Airbnb Price & Scenario Analysis Dashboard Antwerp, Belgium

Group 1 CPDA B6

Meet the team

Rishav Bhattacharya

Madhu N

Shivangi Singh

Jasleen Khurana

Harini N G

Sushanti Ritraj

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Business Problem And Project Overview

Project overview

The project is to analyze how can Airbnb hosts and stakeholders understand listing performance and evaluate pricing decisions to maximize revenue

The Power BI dashboard integrates listing, calendar, host, and review data to evaluate pricing, availability, and performance metrics.

We analyze Airbnb data for Antwerp and use interactive What-If parameters to simulate pricing and occupancy scenarios, enabling informed, data-driven revenue decisions without machine learning.

Data Sources

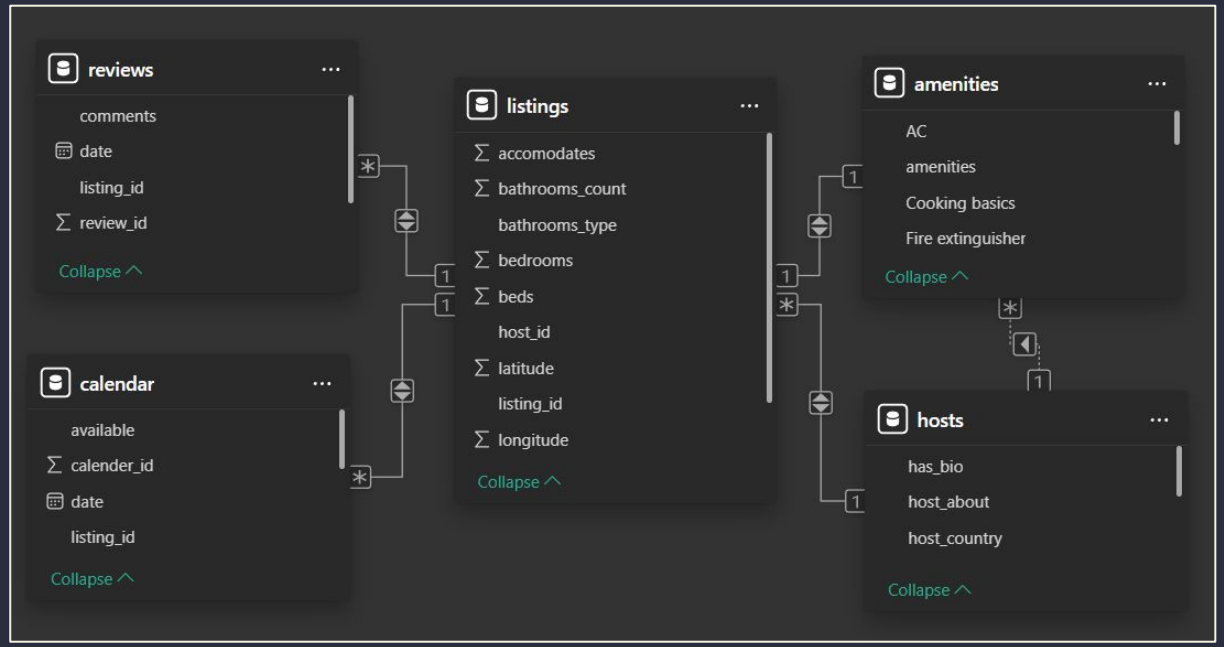
DATA SOURCES

Listings
Serves as the primary fact table for analyzing listing characteristics and price distribution.

Hosts
Supports host-level analysis including experience, profile data, and performance.

Reviews
Used to assess listing popularity, host engagement, and review trends.

Calendar
Used to calculate availability rates, active days, and projected revenue scenarios.



Data Cleaning

CALENDAR

The Calendar table contains **3,19,192** records with day-level availability and pricing data for each listing.

Date formats were standardized, availability values converted to **True/False** for clarity, price fields converted and rounded to two decimal places and missing prices were imputed using average price to improve analytical visibility.

HOST

The Hosts table was cleaned by standardizing the host_since date format and deriving **host tenure (in years)** to measure hosting experience.

Host location was further bifurcated to extract geographic attributes such as **country**, enabling cleaner location-based analysis and filtering.

