

Hotel Booking Analysis

Table of contents

- 1 Project Outline
- 2 Data Summary
- 3 Data Cleaning
- 4 Analysis & Visualizations
- 5 Key Findings
- 6 Recommendations
- 7 Conclusions

Project Outline

- City and Resort Hotels face high cancellation rates, leading to lost revenues and poor room utilization.
- This directly impacts profitability and operational efficiency.

The purpose of the analysis is to:

- Analyze booking and cancellation trends across hotel types.
- Quantify cancellation impact on revenue and occupancy.
- Identify key drivers (market segment, seasonality, ADR, deposits, geography).
- Compare ADR (Average Daily Rate) between City and Resort Hotels.
- Provide data-driven recommendations to reduce cancellations and boost revenue.

Data Summary

Dataset includes 119,390 rows and 32 columns, covering different aspects of hotel reservations such as:

- Booking Information – hotel type, lead time, arrival date, reserved nights, market segment, distribution channel, deposit type, etc.
- Customer Information – country of origin, number of adults, and children.
- Financial Details – average daily rate (ADR), special requests, and whether a deposit was made.
- Reservation Status – whether the booking was cancelled, checked out, or no-show, along with reservation status date.

Data Cleaning

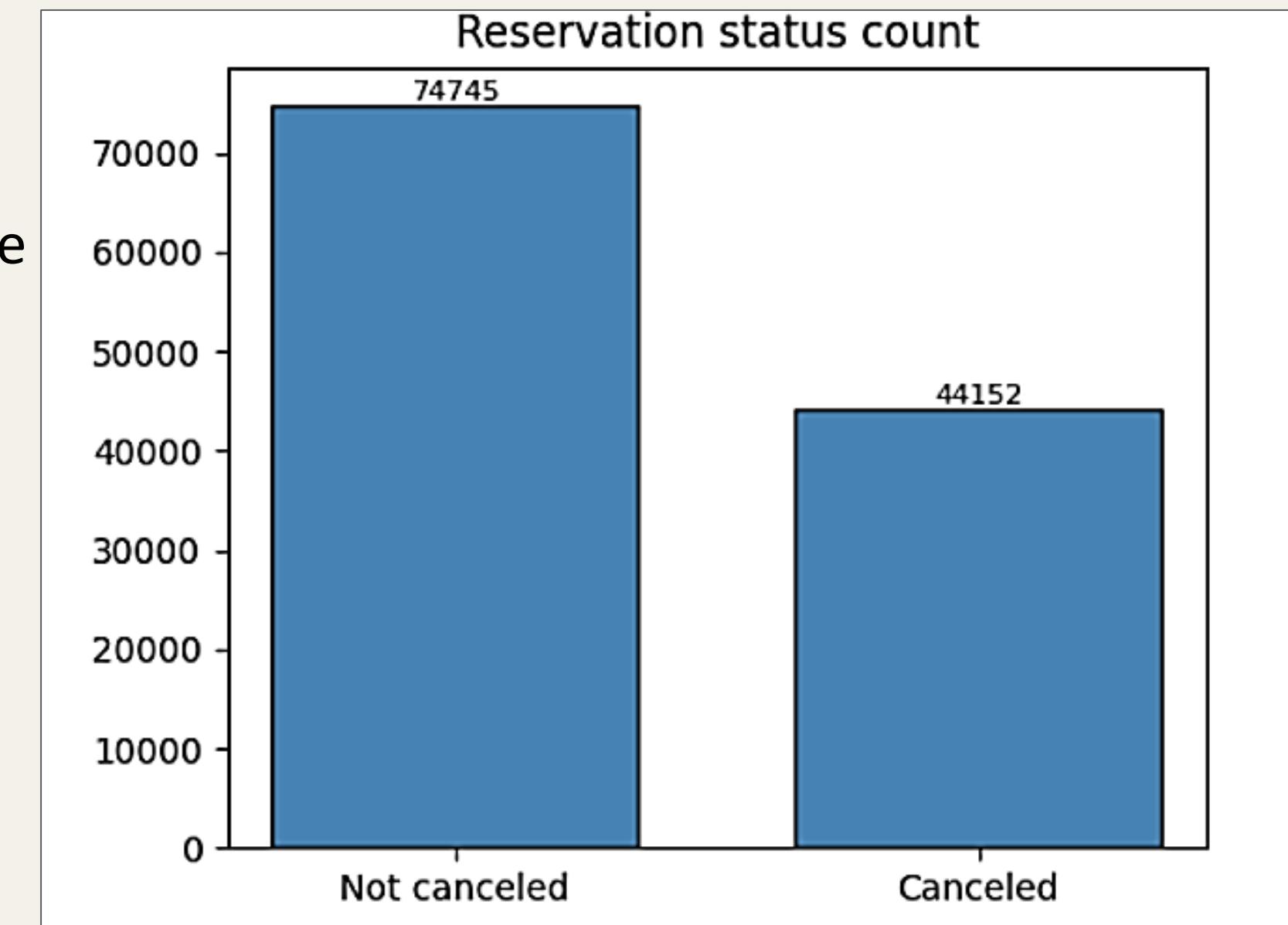
To improve the reliability and accuracy of the insights, inconsistent or non-representative data points were updated/ excluded:

