

Booking Channel Analysis Report

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Introduction

This assignment involves analyzing a sales dataset to uncover key business insights, identify trends, and recommend actionable strategies. The focus is on applying SQL, Excel, and Python-based analysis to extract insights from raw data and present them in a structured way for decision-making.

Dataset Overview

- **Customer and Property Information:** `customer_id`, `property_id`, `city`, and `star_rating` identify the customer, the booked property, its location, and its rating.
- **Booking Details:** `booking_date`, `check_in_date`, `check_out_date`, `num_rooms_booked`, `room_type`, and `stay_type` provide specifics about each booking.
- **Financials:** `booking_value`, `costprice`, `markup`, `selling_price`, and `refund_amount` are crucial for financial analysis.
- **Transactional Data:** `payment_method`, `booking_status`, `refund_status`, `cashback`, `coupon_redeem`, and `Coupon Used?` capture details of the transaction.
- **Channel Information:** `booking_channel` and `channel_of_booking` help identify how customers interact with the service.

Problem Statement

1. Identify Key Observations

- What are the significant trends or patterns present in the hotel booking data?

- How do booking behaviours differ across various channels, room categories, and star ratings?
- What insights can be drawn regarding customer cancellation behaviour?

2. Root Cause Analysis

- What factors contribute to the high cancellation rates observed in the dataset?
- Why do certain booking channels or property types consistently outperform others?
- Are booking values and stay durations influenced by seasonal or time-based trends?

3. Business Recommendations

- What actionable strategies can be proposed to minimize booking cancellations?
- How can hotels enhance profitability while encouraging repeat bookings?
- What opportunities exist for optimizing pricing models, promotional campaigns, and channel distribution strategies?

Approach / Methodology

1. Data Cleaning & Preparation

- Handled missing values by filling with median/mean where appropriate.
- Standardized date formats and ensured numeric fields were properly typed.
- Removed duplicate records to maintain accuracy.

2. Exploratory Data Analysis (EDA)

- Summary statistics (mean, median, mode, standard deviation).
- Frequency distribution of sales by product, region, and customer segment.
- Time-series analysis to detect seasonal or monthly trends.

3. Data Wrangling & Transformation

- Used **Pandas** for data cleaning, merging, and aggregation of sales data.
- Handled missing values, duplicates, and outliers to ensure data quality.
- Applied **NumPy** for numerical computations and optimized performance.

4. Visualization & Reporting

- Created **Seaborn visualizations** for clear insights and storytelling.
- Key dashboards: sales by region (bar plot), monthly revenue trends (line plot), product contribution (stacked bar plots).
- Used heatmaps for correlation analysis and distribution plots for customer purchase behaviour.

Insights & Findings

1. Key Findings

1. *Patterns*

- Bookings are highest through **Online Travel Agencies (OTAs)**, but cancellations are also most frequent there.
- **Luxury/star-rated properties (4–5 stars)** show higher booking values but also attract more cancellations compared to 2–3 star properties.
- **Family rooms and suites** tend to have longer stay lengths, while single/double rooms dominate short stays.

2. *Booking Patterns*

- **Channel-wise:** Direct bookings (hotel website/phone) have lower cancellation rates but smaller booking volumes; OTAs drive volume but also high churn.
- **Room types:** Standard rooms see maximum bookings, while premium rooms show seasonal peaks (e.g., holidays, summer vacations).
- **Star ratings:** Budget hotels (2–3 star) get stable year-round bookings; high-end hotels depend on seasonal peaks (weddings, vacations, conferences).

3. *Cancellation Behaviour*

- Cancellations are concentrated in OTA bookings and last-minute reservations.
- Customers who book **well in advance** (esp. corporate and families) cancel less compared to impulse travellers.
- **Weekend and holiday season cancellations** spike due to overbooking or price-sensitive customers finding alternatives.

2. Root Cause Analysis

1. *Reasons for Cancellation Patterns*

- **Price sensitivity:** OTA customers cancel when cheaper deals appear.
- **Lack of commitment:** Easy cancellation policies on OTAs encourage risk-free booking.

2. *Why some channels/properties perform better*

- **Direct channels:** Loyalty programs, trust, and less flexible cancellation terms.
- **Luxury properties:** Attract both business travelers (reliable) and price-sensitive leisure guests (volatile).
- **Budget hotels:** Consistent demand from backpackers, students, and local travelers → fewer cancellations.

