



Hotel Revenue & Cancellation Risk Strategy

Tourism sector — Hospitality revenue optimisation. "Improving revenue stability through data-driven booking strategy."

Group -19

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Problem Statement



Sector Context

How can hotels reduce booking cancellations and maximize revenue using data-driven insights?



The Impact

Every cancellation represents a "Revenue Loss" that affects the hotel's bottom line and operational planning.



Objective

What are the specific behavioral patterns that lead to a guest clicking "cancel"?

Data Engineering (Source to Sink)



Source: Kaggle – Hotel Booking Demand Dataset
~119,000+ rows | 32 columns | 2015–2017

Cleaning: Handled missing values (agent, company, children)
Created Total Stay NightsDerived Revenue & Lost Revenue
Standardized categorical variables

Dictionary: is_canceled ,lead_time ,deposit_type ,market_segment,adr

KPI Framework – What We Measured

Total Bookings

The total volume of customer reservations processed in the dataset to establish the scale of operations.

Cancellation Rate %

The percentage of total bookings that were canceled, used as the primary metric for risk.

Total Revenue

The actual earnings generated from guests who completed their stays.

Revenue Lost

The financial value of bookings that were canceled, quantifying the "opportunity cost".

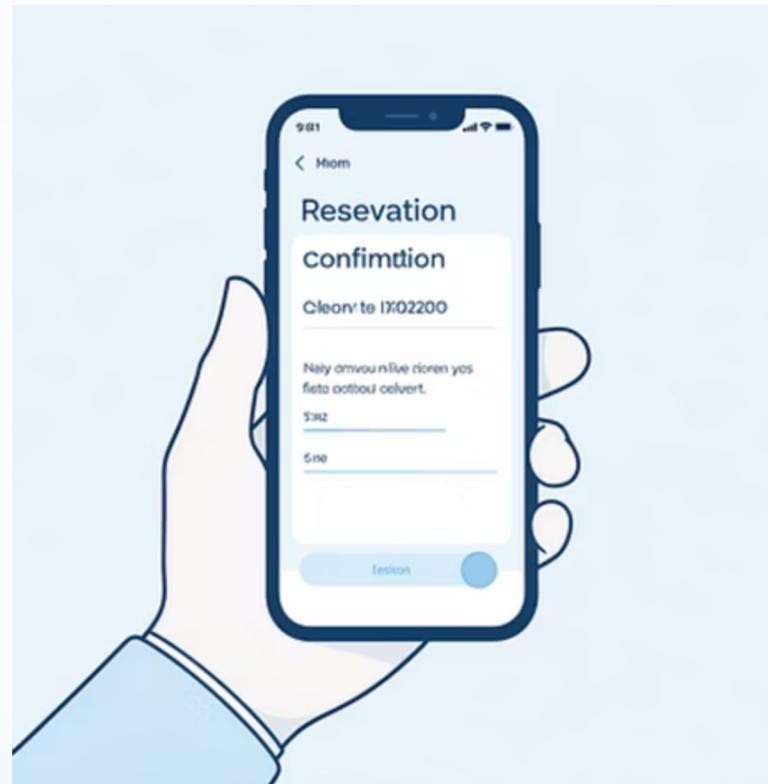
Average ADR (Average Daily Rate)

- The primary metric for pricing health, measuring the average income per occupied room.

Why these KPIs?

- Quantify Loss: Measures the exact financial gap between Revenue and Revenue Lost.
- Spot Inefficiency: Uses Cancellation Rate to identify wasted inventory.
- Optimize Pricing: Links ADR to guest behavior to find the ideal price point.
- Actionable Strategy: Provides the data needed to enforce stricter booking policies.

Key Insights (EDA)



High Structural Risk

Cancellation rate remains structurally high.

No-deposit Vulnerability

No-deposit bookings significantly increase cancellation risk.

Lead-Time Effect

Long lead-time bookings are more volatile.

City vs Resort

City hotels experience higher cancellation rates.

Stable Segments Exist

Certain customer segments provide stable revenue. Revenue growth is accompanied by increasing lost revenue.



