How can Pillow Palooza Optimize revenue and occupancy rates for short–term rentals in NYC?

Prepared by **Muhammad Tareq Mahmud**

8th June 2023

Table of Contents

Project Background

Pillow Palooza, a real estate start-up, is focused on disrupting the traditional real estate market by offering short-term rental options for travelers. With a significant increase in demand for short-term rentals in New York City, Pillow Palooza aims to optimize its business strategy by gaining a better understanding of the market. To achieve this, the company has collected data from various sources on Airbnb listings in New York City and plans to analyze this data to provide insights and recommendations for maximizing revenue and occupancy rates.

Context

The short-term rental market has experienced significant growth in recent years, fueled by factors such as the rise of online booking platforms like Airbnb and the changing preferences of travelers. New York City, being a popular tourist destination and a major economic hub, has witnessed a surge in demand for short-term rentals. This trend has led to the emergence of numerous real estate start-ups, like Pillow Palooza, seeking to capitalize on the opportunities presented by this evolving market.

To succeed in this competitive landscape, Pillow Palooza recognizes the importance of data-driven decision-making. By collecting and analyzing Airbnb listing data, the company aims to gain a competitive edge by understanding key market trends, identifying lucrative neighborhoods, optimizing pricing strategies, and aligning their offerings with the preferences and demands of travelers. This project's objective is to leverage data analysis techniques, including data cleaning, SQL queries, and data visualization, to extract valuable insights and provide actionable recommendations to Pillow Palooza. These insights will enable the start-up to make informed business decisions, maximize revenue, and enhance customer satisfaction, ultimately positioning them as a leading player in the short-term rental market in New York City.

Objective

As a Data Analyst at Pillow Palooza, your objective is to provide insights into the short-term rental market in New York City. By analyzing the Airbnb listing data, your goal is to uncover key trends in popular neighborhoods, rental prices, property types, length of stay, and demand over time. These insights will help the start-up identify opportunities for growth and success, enabling informed business decisions regarding neighborhood investments, property types, and competitive pricing strategies.

Data Analysis and Data Cleaning

The project began by receiving three unstructured datasets in Excel and TSV formats, including prices, room types, and reviews. To ensure data quality and consistency, the datasets underwent a comprehensive cleaning process using Python. Python's data manipulation libraries were leveraged to handle missing values, remove duplicates, and perform any necessary transformations. Once the datasets were cleaned and prepared, they were converted into a standardized CSV file format.

Works done to clean the dataset (Please find the attached 'Data Wrangling and Cleaning_Pillow Palooza_Rental Startup' python source file with the code): The following tasks were completed to clean the untidy dataset:

Exploring the 'reviews' datasets and what to clean there
- 'host_name' column has Null/missing entries, this needs to be corrected
- the date format in the last_review column should be corrected
- the datatype of the 'last_review' column should be in datetime format

Exploring the 'price' datasets and what to clean there
- Values in the 'price' column are listed strings, it should be listed as float
- price column has an extra 'dollar' written after the string value, this extra 'dollar' word should be removed
- Have a look if the 'price' column's value has an outlier, but it will only be possible to check after converting the datatype and removing the 'dollar' word

Exploring the 'room_types' datasets and what to clean there
- 'description' column has some null/missing values, it should be corrected
- 'room_type' column should be in 'category' type and it should have 3 categories. The formatting of the spelling or the word formatting in the values of the column should be in the same format so that we have only three categories.

After cleaning the databases, all of them were merged and converted into a CSV file.

SQL and Data Analysis

To extract insights from the dataset and answer specific questions, SQL was utilized in the analysis phase. The following questions were addressed using SQL (please find the attached 'Data Insights with SQL (Airbnb_NYC_ continuation of the DATA cleaning project from 202's week 01.sql' file with the queries used to extract the insight from the database):

1. What is the most common room type in NYC Airbnb listings?
2. What is the average price of a listing by room type?
3. Which borough has the highest average price per month?
4. How many listings of each room type are in each borough?
5. How many listings in each room type category have a price of over $500 per night?
6. What is the distribution of listing prices by neighborhood?
7. What is the estimated amount of revenue generated by hosts in each borough?
8. What is the average price per month for listings in each neighborhood?
9. How many listings have no reviews?
10. How do the estimated book days correlate with the price of an Airbnb listing in New York City?
11. Calculate the correlation between price and book_days_365.

