Travel & Hospitality Data Analytics Report

Multi-City Airbnb Host Strategy & Revenue Optimization Analysis

Sector Name : Travel and Hospitality

Section : D

Team ID : G-18

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Origin of the creative idea

Sector Context :-

The short-term rental market is highly competitive, where similar properties often have inconsistent pricing and occupancy across neighborhoods. Hosts and platform managers need structured insights into demand, pricing behavior, and availability gaps to improve revenue and marketplace efficiency.

Problem Statement :-

How can Airbnb revenue and occupancy be optimized across cities and neighborhoods by identifying high-performing host patterns, effective pricing strategies, and inventory availability gaps to support data-driven pricing and capacity decisions?

Objective :-

To identify the key drivers of price and availability across cities and neighborhoods and develop a data-driven framework that helps optimize pricing strategy and listing capacity allocation in order to improve occupancy and revenue performance.

Data Engineering: From Raw Data to Clean Dataset

Dataset Overview

- Airbnb open listings dataset with property-level records across multiple cities
- Each row represents one listing/property
- Dataset prepared for pricing and occupancy decision analysis

Major Data Issues Identified

- Missing neighbourhood/location values
- Price stored as text with currency symbols & commas
- Duplicate listings present
- Extreme outliers in price and availability

Preprocessing Performed

- Converted price to numeric format
- Handled missing location fields
- Removed duplicate records
- Treated extreme outliers
- Structured dataset for KPI and dashboard analysis

Source

Source: Airbnb Listings Dataset
Size: 5000+ rows, 10+ columns
Time Period: Recent listing records
Unit of Analysis: One row = One property listing

Cleaning

- Removed duplicate listings
- Imputed missing neighbourhood/location values
- Converted price text → numeric
- Capped extreme outliers (price & availability)

Key Columns Used:

- Neighbourhood
- Room Type
- Price
- Availability
- Number of Reviews
- Host Listing Count
- Minimum Nights

KPI & Metrics Framework

To support pricing and capacity decisions, we designed KPIs to evaluate revenue potential, demand behavior, and host activity across cities and neighbourhoods.
These metrics help identify profitable locations, optimal price ranges, and availability gaps affecting occupancy.

Revenue Potential

- Total Estimated Revenue → Measures overall earning potential across cities and neighbourhoods
- Revenue per Available Day (RevPAD) → Indicates revenue efficiency per active listing day
- Average Listing Price → Identifies premium vs mid-range vs budget positioning

Demand & Occupancy

- Average Occupancy Rate → Measures booking strength and listing attractiveness
- Availability Rate (Days Available / 365) → Identifies vacancy gaps affecting revenue
- Average Minimum Nights Requirement → Evaluates stay flexibility and its impact on demand

Host Performance

- Total Listings (Supply Volume) → Indicates market size and competitive intensity
- Listings per Host → Segments professional operators vs individual hosts

Revenue Potential

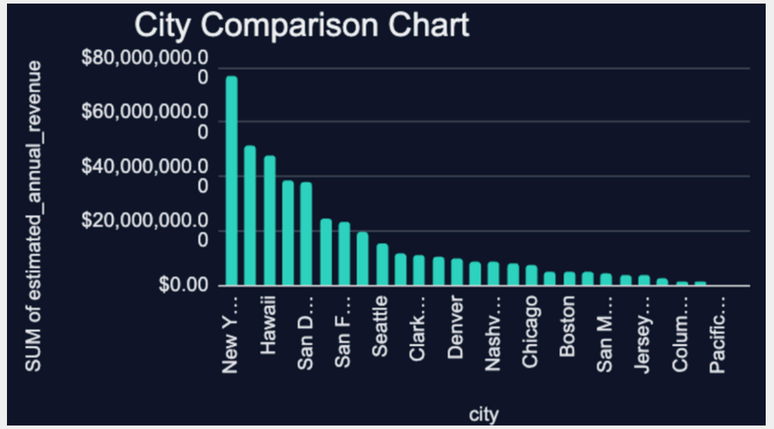
- Average Price per Listing
- Estimated Monthly Revenue

