Hotel Booking Analysis Dashboard

Surbhi Sharma
Department of Computer Science Engineering
Chandigarh University, India

I. Objective

The objective of this project is to analyze hotel booking data to understand booking patterns, cancellation behavior, revenue trends, and customer segmentation. The dashboard focuses on weekday versus weekend behavior, booking lead time, booking channels, and loyalty segmentation to support data-driven decision-making in hotel operations. The analysis is presented through an interactive Power BI dashboard designed for operational and managerial insights.

II. Methodology

A. Data Collection

The dataset consists of hotel booking records containing booking date, stay date, booking channel, customer loyalty level, booking status, number of nights, room rate, and revenue. The dataset represents a simulated real-world hotel booking environment.

B. Data Cleaning & Transformation

Power Query was used for data preparation and transformation. Key steps included standardizing booking and stay date formats, cleaning categorical columns such as loyalty level and booking channel, creating derived columns such as day name, numeric day of week, day type (weekday or weekend), booking lead-time buckets, and handling missing and inconsistent values.

C. Feature Engineering & DAX Measures

Key DAX measures were created to calculate booking count, total revenue, average room rate, total room nights, cancellation count, cancellation percentage, loyalty-based booking counts, and single-night and multi-night booking counts. These measures enable dynamic filtering and interactive analysis across visuals.

D. Data Modeling

A clean and optimized data model was maintained. Numeric day-of-week values were used for correct chronological sorting, and calculated columns were used for weekday/weekend and loyalty classification.

E. Visualization & Dashboard Design

The dashboard includes KPI cards for high-level metrics, line charts showing daily stay trends, column charts comparing weekday and weekend bookings, pie charts for booking distribution, and matrix visuals with conditional background formatting to analyze booking channels by loyalty level. A dark-themed visual style was applied for consistency and readability.

III. Key Findings

A. Booking Volume

Booking volume varies significantly by loyalty segment. When only non-members are selected, total bookings are approximately 2,000. When loyalty members are selected, total bookings increase to approximately 3,000, indicating that loyalty members contribute a larger share of overall bookings.

B. Cancellation Analysis

The overall cancellation rate is 28.6% in which non-member customers show a higher cancellation rate of approximately 29.8%, indicating higher booking volatility and uncertainty. Loyalty members exhibit a lower cancellation rate of approximately 27.8%, demonstrating stronger booking commitment.

C. Revenue Performance

Total revenue generated is $1M in which non-members have generated total revenue of approximately $502K with an average room rate of $143.3 and Loyalty members generate higher total revenue of approximately $783K with an average room rate of $151.3, indicating stronger customer value.

D. Weekday vs Weekend Booking Behavior

Weekday bookings account for a higher share of total booking volume. Weekends, while fewer in number, are strategically important due to higher leisure travel, potentially longer stays, and higher spend per booking.