SI	M	W	W	T	F	St	ST
		1	3	4	0	1	3
4	9	15	11	20	10	12	
16	10	15	12	23	14	29	

Advanced Analysis

Focus: Risk Driver Analysis

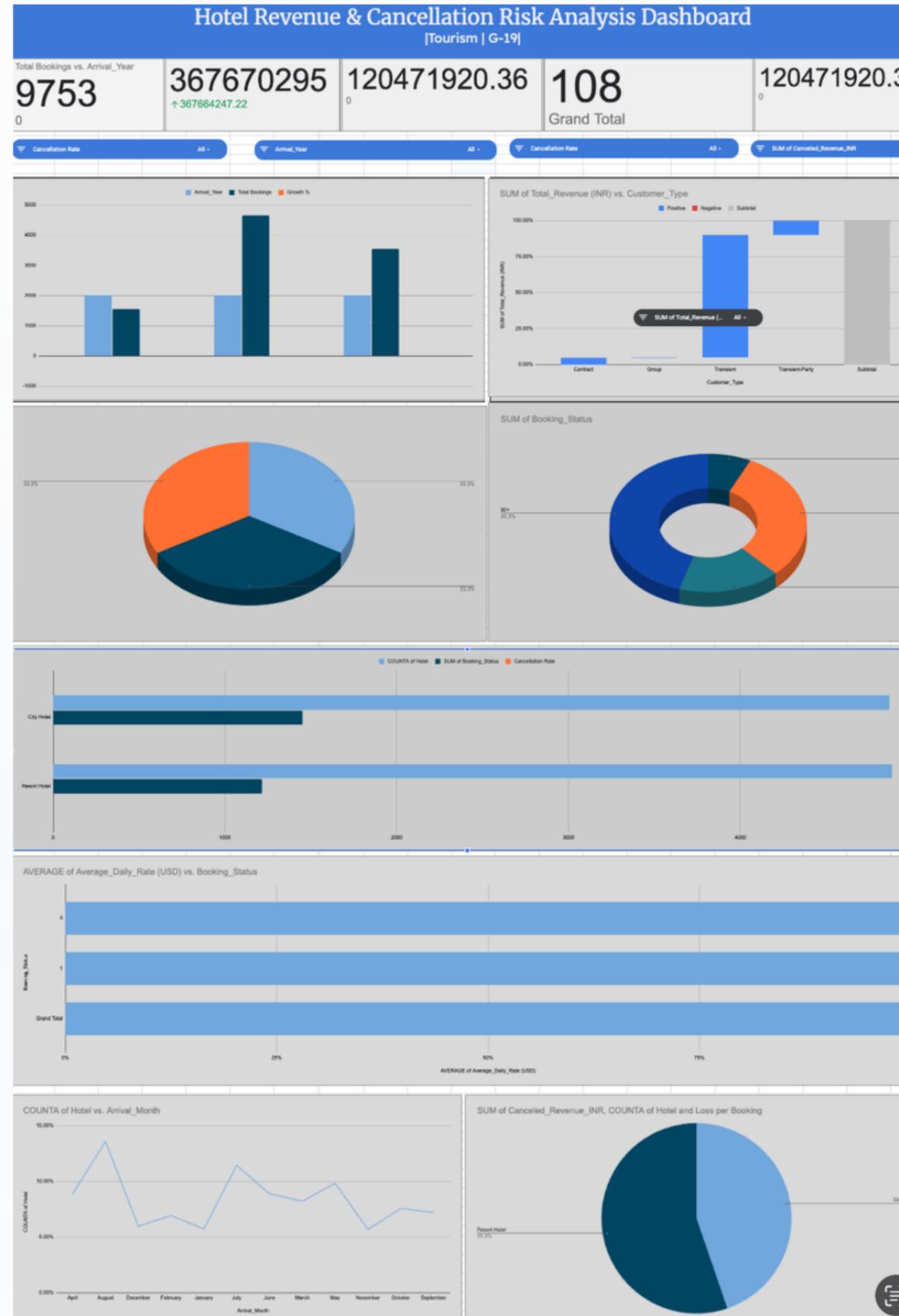
Lead-Time Management :
Deposit policy impact ,Revenue concentration by segment

New Understanding: Cancellation risk is strongly influenced by controllable factors — primarily deposit policy and booking timing.

Executive Dashboard

Key KPIs

Cancellation rate,
lost revenue, ADR
for quick review.



The dashboard enables interactive drill-down analysis for decision support.