- Converted string dates (e.g., *reservation_status_date*) into datetime format
- Removed irrelevant columns (*company*, *agent*) for clarity
- Dropped rows with missing values to ensure consistency
- Excluded extreme outliers ($ADR \geq 5000$) to improve reliability

1. Booking Status: Cancelled vs. Not Cancelled

- **62.9% bookings retained vs. 37.1% cancellations**
- Over **1 in 3 bookings** are cancelled → major revenue leakage
- Highlights the need for stronger **cancellation management policies**

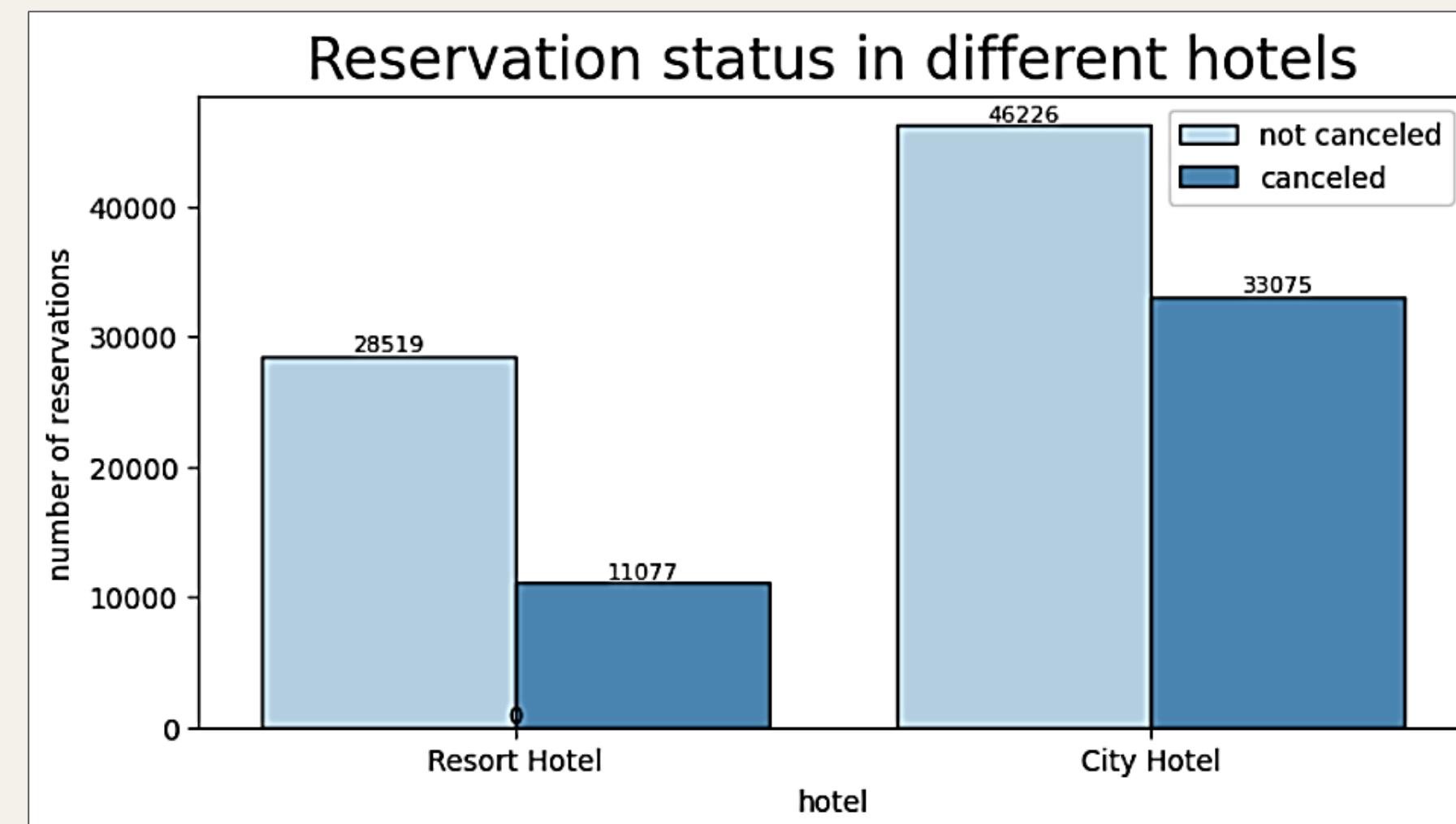
Not Cancelled	62.86%
Cancelled	37.13%



1. Booking Status: Cancelled vs. Not Cancelled

City vs. Resort Hotel Bookings

- City Hotels receive higher booking volume than Resort Hotels
- Resort Hotels likely more expensive, leading to fewer bookings
- Suggests City Hotels benefit from business + casual travelers, while Resorts rely on seasonal demand



