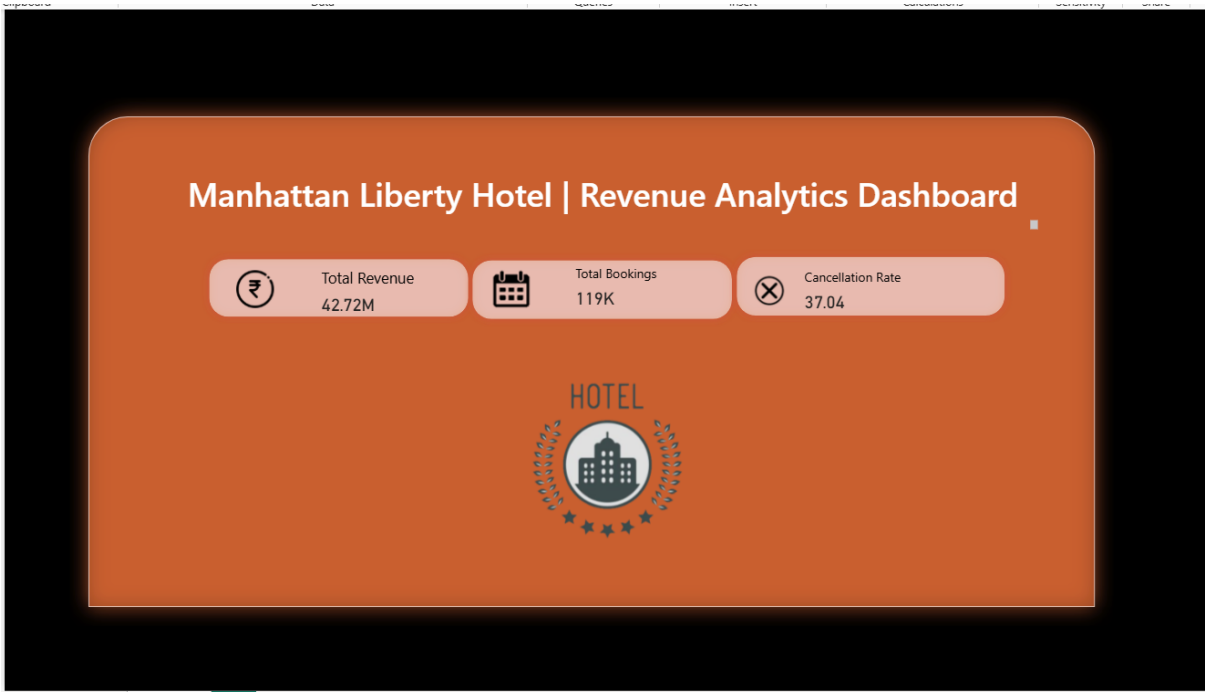


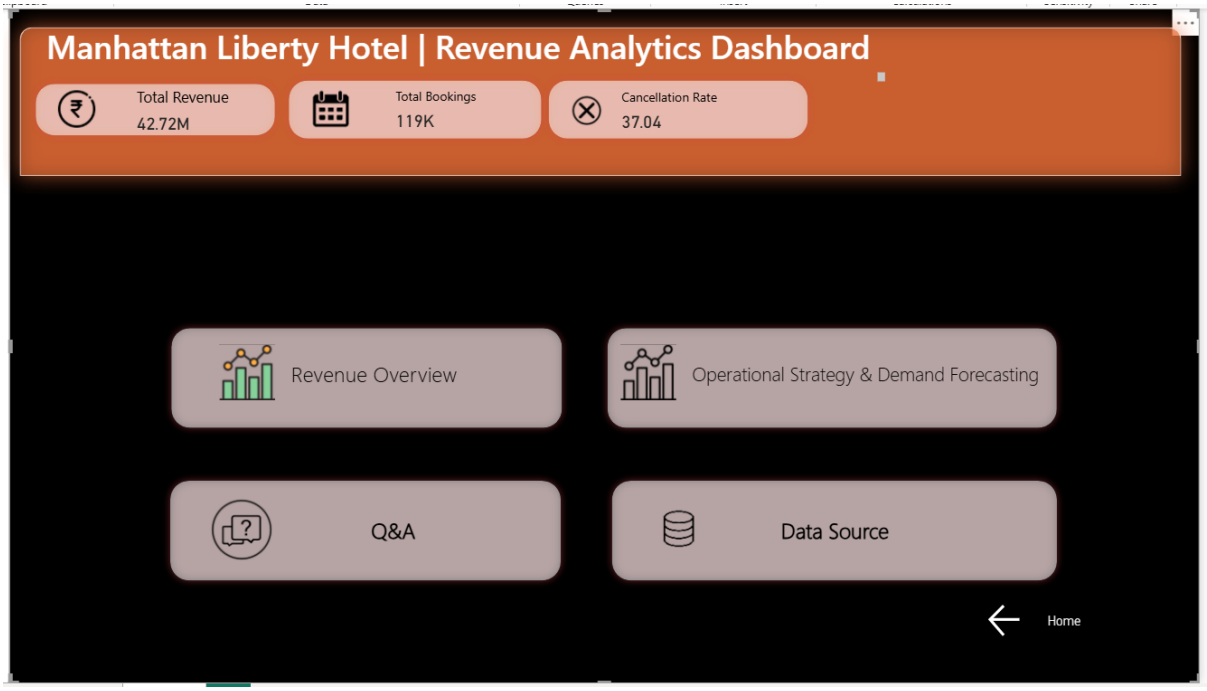


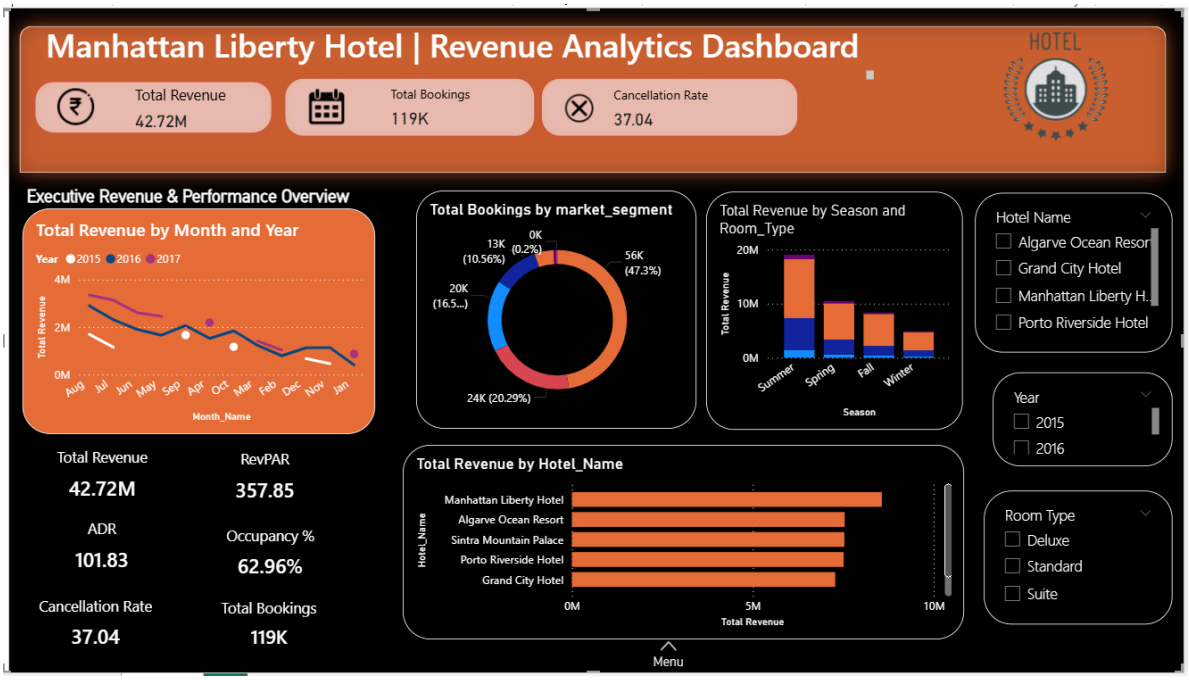
Module 5: Revenue Strategy Dashboard

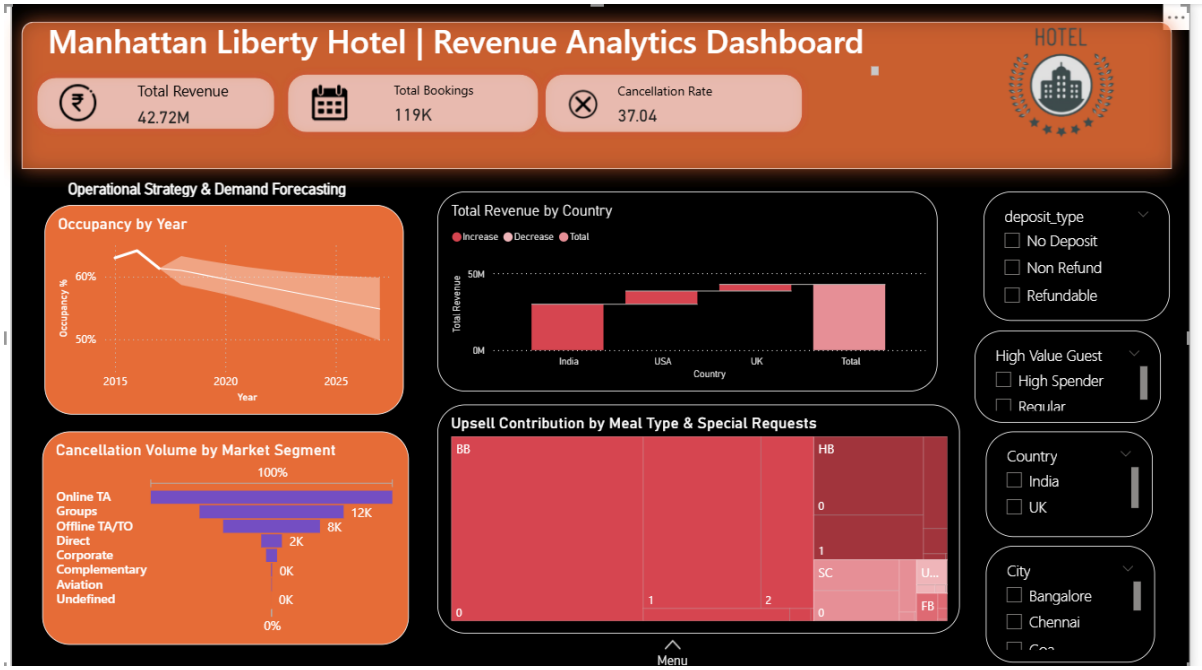
Module 5 focuses on converting analytical insights into strategic revenue decisions for hotel management. In this phase, key findings from occupancy, revenue, guest segmentation, and forecasting modules are integrated into a final interactive dashboard using Microsoft Power BI Desktop.

The dashboard highlights pricing optimization opportunities based on season, room type, and booking channel performance. It also identifies upselling potential for additional services such as dining, spa, and premium room upgrades. Comparative branch-level performance analysis supports better resource allocation and marketing strategies. The module provides actionable recommendations for promotions, loyalty programs, and seasonal