Revenue by Segment

Lead-Time Risk Impact

Recommendations



Tiered Deposit for High Lead-Time

introduce tiered deposit policy for high lead-time bookings



Risk-Based Booking Segmentation

Apply risk-based booking segmentation



Reallocate Marketing

Focus marketing on stable revenue segments



Dynamic Seasonal Pricing

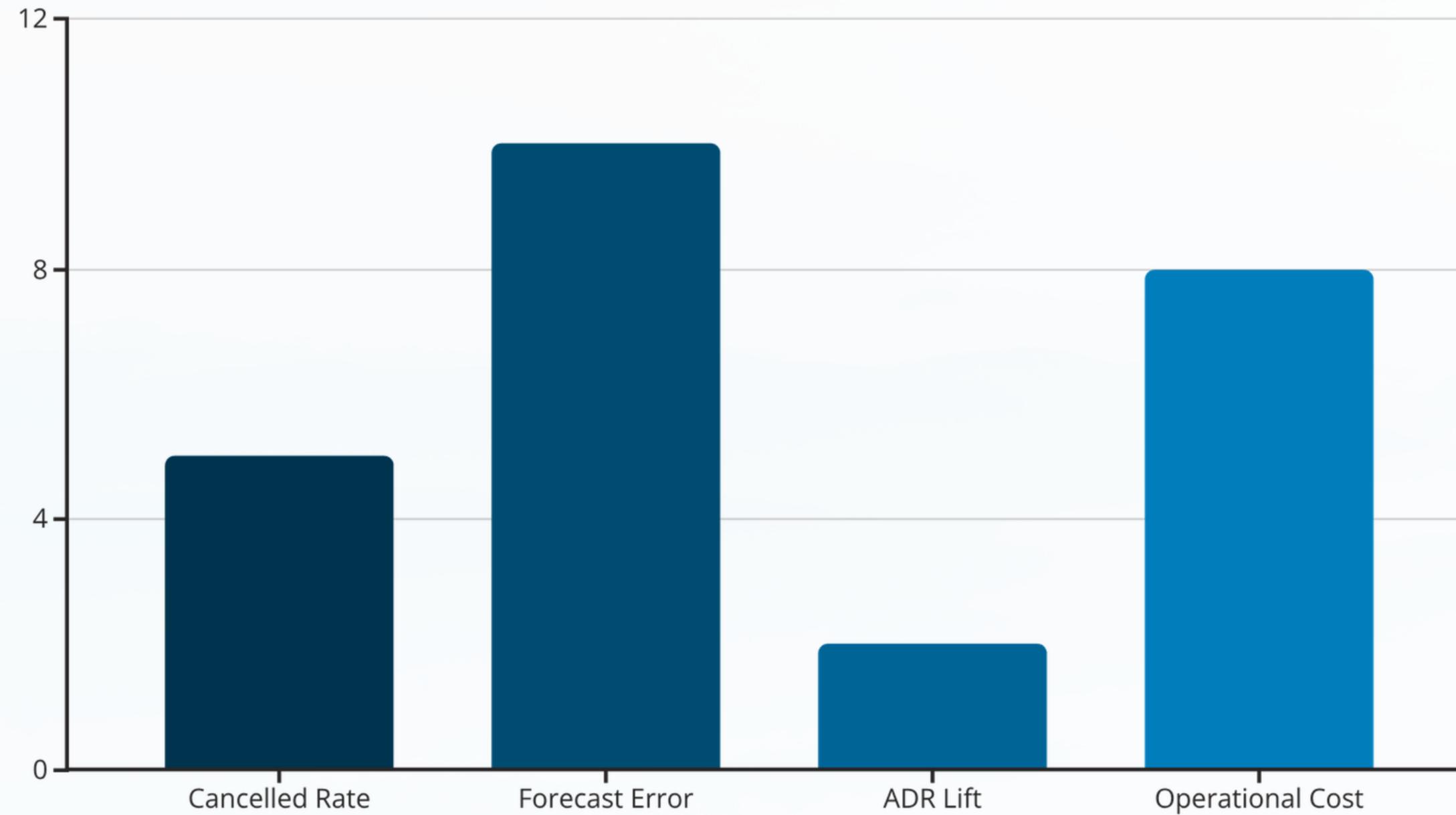
Implement seasonal dynamic pricing



Strengthen Loyalty Programmes

Strengthen repeat guest loyalty programs

Business Impact & Value



Estimated Business Impact:

- Reduced revenue leakage.
- Improved occupancy forecasting.
- Better pricing strategy alignment.
- Increased financial predictability.
- Lower operational volatility.
- A 5% reduction in cancellation rate significantly improves revenue stability.

Limitations & Next Steps

Data Gaps & Biases

Contextual Blind Spots

The dataset lacks qualitative "reason for cancellation" codes, meaning we can identify when people cancel but not the exact personal or external motivation.

Static Snapshot:

The analysis is based on historical logs which may not reflect current post-pandemic travel behaviors or sudden economic shifts.

Incomplete Guest Profiles

Missing demographic data (age, purpose of travel) prevents more granular behavioral segmentation.

Future Improvements

- Predictive Modeling: Move to AI-driven "Cancellation Probability Scores" for new bookings.
- Policy Automation: Automatically trigger deposit requirements for high-risk booking profiles.
- External Integration: Incorporate flight and event data to improve cancellation forecasting.