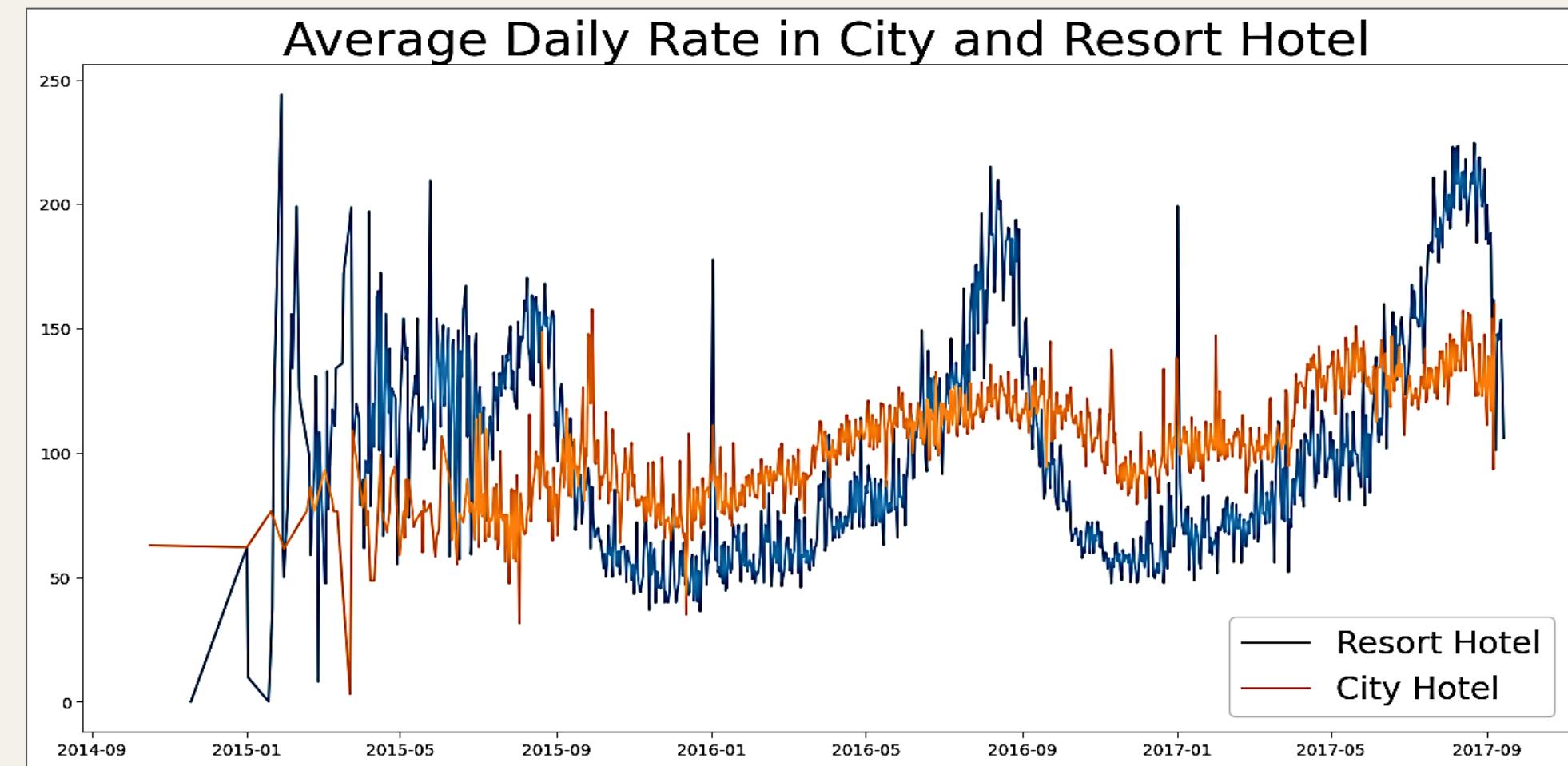
2. Time-Series ADR Comparison: City vs. Resort Hotels

Resort Hotels – High Volatility

- ADR shows sharp spikes & dips, highly seasonal (holidays, vacations, summer peaks)
- Average ADR often higher than City Hotels during peak periods

City Hotels – Stable & Predictable

- ADR mostly ranges with less volatility
- Consistent demand from business + local tourism



Key Insight:

- Resorts depend on seasonal surges, while City Hotels ensure stable revenues.