LISTING

The Listings table required minimal data-type changes, as most fields were already in **usable formats**.

The bathroom information was split into structured components to enable clearer analysis of property features and improve comparability across listings.

REVIEWS

The Reviews table was cleaned by converting review dates into a standard date format.

This enables **accurate time-based analysis** of review trends and aggregation at listing and host levels.

AMENITIES

A **new table was created** by separating the multi-valued amenities field from the Listings table.

We created boolean indicators for frequently occurring amenities and calculated an amenity count per listing. The complete amenities list was normalized into a separate table to maintain scalability while avoiding an overly wide table.

Core DAX Measures and Logic

Key Business Metrics

Average Price	Mean nightly price across all available dates
Total Nights	Total calendar days in scope
Available Nights	Nights marked as available for booking
Availability Rate	Ratio of available nights to total nights
Total Listings	Distinct count of active Airbnb listings

Core DAX Measures

Average Price = AVERAGE (calendar[price])

Total Nights = COUNT (calendar[date])

Available Nights =
CALCULATE (
  COUNT (calendar[date]),
  calendar[available] = TRUE ()
)

Availability Rate =
DIVIDE (
  [Available Nights],
  [Total Nights]
)

Total Listings =
DISTINCTCOUNT (listings[listing_id])

Key Scenario Metrics

Scenario Price	Adjusted nightly price after seasonality
Projected Booked Nights	Expected bookings volume
Projected Revenue	Scenario-based revenue
Baseline Revenue	Revenue under current pricing
Revenue Delta	Scenario impact vs baseline
Listing Projected Revenue	Aggregated scenario revenue by listing

Listing-Level Revenue Calculation

1. Calculates revenue for each listing individually
2. Aggregates listing revenues to total revenue
3. **Enables**:
   a. Top revenue listings analysis
   b. Host-wise revenue comparison

Scenario Measures

Scenario Price = Average Price × Seasonal Multiplier

Projected Booked Nights = Available Nights × Occupancy Rate

Projected Revenue = Scenario Price × Projected Booked Nights

Baseline Revenue = Average Price × Available Nights

Revenue Delta = Projected Revenue – Baseline Revenue

Listing projected revenue = SUMX (VALUES (listings[listing_id]), [scenario price] * [projected booked nights])

Scenario Analysis and Logic
(What-if Parameters)

Calculations based on Occupancy Rate

$$\text{Occupancy Rate} = \frac{\text{Booked Nights}}{\text{Available Nights}}$$

Aspect	Value / Rule	Reasoning	Business Interpretation
Definition	Booked Nights ÷ Available Nights	Occupancy represents a ratio, not an absolute count	Measures how efficiently available inventory is utilized
Minimum Value	0	Zero bookings across all available nights	Worst-case scenario, off-season demand, or property unavailable
Maximum Value	1 (Power BI practical limit: 0.95)	1 indicates all available nights are booked; Power BI caps at 0.95	95% occupancy is more realistic than 100% in real markets
Increment	0.05 (5%)	Allows smooth slider interaction and intuitive adjustment	Aligns with business thinking (e.g., "increase occupancy by 5%")
Default Value	0.7 (70%)	Based on typical urban Airbnb occupancy (60–75%)	Represents stable, most-likely demand scenario

Seasonal Multiplier – Parameter Design Explanation

Off-Season	0.60(60%) Seasonal Multiplier - 0.80(20% Discount)
Peak Season	0.90(90%) Seasonal Multiplier - 1.30(30% Price Hike)

Aspect	Value / Rule	Reasoning	Business Interpretation
Definition	Price × Seasonal Multiplier	Adjusts base price to reflect seasonal demand fluctuations	Models real-world price changes due to seasonality
Minimum Value	0.8	Represents a 20% price reduction during low-demand periods	Off-season pricing to attract bookings
Maximum Value	1.5	Shows a 50% price premium during peak demand	Peak season pricing during festivals, holidays, or high tourism
Increment	0.05 (5%)	Allows gradual and controlled price testing	Enables users to assess small, realistic pricing adjustments
Default Value	1.0	No price adjustment applied	Baseline scenario representing normal demand