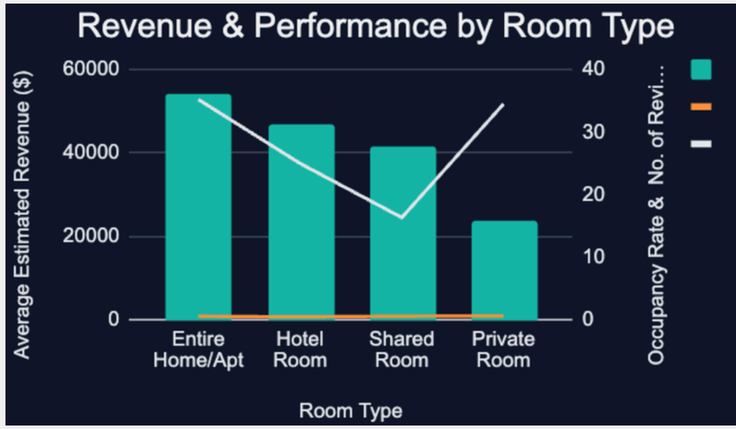
Demand & Occupancy

- Review Density (Demand indicator)
- Availability Rate (Occupancy gap)

Supply & Host Behavior

- Listings per Host
- Minimum Stay Requirement





Minimum stay requirement → Impacts Occupancy

Exploratory analysis shows occupancy varies with pricing, location demand, and host type across neighbourhoods.

Key Insights

Host Segmentation Analysis

- Listings managed by professional hosts show more stable occupancy but not always higher pricing.
- Small operators tend to rely more on competitive pricing to attract bookings.

Pricing vs Occupancy Relationship

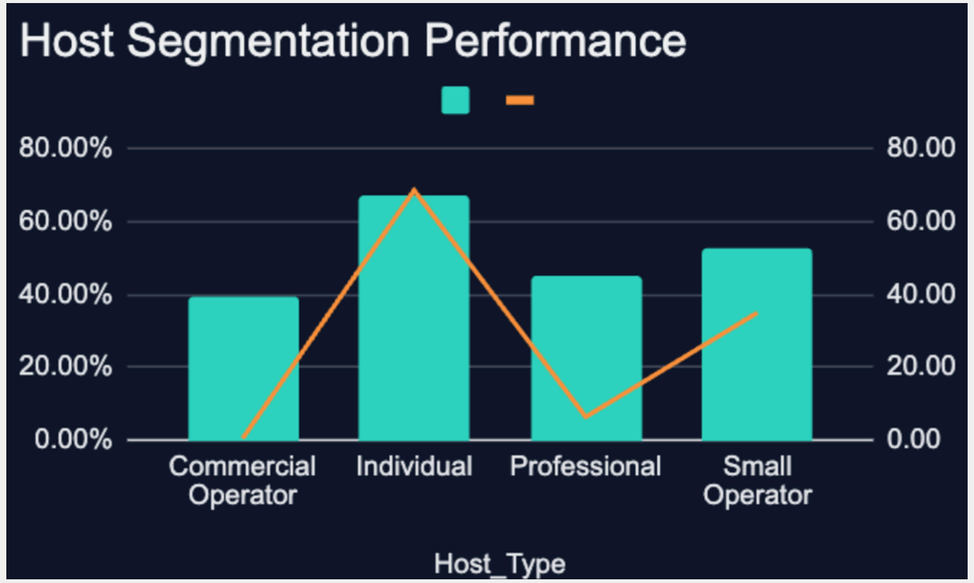
- Lower priced listings achieve higher occupancy rates, indicating strong price sensitivity in the market.
- Premium listings generate higher revenue but remain vacant more often.