Deliverables

The project was divided into three parts:
- Data Wrangling and Cleaning: In this part, the NYC Airbnb dataset was imported into Python, cleaned, and prepared. The resulting cleaned dataset was exported in CSV format.
- Data Analysis and Insights Generation: In the second part, the cleaned and preprocessed data was imported into **bit.io,** and a schema was created for further analysis. Insights were generated by running SQL queries to answer specific questions.
- Presenting Findings for Business Impact: In the final part, Tableau was used to create an **interactive dashboard and story points**, and a video based on the analysis of the NYC Airbnb dataset. Additional Airbnb data was provided to enhance the analysis and insights.

Findings

Most Common Room Types

Based on the analyzed data, it is evident that the Airbnb listings in NYC predominantly consist of two main room types: Entire home/apartment and private rooms. The most common room type among these listings is the Entire home/apartment, which represents a significant portion of the available options. Following closely behind are private rooms, which also enjoy a considerable presence in the Airbnb market.
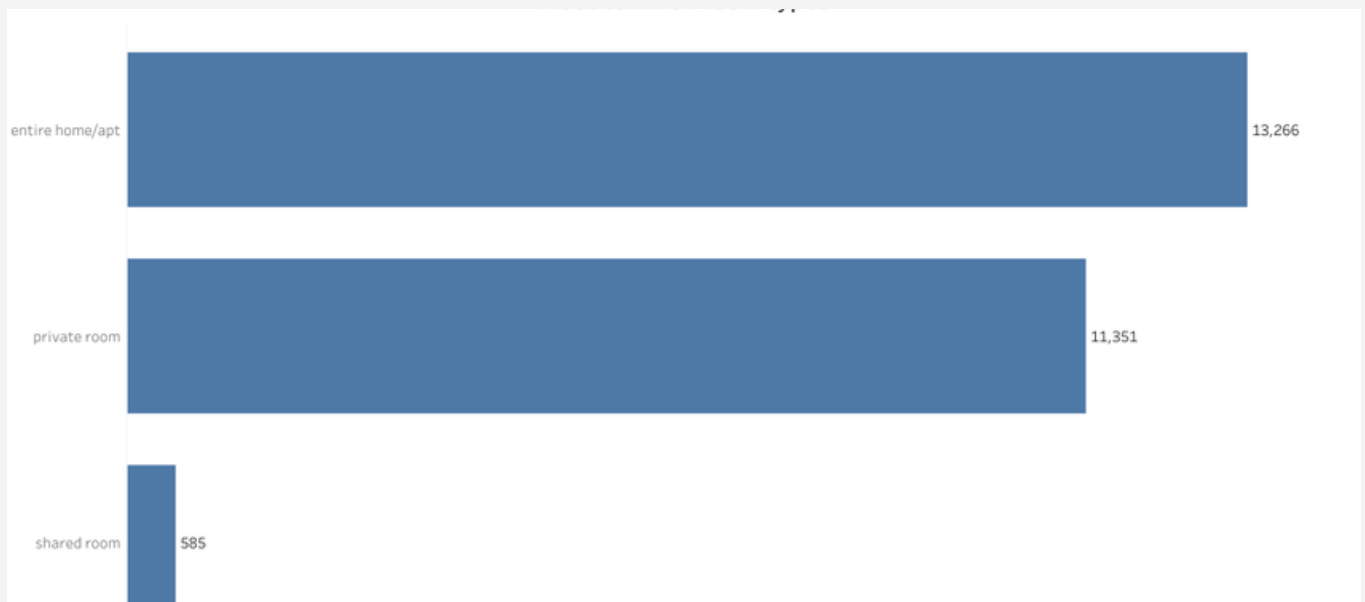
In contrast, the presence of shared rooms in the listings is comparatively lower compared to the aforementioned room types. Although shared rooms are still available, their frequency is noticeably less when compared to Entire homes/apartments and private rooms.

To summarize, the data analysis reveals that the majority of NYC Airbnb listings are comprised of Entire home/apartments and private rooms, while shared rooms represent a smaller proportion of the available options. Average price of a listing by room type
The data suggest that the entire home/apt room type is the most expensive listing type whereas renting a shared room would cost less than home/apt or private rooms.