E. Customer Loyalty Insights

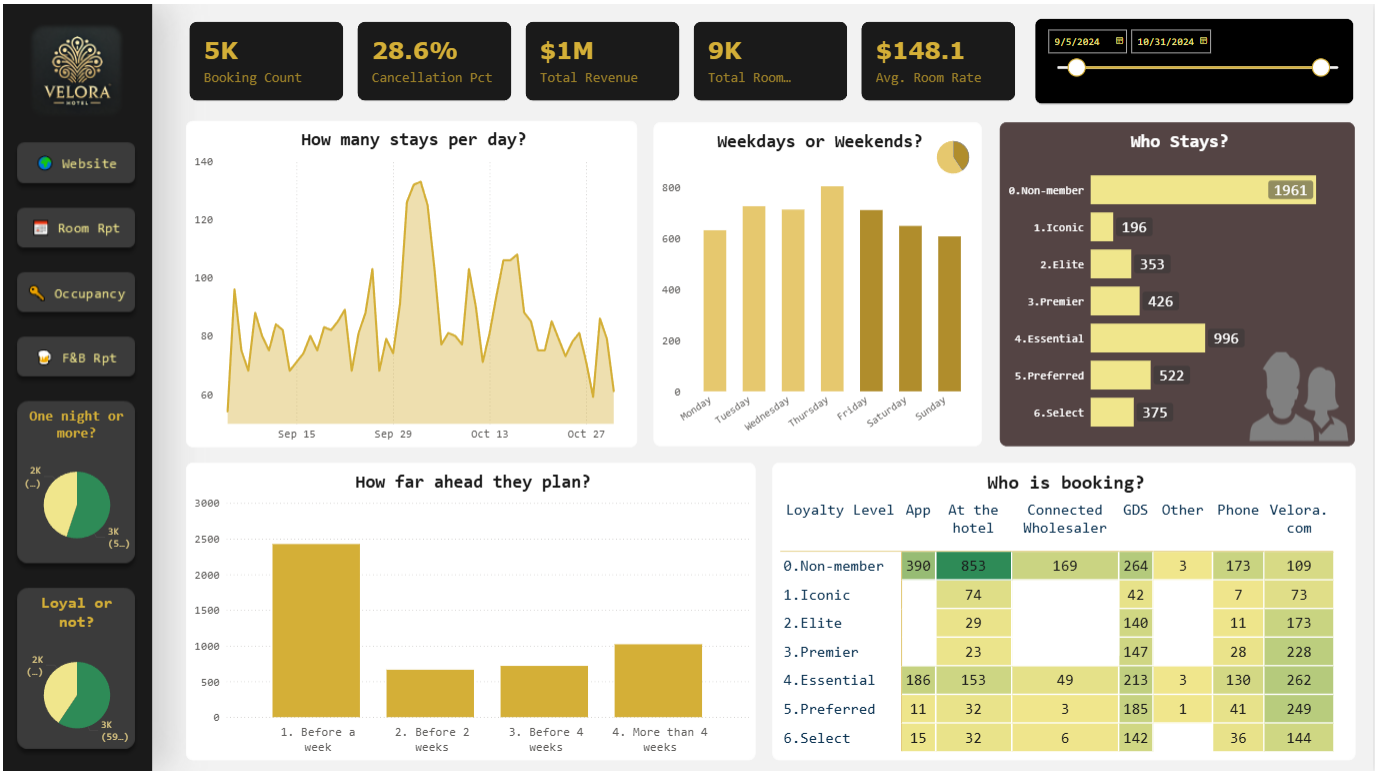
Non-member customers account for the highest number of bookings, indicating strong acquisition but weaker retention. Loyal customer segments show more consistent booking behavior and potentially lower cancellation tendencies. Preferred and essential loyalty tiers contribute significantly to repeat bookings.

F. Booking Channel Analysis

Direct hotel bookings and connected wholesalers generate the highest booking volumes. Digital channels such as applications and websites perform better among loyal customers, indicating effective engagement. Channel-wise analysis highlights differences in performance across loyalty segments.

G. Booking Lead Time Analysis

A large portion of bookings are made within one week of the stay, indicating last-minute planning behavior. Bookings made further in advance tend to be more stable and may have lower cancellation risk.



Loyalty Level	App	At the hotel	Connected Wholesaler	GDS	Other	Phone	Velora.com
0.Non-member	390	853	169	264	3	173	109
1.Iconic		74		42		7	73
2.Elite		29		140		11	173
3.Premier		23		147		28	228
4.Essential	186	153	49	213	3	130	262
5.Preferred	11	32	3	185	1	41	249
6.Select	15	32	6	142		36	144

Fig. 1. Hotel Booking Analysis Dashboard

IV. Business Insights

1) Weekday demand drives overall booking volume, while weekends offer revenue optimization opportunities.
2) High cancellation rates highlight the need for improved booking policies and loyalty incentives.
3) Lead-time behavior can be leveraged to improve operational planning and targeted promotions.
4) Channel-wise insights can guide marketing investment toward higher-performing platforms.

V. Recommendations

1) **AI-Based Customer Targeting:** Use AI-driven automation to target loyal and non-member customers with personalized offers, promotions, and incentives based on booking behavior and preferences.
2) **Reduce Cancellations:** Apply stricter policies or targeted incentives for short lead-time bookings to improve booking stability.
3) **Strengthen Loyalty Programs:** Encourage non-members to join loyalty programs through targeted offers and membership benefits.
4) **Dynamic Pricing:** Optimize room pricing based on weekday/weekend demand and high-occupancy periods.
5) **Channel Optimization:** Focus on high-performing direct and digital booking channels to improve efficiency and reduce dependency on intermediaries.

VI. Conclusion

This Hotel Booking Analysis Dashboard demonstrates the effective use of Power BI to analyze booking patterns, cancellation behavior, revenue trends, and customer segmentation in the hospitality domain.

The analysis highlights variations in weekday and weekend demand, booking lead-time behavior, and channel performance, supporting data-driven operational and managerial decisions.

Based on the insights obtained, the project recommends the future adoption of AI-based customer targeting to deliver personalized offers and incentives to both loyal and non-member customers.

Overall, the dashboard provides a strong analytical foundation that can be further enhanced with advanced analytics and automation.