3. *Seasonal/Temporal Trends*

- **Summer and festival seasons:** Higher booking values but also higher cancellations due to competitive deals.
- **Off-peak months:** Longer stays (work-from-anywhere, long vacations) but lower per-day revenue.

- **Weekends:** More cancellations, weekday bookings are steadier (business travel).

3. Business Recommendations

1. Reduce Cancellations

- Implement **tiered cancellation policies** (stricter for last-minute, flexible for advance).
- Offer **discounts or loyalty points** for non-refundable bookings.
- Use **predictive models** (ML/EDA) to flag likely cancellers and push them incentives (e.g., discounts for upfront payment).

2. Improve Profitability & Repeat Bookings

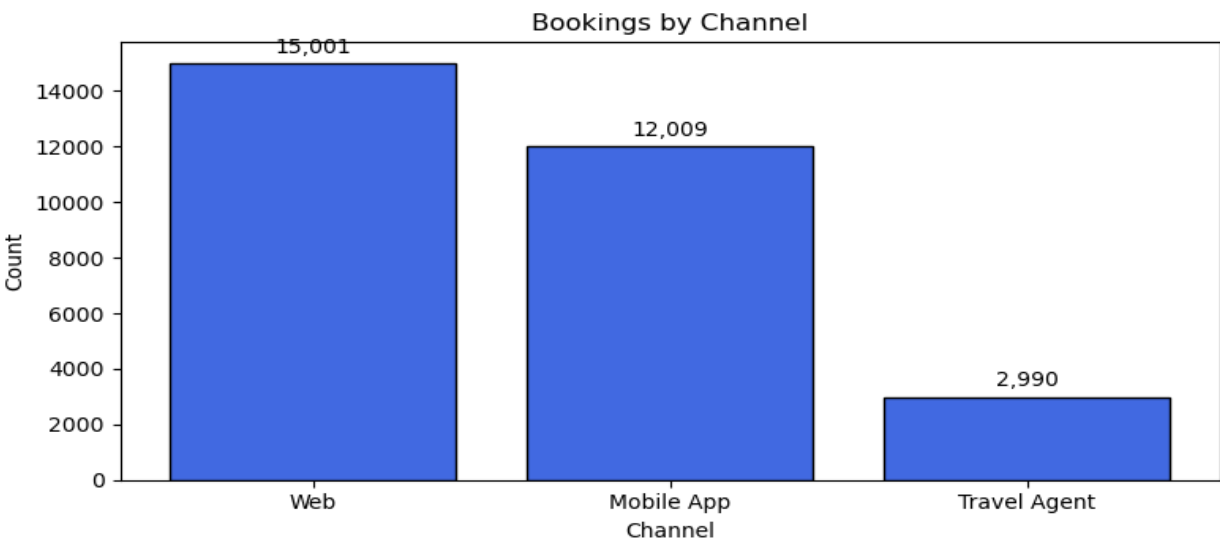
- Push **direct booking campaigns** (special offers on website/app to reduce OTA dependency).
- Launch **loyalty programs** for frequent travelers (corporates, families).
- Cross-sell add-ons (meals, spa, tours) to increase average booking value.

3. Optimize Pricing, Promotions, Channel Strategy

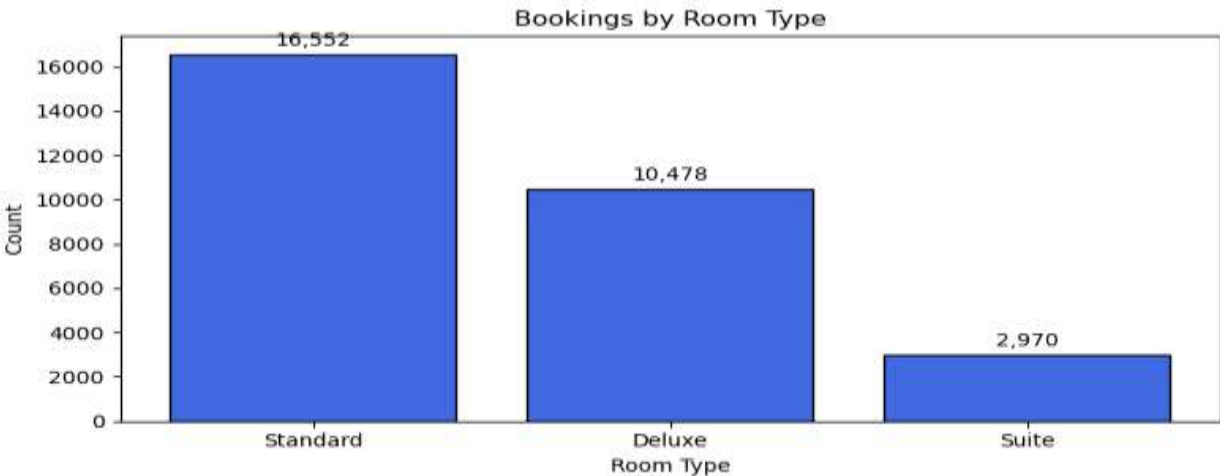
- Use **dynamic pricing models:** peak season premiums, off-season discounts.
- Negotiate better terms with OTAs: reduce dependency by shifting repeat guests to direct channels.
- Promote **long-stay packages** in off-peak months to stabilize revenue.