pricing adjustments. Overall, this dashboard acts as a decision-support system for general managers and revenue managers to maximize profitability and operational efficiency.




Manhattan Liberty Hotel | Revenue Analytics Dashboard
Total Revenue
42.72M
Total Bookings
119K
Cancellation Rate
37.04
Revenue Overview
Operational Strategy & Demand Forecasting
Q&A
Data Source
Home


Manhattan Liberty Hotel | Revenue Analytics Dashboard
HOTEL
Total Revenue
42.72M
Total Bookings
119K
Cancellation Rate
37.04
Executive Revenue & Performance Overview
Total Revenue by Month and Year
Year 2015 2016 2017
4M
2M
0M
Total Revenue
Aug Jul Jun May Sep Apr Oct Mar Feb Dec Nov Jan
Month_Name
Total Bookings by market_segment
0K (0.2%)
13K (10.56%)
56K (47.3%)
20K (16.5...)
24K (20.29%)
Total Revenue by Season and Room_Type
20M
10M
0M
Total Revenue
Summer Spring Fall Winter
Season
Hotel Name
Algarve Ocean Resor
Grand City Hotel
Manhattan Liberty H...
Porto Riverside Hotel
Year
2015
2016
Room Type
Deluxe
Standard
Suite
Total Revenue
42.72M
RevPAR
357.85
ADR
101.83
Occupancy %
62.96%
Cancellation Rate
37.04
Total Bookings
119K
Total Revenue by Hotel_Name
Manhattan Liberty Hotel
Algarve Ocean Resort
Sintra Mountain Palace
Porto Riverside Hotel
Grand City Hotel
Hotel_Name
0M
5M
10M
Total Revenue
Menu



Conclusion –

The Hotel Revenue Analysis project demonstrates how data analytics enhances hotel revenue management and operational efficiency. It integrates data modeling, KPI analysis, guest segmentation, and forecasting into a complete analytical solution. Interactive dashboards in Microsoft Power BI enable real-time tracking of Occupancy, ADR, and RevPAR. Guest insights support targeted marketing and loyalty strategies, while forecasting helps reduce revenue loss. Overall, the project provides a scalable framework for revenue optimization in modern hotels.