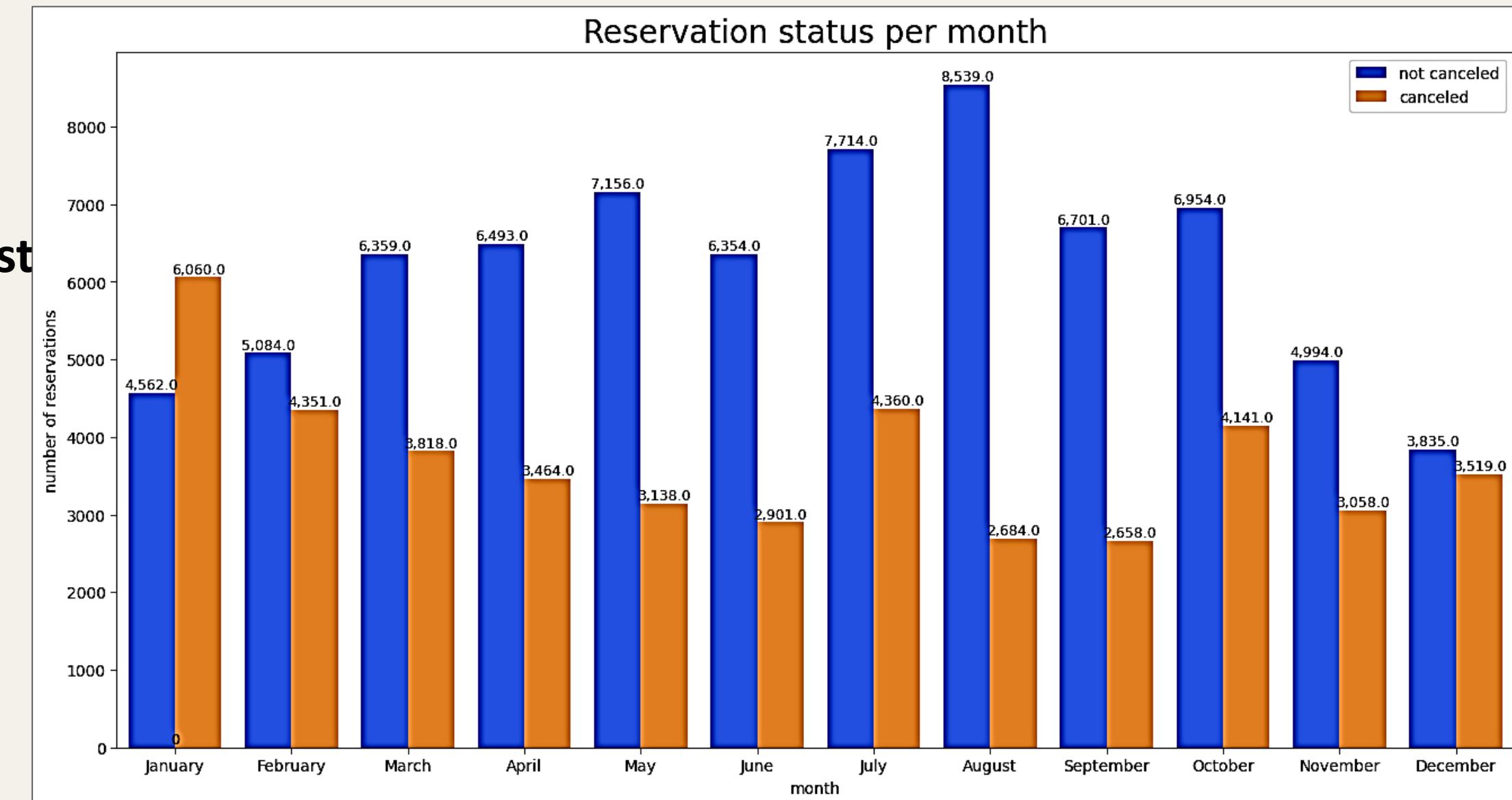
3. Monthly Reservation: Cancelled vs. Confirmed Bookings

Peak Season (June–Aug):

- Confirmed bookings highest in **July** and **August**
- Cancellations also high in **July** and **August**
- → Strong demand but higher booking uncertainty

High Cancellation Months (Jan–Feb):