The average price of a listing by room type

The data suggest that the entire home/apt room type is the most expensive listing type whereas renting a shared room would cost less than home/apt or private rooms.
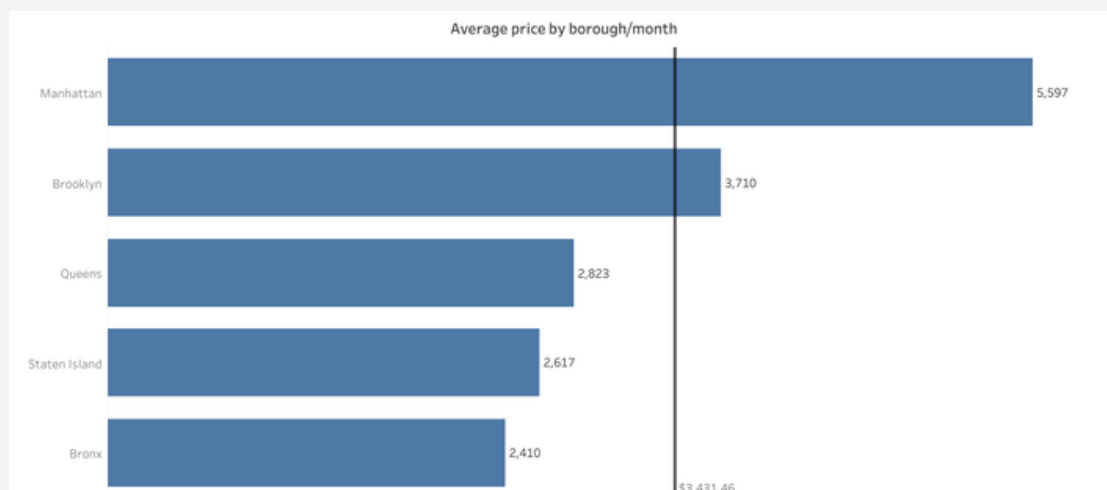

Average Listing Price/Room type

Avg price by borough/Month

In New York City (NYC), the borough of Manhattan stands out as the most expensive, followed by Brooklyn, while the Bronx is considered the least expensive among the five boroughs. The average price of a monthly listing across all boroughs is approximately $3431.46.

When focusing specifically on Manhattan, the average monthly cost for a listing skyrockets to $5597, nearly double the citywide average. This makes Manhattan the priciest borough in NYC. Brooklyn, while not quite as expensive as Manhattan, still exceeds the citywide average with an average monthly listing price of $3710.


Average price by borough/month

Borough	Price
Manhattan	5,597
Brooklyn	3,710
Queens	2,823
Staten Island	2,617
Bronx	2,410

$3,431.46

To summarize:

a) Manhattan: With an average monthly listing price of $5597, Manhattan is the most expensive borough in NYC, nearly doubling the citywide average.

b) Brooklyn: Following Manhattan, Brooklyn boasts an average monthly listing price of $3710, which also surpasses the overall citywide average.

c) Bronx: In contrast to Manhattan and Brooklyn, the Bronx stands as the least expensive borough, with listing prices below the citywide average of $3341.46.