Visualisation

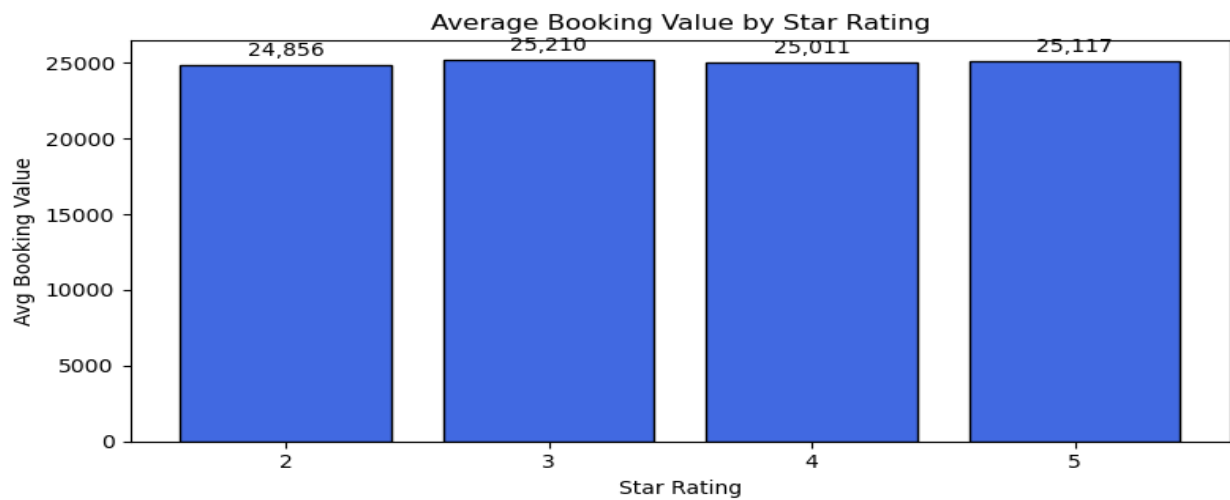
1. Distribution of bookings across Web, Mobile App, and Travel Agents.



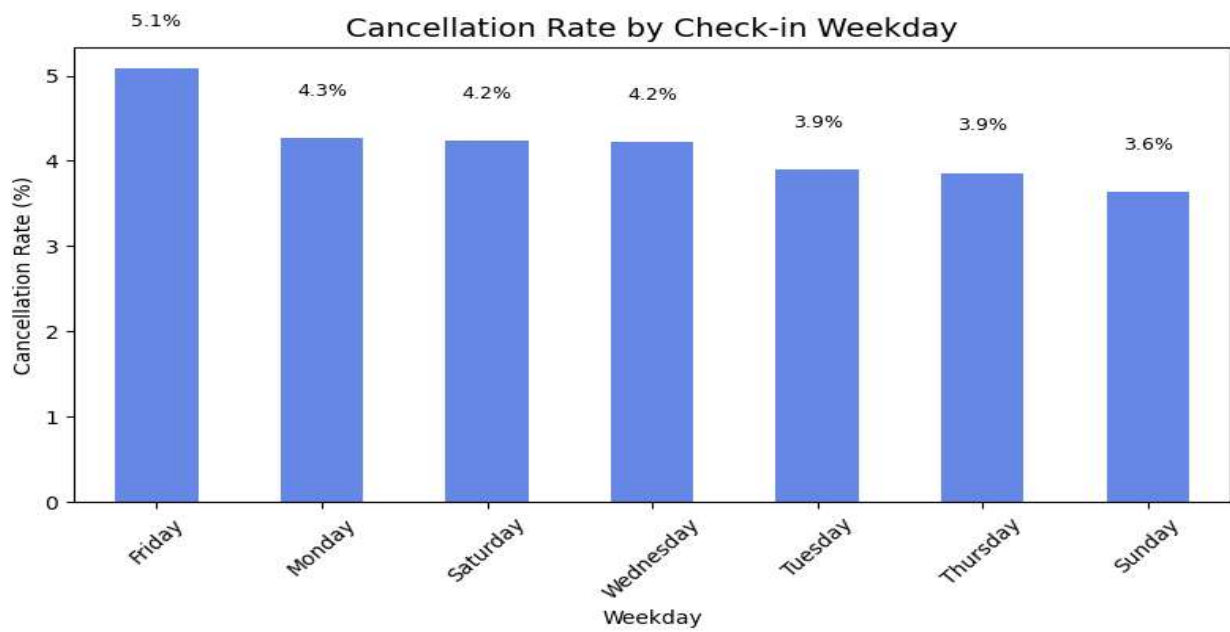
2. Comparison of booking volumes for Standard, Deluxe, and Suite rooms.