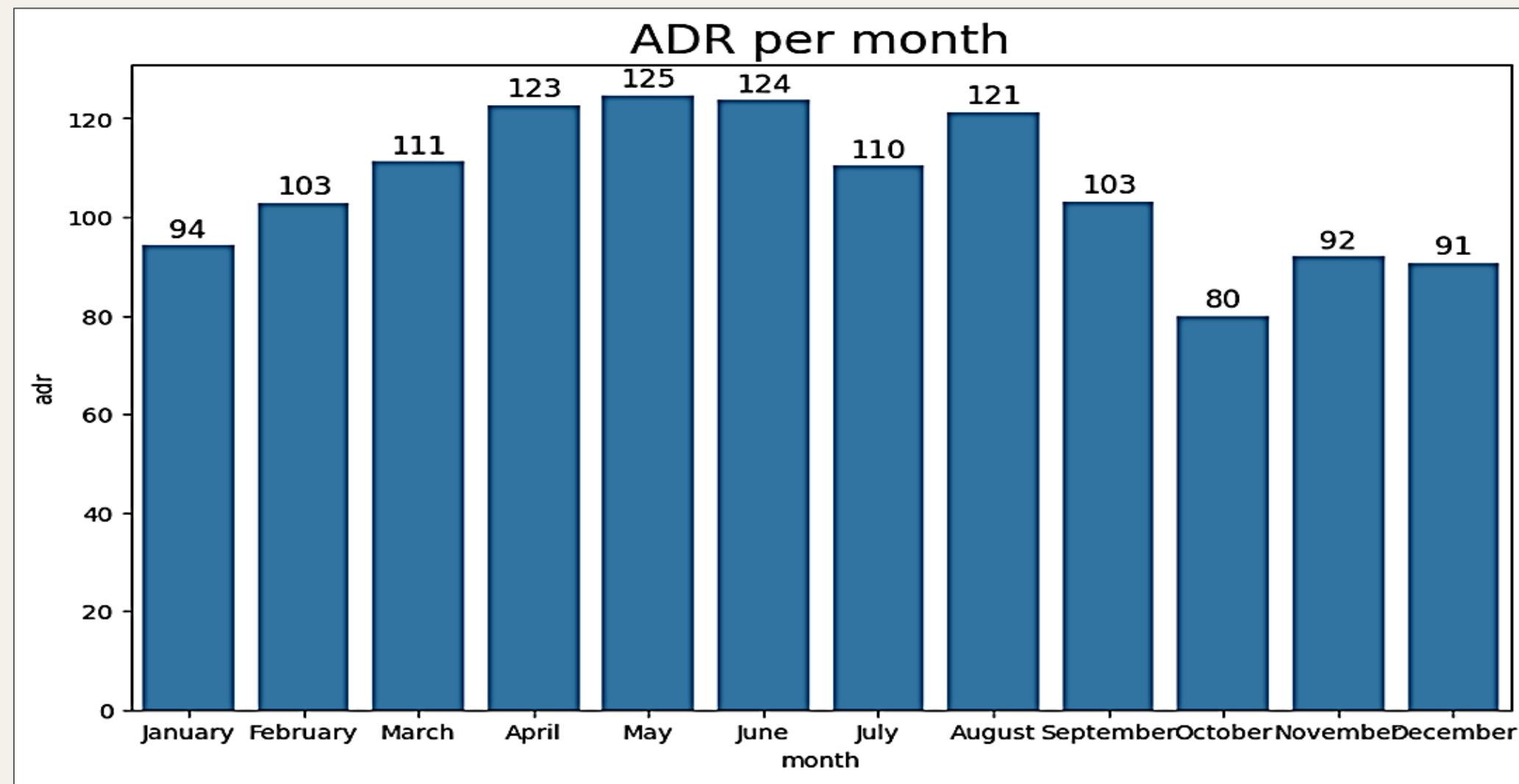
- Likely due to post-holiday plan changes, weather, or financial constraints



Key Insight:

- Cancellations peak in Jan–Feb and during summer (July–Aug), highlighting risks from both off-season uncertainty and peak-season demand.