Different room types in each borough

In both Manhattan and Brooklyn, room prices have been on the rise, and one of the reasons behind this is the availability of Entire home/apartment and private room types. Our previous analysis has indicated that the most expensive room type is the 'Entire home/apartment,' followed by 'Private rooms.'
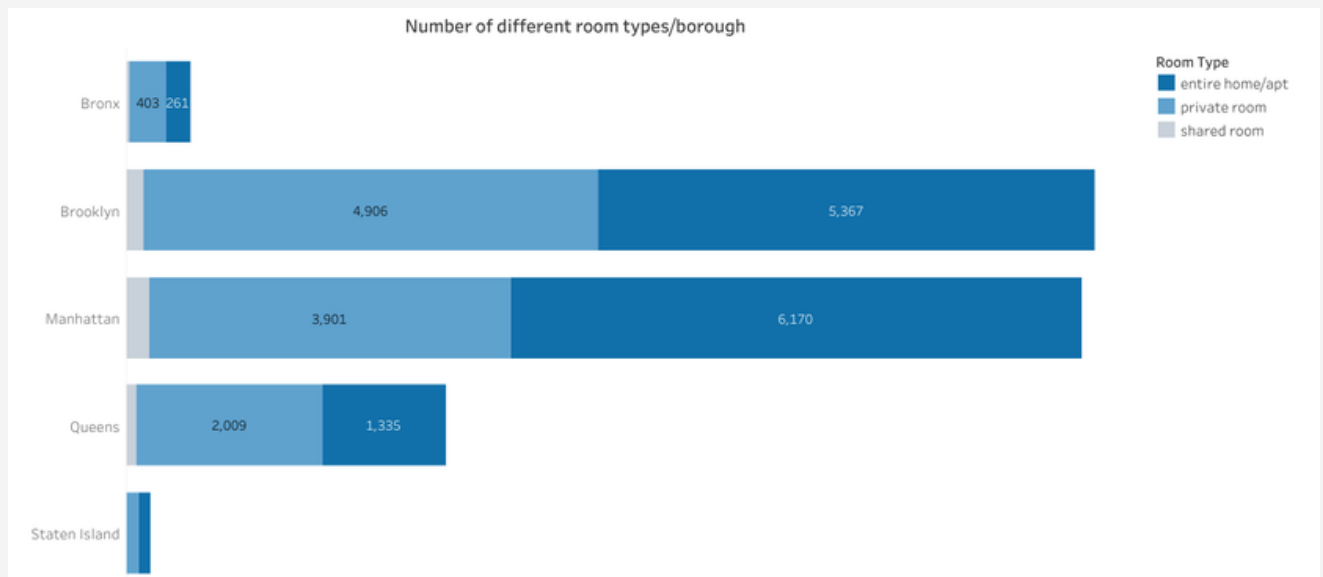

Specifically, in Brooklyn, there are currently 5367 listings for Entire home/apartments, while Manhattan has 6170 listings of the same type. As for Private rooms, Manhattan offers 3901 listings, whereas Brooklyn has 4906 listings. The higher number of listings for Entire home/apartment and private room types in these two boroughs contributes to the overall higher average prices of accommodations compared to other boroughs.

Interestingly, the data also reveals that Staten Island has the fewest number of listings across all room types. This observation suggests that Brooklyn, Manhattan, and Queens are the most sought-after boroughs, as the majority of listings are concentrated within these areas in New York City.

Room type by price over 500

When analyzing the price of listings, the data reveals that the room type "entire home/apt" has the highest number of listings priced at over 500 USD per night. Specifically, there are a total of 395 listings in the "entire home/apt" category that would cost 500 USD per night. In contrast, the number of such listings is 19 for private rooms and only 1 for shared rooms.

This data highlights that the "entire home/apt" room type is generally more expensive compared to the other two room types, indicating a higher price range for this particular category