Data Validation

What If Parameters (Occupancy Rate: 0.95, Seasonal Multiplier: 1.0)

Base Aggregations

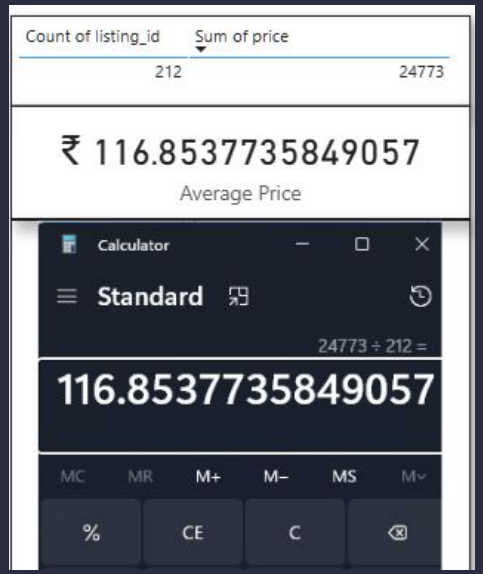
AVERAGE PRICE VALIDATION

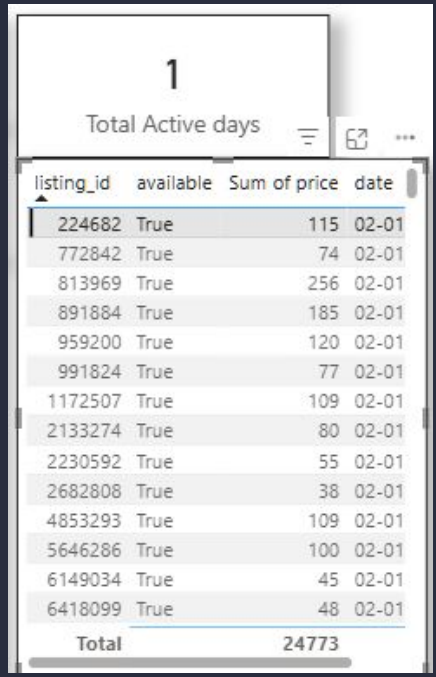
Filters applied:
City = Antwerp
Date = 01-Feb-2022
Available = True

Manual calculation:
Sum(price) ÷ Count(listing_id)

Result matched DAX Average Price
✔ Aggregation logic validated

ACTIVE DAYS VALIDATION
Each row = one listing on one date
Single date filter returns 1 active day
✔ Date & availability logic confirmed

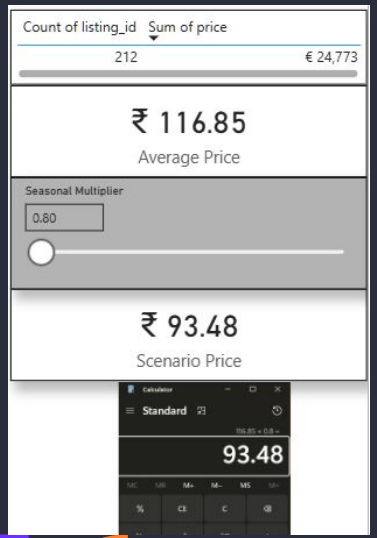




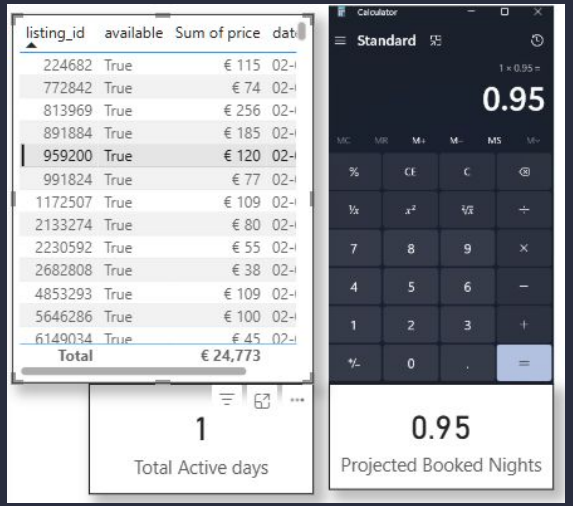
listing_id	available	Sum of price	date
224682	True	115	02-01
772842	True	74	02-01
813969	True	256	02-01
891884	True	185	02-01
959200	True	120	02-01
991824	True	77	02-01
1172507	True	109	02-01
2133274	True	80	02-01
2230592	True	55	02-01
2682808	True	38	02-01
4853293	True	109	02-01
5646286	True	100	02-01
6149034	True	45	02-01
6418099	True	48	02-01
Total		24773	