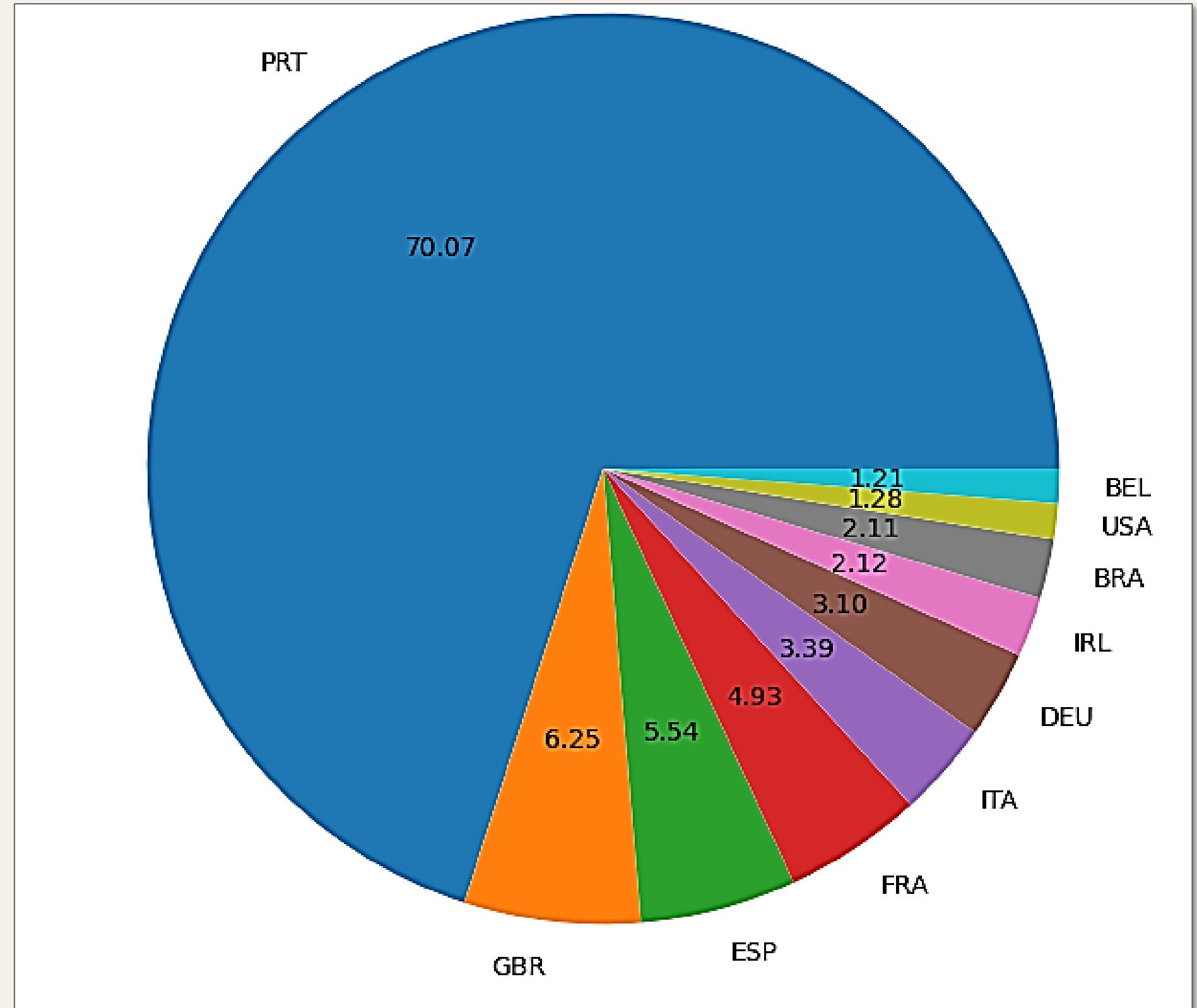
4. Impact of Pricing on Reservation Cancellations



- Cancellations are most frequent when room prices are at their peak.
- Lowest cancellations occur when prices are comparatively low.
- Strong correlation observed between pricing and cancellation behavior.
- High accommodation cost is a key driver of customer cancellations.

5. Distribution of Cancellations by Country

- The top country is Portugal with the highest number of cancellations.



6. Distribution of Bookings by Market Segment

- Majority of bookings come from Online Travel Agencies (OTAs), making them the key sales channel.
- Offline agents still hold a notable share, especially for group/package bookings.
- Heavy reliance on OTAs increases commission costs and reduces customer relationship control.
- Direct channels (websites, loyalty programs) can improve profitability.
- Corporate travel is under-utilized → partnerships with companies can unlock new revenue streams.