Room type by price over $500
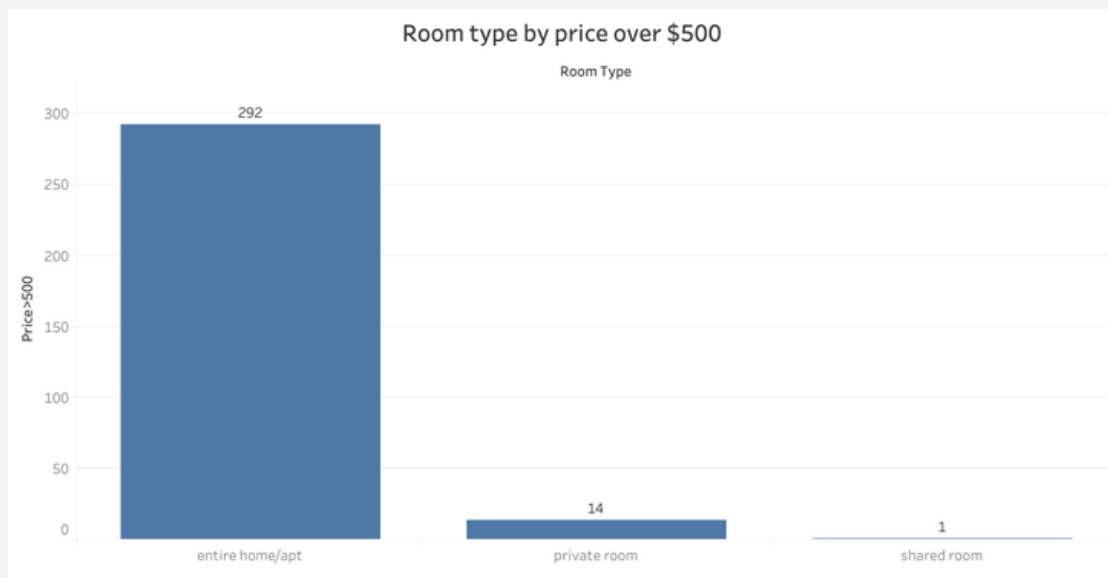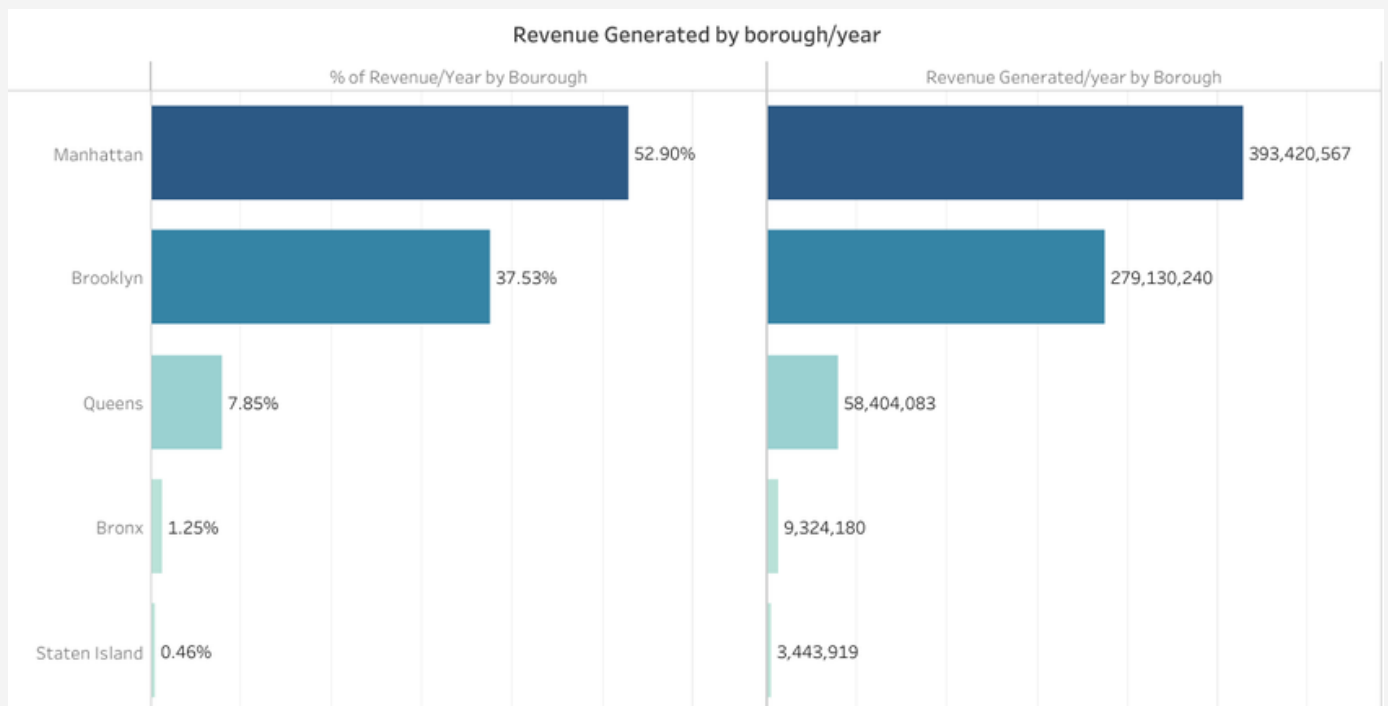
Price Distribution by Borough

When analyzing the distribution of listing prices in different boroughs, certain patterns emerge. The highest-priced listings are found in Brooklyn, with a rate of $7,500, closely followed by Manhattan at $5,100. Conversely, the lowest-priced listings are also found in Brooklyn and Manhattan, with an astonishingly low rate of $10.

Taking a closer look at the average prices of listings in each borough, we observe that in Brooklyn, the average cost per night is $122, while in Manhattan, it is slightly higher at $184. The borough with the most affordable average listing price is the Bronx, where it would cost around $79 per night.

In summary, the distribution of listing prices reveals that Brooklyn has both the most expensive and the least expensive listings, while Manhattan closely follows in terms of high-priced options. The average prices per night are relatively higher in Manhattan compared to Brooklyn, and the Bronx stands out as the most affordable borough for accommodation.