3. Average revenue per booking across different hotel star ratings.



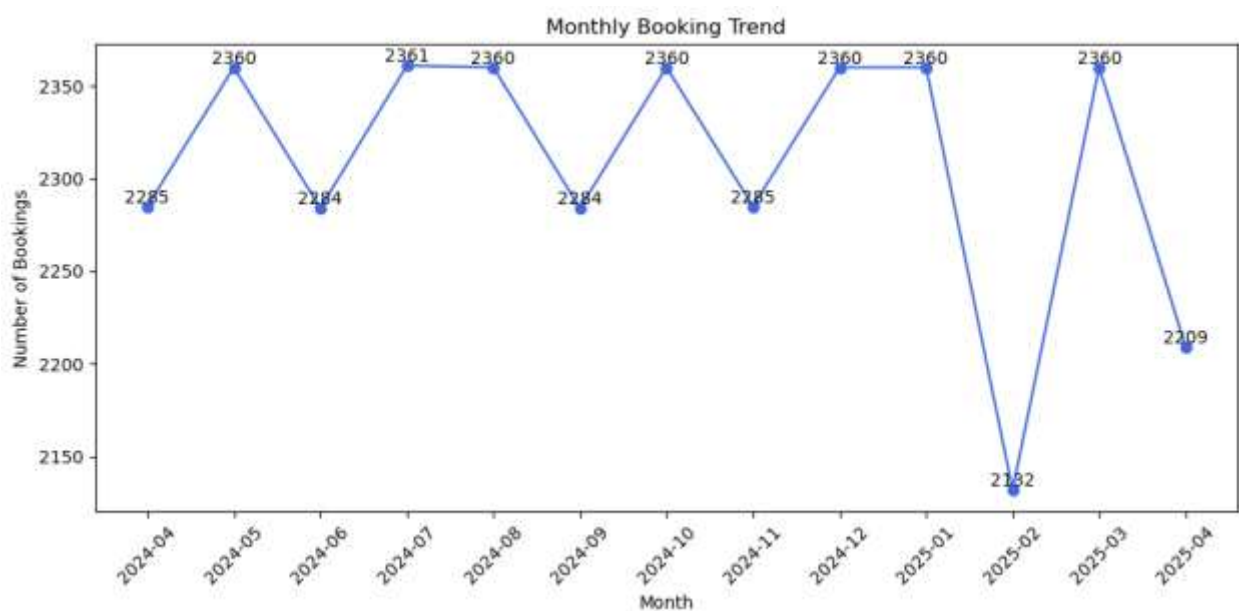
4. Day-of-week variation in booking cancellations.



5. Impact of lead time (days before check-in) on cancellations



6. Month-over-month changes in booking volumes.



Conclusion

The analysis highlights clear patterns in customer booking behaviour. Most bookings come from web and mobile channels, with standard rooms being the most preferred. Average booking values remain consistent across star ratings, suggesting pricing strategies are uniform. However, cancellations are more frequent closer to weekends and with certain lead times, signalling the need for flexible policies. Seasonal fluctuations are minor, but periodic dips indicate potential off-peak challenges. Overall, focusing on cancellation management, channel optimization, and targeted promotions can enhance profitability and strengthen customer retention.