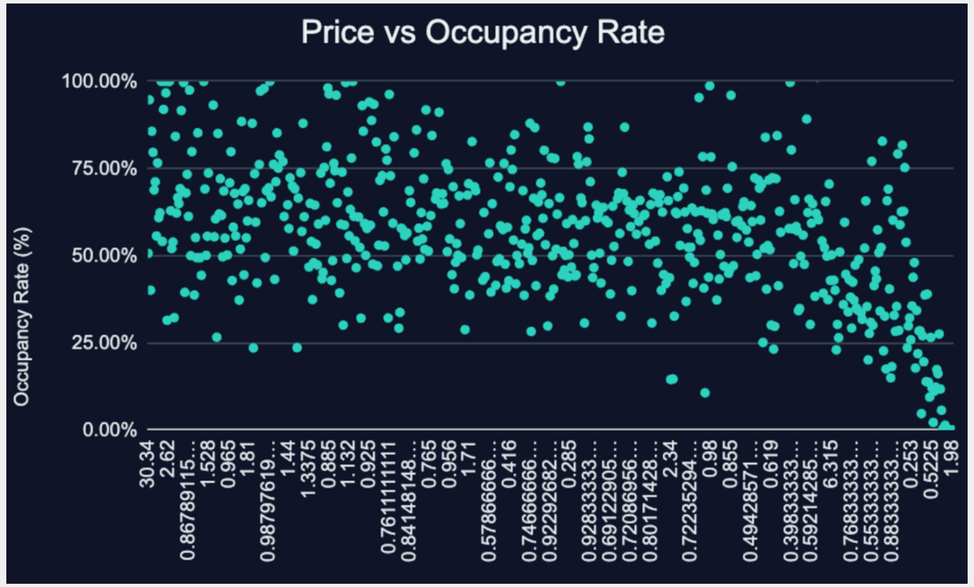
Minimum Nights Impact

- Listings requiring shorter minimum stays attract significantly more bookings.
- Long minimum stay policies reduce demand and lead to occupancy gaps.

Location Demand Gap

- Certain neighbourhoods show high review density but limited availability—indicating unmet demand and expansion opportunity.





New Understanding : Revenue is driven by balancing pricing strategy with stay flexibility rather than simply increasing price.

Final Executive Dashboard Overview

Advanced Analysis — Demand & Pricing Behaviour

Pricing & Minimum Nights

Price vs Occupancy

- Moderate negative correlation observed
- Higher prices slightly reduce occupancy
- Premium zones maintain stable demand

Insight: Pricing affects occupancy but elasticity varies.

Minimum Nights Impact

- Listings with 1–3 nights show higher demand
- High minimum nights reduce booking flexibility

Insight: Flexible stay policies increase occupancy.

Revenue & Host Analysis

Revenue Concentration

- Revenue concentrated in top cities
- High revenue linked to lower availability

Insight: Location strongly drives earnings.

Host Segmentation

- Professional hosts manage more listings
- Multi-listing hosts dominate revenue share

Insight: Scale improves revenue consistency.

Business Recommendations

1. **Adopt Flexible Stay Policies :** Encourage host to allow shorter minimum stays to increase booking frequency and occupancy.
2. **Dynamic Pricing Strategy :** Adjust pricing based on demand intensity — lower price in low-demand areas and premium pricing in high-demand neighborhoods.
3. **Expand Supply in High Demand Areas :** Increase listings in neighbourhoods showing high reviews but low availability.
4. **Segment Host Strategies :** Provide different pricing guidance for professional hosts vs casual hosts to optimize revenue.
5. **Promote Mid-Range Pricing Tier :** Mid-priced listings balance occupancy and revenue most effectively.

Business Impact & Value

Implementing these strategies can significantly improve marketplace efficiency.

Expected Impact:

- Higher occupancy rates due to flexible stay policies
- Increased revenue through optimized pricing ranges
- Better resource allocation across neighbourhoods
- Improved host earnings consistency
- Reduced vacancy across listings

Why Stakeholders Should Approve

This solution supports data-driven pricing and capacity decisions, directly improving profitability without increasing operational cost.

Limitations & Future Improvements

Limitations

- Dataset does not include seasonal demand variation
- Customer demographics and booking intent unavailable
- External factors like events, tourism, and holidays not captured
- Review count used as demand proxy, not actual bookings

Next Steps

- Integrate time-series booking data for forecasting
- Add event & seasonal trend analysis
- Build automated pricing recommendation system
- Develop host performance scoring model

Thank You