Revenue Generated by Borough

The revenue generated by each borough in NYC, based on the price of the listings per night, can be analyzed as follows:

Revenue Generated by borough/year

% of Revenue/Year by Bourough	Revenue Generated/year by Borough
Manhattan — 52.90%	393,420,567
Brooklyn — 37.53%	279,130,240
Queens — 7.85%	58,404,083
Bronx — 1.25%	9,324,180
Staten Island — 0.46%	3,443,919

1. Manhattan:

– Manhattan is projected to generate the highest revenue among all the boroughs.

– If we consider the price of the listings per night, Manhattan would contribute approximately 53% of the total revenue earned by all the boroughs in NYC.

2. Brooklyn:

– Brooklyn follows Manhattan in terms of revenue generation.

– Based on the price of the listings per night, Brooklyn is expected to generate around 38% of the total revenue earned by all the boroughs in NYC.

3. Bronx:

– The Bronx contributes a smaller percentage of the total revenue.

– If we consider the price of the listings per night, the Bronx is estimated to generate approximately 1.25% of the total revenue earned by all the boroughs in NYC.

4. Staten Island:

– Staten Island generates the least amount of revenue among all the boroughs.

– Based on the price of the listings per night, Staten Island is projected to generate only 0.46% of the total revenue earned by all the boroughs in NYC.

In summary, Manhattan stands out as the borough generating the most revenue, followed by Brooklyn. The Bronx and Staten Island contribute smaller percentages to the overall revenue earned by all the boroughs in NYC, with Staten Island generating the least revenue.

Avg price/month/neighborhood

When analyzing the average price per month per neighborhood, we discover that the overall average price, considering all neighborhoods, is $3200. Upon closer examination, we observe that in most neighborhoods, listings for entire homes or apartments tend to be priced higher than the average. Additionally, there are neighborhoods where the average price per month for all types of rooms exceeds the average price.

For instance, in the 'West Village neighborhood, the average price per month for all room types surpasses the overall average, making it one of the most expensive neighborhoods. Another noteworthy observation is that the 'Sea Gate' neighborhood only offers listings for entire homes or apartments, with an average price of $24485 per month. This makes 'Sea Gate' the most expensive neighborhood of all.

Conversely, there are also neighborhoods such as 'Woodlawn', 'Tremont', or 'Woodhaven' where the average price per month is below the overall average line. It is crucial to consider the presence of outliers in the dataset, such as the listing price of an entire home or apartment in 'Sea Gate' ($24485) or the listing price in 'Tribeca' ($13708). These outliers contribute to the average price of all neighborhoods showing as $3200 per month.

Average price based on the condition if it has been reviewed over 100 and is available over 200 days

In terms of average prices per room type, when considering listings with a minimum of 100 reviews and 200 days of availability, the most expensive option is the Entire home/apt room type, priced at $179.5. On the other hand, the cheapest option is the shared room, with an average price of $59.2.
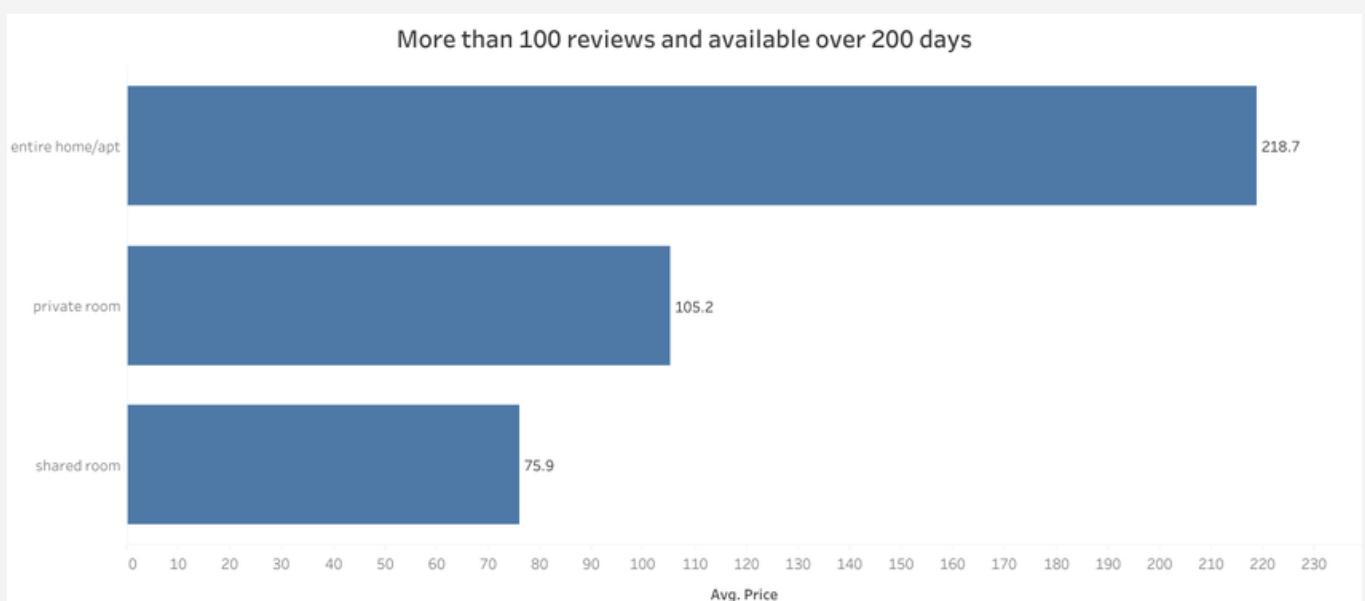
Recommendations

