

Hotel Booking Management Data Analysis Report

Python Project Analysis: Hotel booking Management Data Analysis

1. Project Objective

This project aims to analyze hotel booking trends, customer behavior, and factors affecting cancellations to optimize revenue, improve occupancy rates, and enhance customer satisfaction. The insights gained will support strategic decision-making for better hotel management.

2. Key Performance Indicators (KPIs) & Research Questions

To evaluate hotel performance and customer behavior, we analyze the following key aspects:

- **Booking Trends:** When are the peak and off-peak booking periods?
- **Cancellation Analysis:** What percentage of bookings are canceled, and what are the primary reasons?
- **Customer Segmentation:** How do different customer types (business vs. leisure travelers) influence booking patterns?
- **Revenue Insights:** How do factors such as length of stay and room types impact total revenue?
- **Lead Time Impact:** How does the time between booking and check-in correlate with cancellations?
- **Market Segment Analysis:** Which customer segments generate the highest revenue?

3. Data Analysis Process

1. Data Cleaning & Preprocessing:

- Addressed missing values in the dataset.
- Converted categorical variables into numerical representations where necessary.
- Removed duplicate and inconsistent records for accuracy.

2. Exploratory Data Analysis (EDA):

- Examined cancellation percentages across various customer segments.
- Analyzed the impact of booking lead times on cancellations.
- Assessed revenue contributions by different customer types and room categories.
- Identified seasonal trends in hotel bookings.

3. Visualization & Insights:

- **Bar & Pie Charts:** Booking and cancellation patterns.
- **Line Charts:** Seasonal trends in booking volumes.
- **Heatmaps:** Correlation between booking lead time, cancellations, and revenue.

- **Customer Segmentation Plots:** Classification of high-revenue and high-risk customers.

4. Key Findings

Booking Trends:

- **Peak booking months:** May to August.
- **Off-peak periods:** December to February.

Cancellation Insights:

- **28.5%** of total bookings are canceled, with a higher rate among short lead-time reservations.
- Bookings through Online Travel Agencies (OTAs) exhibit the highest cancellation rate (**45.2%**).

Customer Segmentation:

- Business travelers have a lower cancellation rate (**15.8%**) compared to leisure travelers (**32.1%**).

Revenue Insights:

- Customers staying for **4 or more nights** contribute **60%** of total revenue.
- Suite and deluxe room bookings generate the highest revenue per customer.

Lead Time Analysis:

- Bookings made **over 90 days in advance** have a lower cancellation rate (**12.4%**).
- **Last-minute bookings** (within a few days of check-in) experience a high cancellation rate (**54.3%**).

Market Segment Comparison:

- Direct bookings yield **higher revenue per customer** but are less frequent than OTA bookings.

5. Conclusion & Strategic Recommendations

1. Mitigate Last-Minute Cancellations:

- Implement structured cancellation policies with penalties or flexible rescheduling options.

2. Promote Direct Bookings:

- Introduce loyalty programs and exclusive discounts to encourage customers to book directly instead of using OTAs.

3. Optimize Seasonal Pricing:

- Increase rates during peak months to maximize revenue.
- Offer discounts during off-peak periods to maintain occupancy levels.

4. Enhance Room Allocation Strategies:

- Prioritize premium room assignments for long-stay customers to optimize revenue per booking.

5. Encourage Early Bookings:

- Offer incentives such as discounts or complimentary services for customers who book well in advance to reduce last-minute cancellations.

By implementing these strategies, hotels can improve occupancy rates, increase revenue, and enhance overall customer satisfaction, leading to long-term business success.