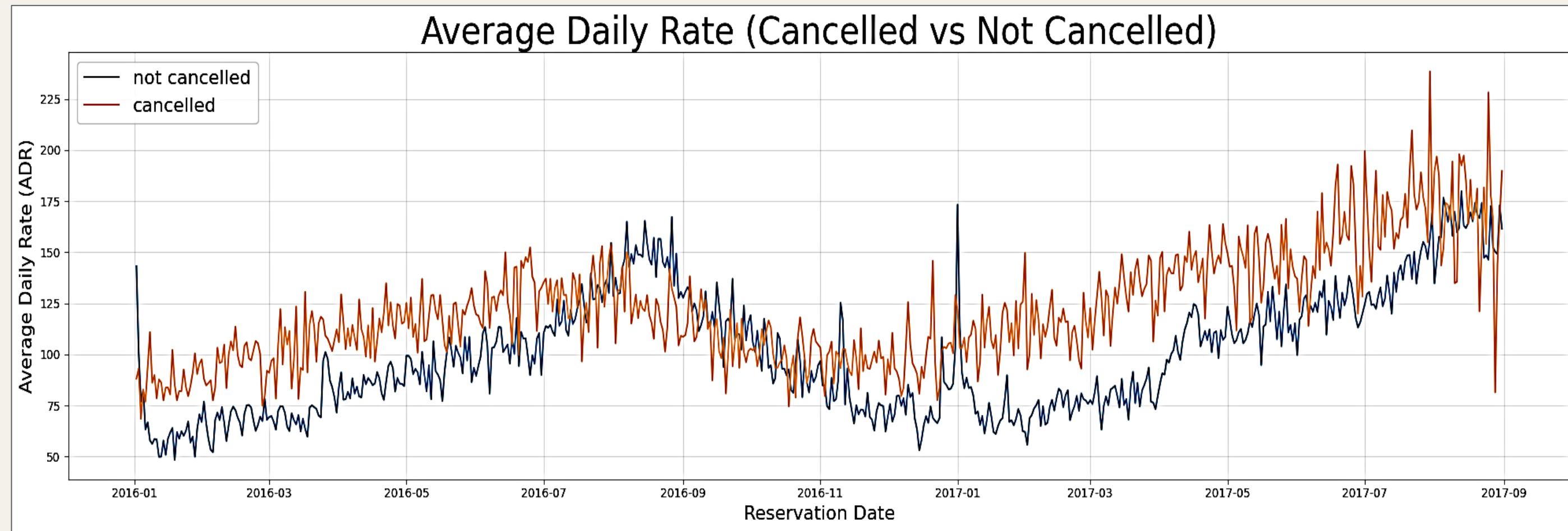
market_segment	proportion
Online TA	0.474377
Offline TA/TO	0.203193
Groups	0.166581
Direct	0.104696
Corporate	0.042987
Complementary	0.006173
Aviation	0.001993

7. Distribution of Cancelled Bookings by Market Segment

market_segment	proportion
Online TA	0.469696
Groups	0.273985
Offline TA/TO	0.187466
Direct	0.043486
Corporate	0.022151
Complementary	0.002038
Aviation	0.001178

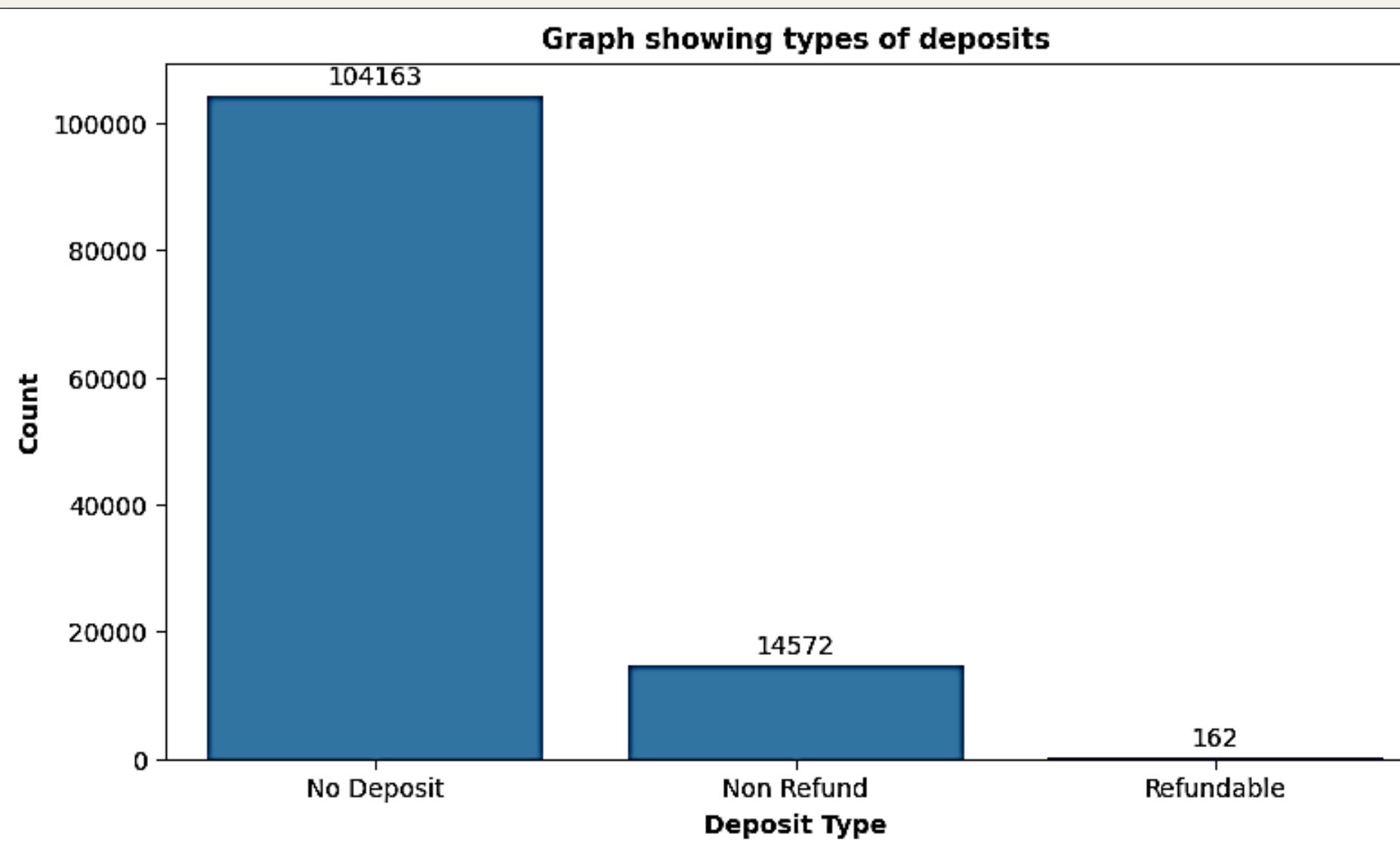
- OTAs (~47%) and Group bookings (~27%) account for nearly 74% of all cancellations.
- Heavy dependence on these channels increases revenue risk.
- Hotels should diversify bookings and implement strategies like non-refundable rates, loyalty programs, and corporate tie-ups to reduce cancellations.