Based on the insights above, here are some recommendations and considerations for Pillow Palooza's business plan to enter the rental market:

Focus on Entire Home/Apartment and Private Rooms: Given that the majority of Airbnb listings in NYC consist of Entire home/apartment and private rooms, Pillow Palooza should prioritize offering these room types to cater to the demand. These room types have a higher presence in the market, indicating greater potential for bookings.

Consider Pricing Strategies: Pillow Palooza should carefully determine the pricing for their listings. It is important to note that Entire home/apartment listings tend to be more expensive, while shared rooms are generally more affordable. Pillow Palooza can consider offering competitive prices within their chosen room types to attract guests.

Target Manhattan and Brooklyn: These two boroughs, Manhattan and Brooklyn, have a significant number of listings and generate a substantial amount of revenue. Pillow Palooza should consider establishing a strong presence in these boroughs to tap into the lucrative market. However, it's crucial to conduct thorough market research and assess competition in these areas before finalizing the locations.

Explore Opportunities in Other Boroughs: While Manhattan and Brooklyn may offer the potential for high revenue, Pillow Palooza should also consider opportunities in other boroughs, especially if they are looking for more affordable options. The Bronx, despite generating a smaller percentage of revenue, presents an opportunity to target budget-conscious travelers.

Neighborhood-Specific Pricing: Pillow Palooza should analyze the average price per month in different neighborhoods and adjust their pricing accordingly. Some neighborhoods may command higher prices due to their popularity or desirable locations. It's essential to strike a balance between competitive pricing and profit margins, considering neighborhood-specific factors.

Emphasize Customer Reviews and Availability: To align with the average pricing analysis based on review count and availability, Pillow Palooza should encourage guests to provide reviews and ensure their listings have a minimum of 100 reviews and 200 days of availability. This strategy will allow them to maintain competitive prices and attract potential guests.

Marketing and Differentiation: In a competitive rental market, Pillow Palooza should focus on effective marketing strategies to stand out from the competition. They can highlight unique features of their listings, such as exceptional amenities, stylish interiors, or special services, to differentiate themselves and attract guests.

Customer Satisfaction and Service: Providing excellent customer service and ensuring guest satisfaction is crucial for success in the rental market. Pillow Palooza should prioritize responsiveness, cleanliness, and addressing any guest concerns promptly. Positive reviews and word-of-mouth recommendations can significantly impact their reputation and bookings.

Monitor Market Trends: It's essential for Pillow Palooza to continuously monitor market trends, including changes in pricing, demand, and customer preferences. By staying informed about the evolving landscape, they can adapt their business strategies accordingly and stay competitive in the rental market.

Partner with Airbnb and Utilize Data: As Pillow Palooza enters the rental market, it should consider partnering with Airbnb and leveraging the platform's resources and data analytics. Airbnb can provide valuable insights and guidance on pricing strategies, and market trends, and reach a wider audience, enhancing Pillow Palooza's chances of success.

By considering these recommendations and developing a comprehensive business plan, Pillow Palooza can position itself for success in the NYC rental market.