Scenario & What-If Logic

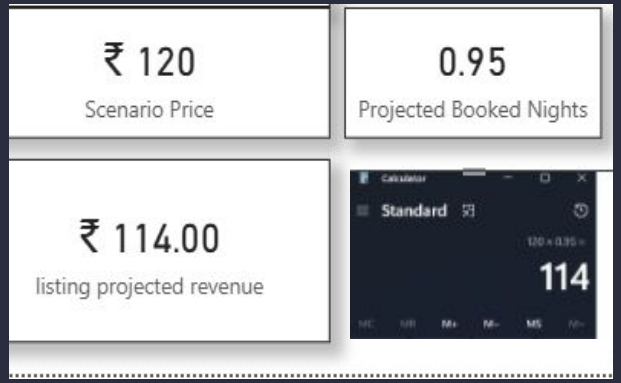
SCENARIO PRICE VALIDATION
Seasonal Multiplier = 1.0
Scenario Price = Average Price
✔ Price adjustment logic validated



PROJECTED BOOKED NIGHTS VALIDATION
1 active day × 0.95 = 0.95
DAX matches manual calculation



PROJECTED REVENUE VALIDATION
Scenario Price × Projected Booked Nights
Matches Listing Projected Revenue
✔ Revenue logic validated



Sanity Check

Baseline vs Scenario Logic
Occupancy = 0 → Revenue = 0
Multiplier = 1.0 → Scenario = Baseline
✔ Model behaves correctly at extremes

Key Insights & Recommendations

Source	Key Insights	Business Recommendations
Overview – Pricing, Availability & Revenue	• Revenue more sensitive to occupancy & seasonality • Strong seasonality: Mar–Jun peak, Dec weakest	• Focus on occupancy uplift over price hikes • Dynamic pricing: higher in peak, discounts in Q4
Listing Analysis – Revenue & Geography	• Top 10 listings drive outsized revenue • Entire homes dominate high revenue • Central Antwerp drives most demand	• Reduce dependency by uplifting mid/low performers • Incentivize amenity upgrades for mid-tier listings • Apply location-based pricing premiums
Scenario Insights – Pricing Sensitivity	• Entire homes show higher price tolerance • Scenario revenue < baseline → conservative model	• Apply aggressive pricing only to tolerant segments • Keep shared rooms competitively priced • Use scenario sliders for risk-aware planning
Reviews & Amenities	• Amenity count ≠ guaranteed revenue • Reviews & host tenure correlate strongly with revenue • ~50% hosts lack profile bios	• Push profile completion (bios, photos) • Encourage review generation post-stay • Prioritize experience quality over amenity volume
Hosts & Power Sellers	• One professional host dominates listings & reviews • Long tail of small, casual hosts • Entire homes heavily outnumber other types	• Segment hosts: professional vs casual • Offer portfolio tools for large hosts • Education & automation for small hosts

Next steps

Deploy Occupancy-First Pricing Strategy

Shift pricing decisions to prioritize occupancy uplift over blanket price increases, especially in off-peak months where underutilized inventory presents immediate revenue upside.

Implement Seasonal Playbooks by Segment

Define clear pricing and promotion strategies by month and listing type (entire homes vs shared rooms), with aggressive optimization during Mar–Jun and defensive tactics in Q4.

Target Revenue Concentration Risk

Reduce dependency on top-performing listings by actively uplifting mid-tier and lower-tier listings through pricing guidance, amenity improvements, and visibility boosts.

Differentiate Host Engagement Models

Segment hosts into professional and casual cohorts and deploy tailored tools—advanced revenue optimization for large operators and onboarding, automation, and education for smaller hosts.

Any questions? Ask away!

Thank you