8. ADR Analysis: Cancelled vs. Retained Bookings



- Analyzed ADR trends to identify correlation between high rates and booking cancellations.
- Highlighted seasonal pricing effects on cancellations and revenue risk.
- Recommended tiered cancellation policies for premium bookings to reduce revenue loss.
- Suggested prioritizing direct bookings to improve booking stability.

9. Booking Distribution by Deposit Type



- Majority of bookings (~86%) made with **no deposit**, reflecting customer preference for flexibility.
- Non-refundable deposits (~12%) indicate more committed travelers, leading to stable revenue.
- Insights help **optimize deposit policies** to balance flexibility and revenue security.

9. Booking Distribution by Deposit Type

Deposit Type & Cancellations

- 86% No Deposit → High Cancellations
- 12% Non-Refundable → Stable Revenue
- Summer Peaks (Jul–Aug) → More Early Cancellations

Key Actions:

- Incentivize non-refundable bookings (discounts/loyalty points)
- Reduce “No Deposit” options during peak months
- Use ADR & deposit type to predict cancellations & optimize overbooking

Key Insights

- 1. Cancellations vs Retained:** 37% cancelled, 63% retained; City Hotels have more bookings, Resort Hotels show higher ADR and volatility.
- 2. ADR Trends:** Resort Hotels fluctuate €80–€200; City Hotels stable €80–€130.
- 3. Seasonality:** Peak bookings in July–Aug (8k+ confirmed/month); highest cancellations in Jan–Feb (~4.5k/month).
- 4. Pricing Impact:** High ADR bookings face highest cancellation risk, indicating strong price sensitivity.
- 5. Market Segments:** OTAs (47%) and Group bookings (27%) account for 74% of cancellations.
- 6. Deposits:** 86% bookings with no deposit, increasing cancellation flexibility.
- 7. Geography:** Portugal largest share of cancellations; top 10 countries ≈ 60%.

Recommendations

- 1. Target OTA & Group Bookings:** Reduce cancellations from these segments (74% of total) to save €1.2M+ annually.
- 2. Strengthen Deposit Policies:** Introduce flexible yet binding deposits to lower cancellations (85% bookings currently no deposit).
- 3. Seasonal Pricing & Promotions:** Use targeted retention offers in summer; stricter policies in Jan–Feb to manage peak cancellations.
- 4. Focus on Resort Hotel ADR:** Stabilize high ADR pricing to improve retention and maximize revenue.
- 5. Country-Specific Interventions:** Apply tailored policies for top 10 countries (~60% of cancellations) to reduce risk.

Conclusion

- High cancellations reduce revenue and efficiency, driven mainly by pricing, deposit policies, and market segments.
- City Hotels remain stable, while Resort Hotels face higher volatility due to seasonality.
- Data-driven strategies like stronger deposit rules, pricing optimization, and booking channel diversification can improve profitability.

Thank you

Salonee Singh

<https://www.linkedin.com/in/salonee-singh-6285501ab/>