



Business Plan

DBA3702: Descriptive Analytics with R

AY 2021/2022 Semester 2

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Submitted On: 13 Nov 2022

**DBA3702 DESCRIPTIVE ANALYTICS WITH R
Project Report
DBA3702 SA1 TEAM 3**

1. Background and problem

Ever since the introduction of Airbnb, the landscape of short-term rentals have expanded by a very large amount. This platform has enabled property owners to rent out their units to guests from all backgrounds. Furthermore, due to the vast variations in different hosts, and the general decentralisation of the way it worked, it sets itself as a direct competitor to hotels and other commercial accommodations. Due to the freedom and lack of regulations, many investors began buying properties just to rent out to incoming guests, many of them only staying for a short period i.e., below 90 days.

Problem Statement

While the rise of Airbnb attracted many investors, there was a lot of uncertainty involved in these investment decisions. These problems mainly affected two groups of people.

• **Prospective Airbnb Investors:**

Prospective investors were unable to identify and project the *rental yield* of a certain property. Due to the lack of information, many investors are unable to determine the expected rental income they can earn through Airbnb, and are hence unable to project their rental income. This made it challenging to determine the expected rate of return on such real estate investments, which could lead to poor investment decisions.

• **Existing Airbnb landlords:**

For existing landlords, it was also difficult to identify the optimal price to charge to maximise their rental income. This is because Airbnb landlords were not able to determine the prices charged by their competitors in close proximity to them. As such, many landlords experienced *low tenancy rates*, which greatly reduced their potential rental income.

Despite this problem persisting for many years, there remain no companies that offer analysis services on the surrounding competition of Airbnbs.

2. Current Market Practice and Industry analysis

The revenue of Airbnb has increased by 73% from 2020 to 2021, and the number of annual bookings for 2021 was approximately 300 million. There is a growing demand for their service and every year there are more and more investors buying the properties for the sole purpose of Airbnb rentals (Curry, 2022).

A quick secondary research on the Internet reveals that property transaction sites do not provide estimates of potential income that can be earned from short-term rentals.

Furthermore, there are no websites that provide spatial analysis of investment properties with detailed information about Airbnb's projected rental incomes. Currently, there are only guides for manual calculations or ones that give estimates for long-term leases available (Zillow, 2021). Some other sites provide the ability to view Airbnb competitors, however, these visualisations do not factor in important metrics such as the type and characteristics of the properties. Furthermore, these sites do not provide a recommendation on how a landlord should price the property for Airbnb. Currently, there is no app that has the combined function of viewing both properties available for investment and the existing competition within the area.

Table 1: Competitor Analysis Pros v Cons

Competitor Analysis			
Competitor	Summary	Pros	Cons
 Zillow.com	Real Estate Site that provides listing price, estimated market value, and rental income potential for long-term leases	<ul style="list-style-type: none"> Shows listings of homes on the market Estimates Long term lease income 	<ul style="list-style-type: none"> Does not project income for short term leases on Airbnb Variance in occupancy rates not accounted for
 realtor.com®	Real Estate Site that provides listing price, estimated market value, and rental income potential for long term leases	<ul style="list-style-type: none"> Shows listings of homes on the market Estimates Long term lease income 	<ul style="list-style-type: none"> Does not project income for short term leases on Airbnb Variance in occupancy rates not accounted for
 alltherooms.com	Competitor Analysis site that shows competitors pricing	<ul style="list-style-type: none"> Shows competition spatially on an area 	<ul style="list-style-type: none"> Fails to show existing properties on the market for investments Does not provide recommended price range No functionality for periodic notifications to landlords

Our startup aims to fill the market gap in information, and serve the unmet need for a spatial competitor analysis of a particular property. We aim to decrease the unsystematic risk in this market and help investors make more confident financial decisions. In addition, we aim to provide existing landlords who subscribe to our service a competitive advantage in pricing decisions.

Pain Points to prospective investors

Many interested retail investors would find difficulty in uncovering the true earning potential of a property and would shy away from Real Estate as an asset vehicle to compound their net worth. In particular, investors are unable to identify the price they are able to charge per night for their stay, and are unable to project the occupancy rate for their leases.

In addition, each property has unique characteristics, which greatly cause a difference in the price that they can earn per night. This makes simple price comparisons inaccurate and misleading, often causing an erroneous estimation of the earning potential.

Prospective investors also face difficulty in viewing the competitive landscape of their property spatially, given the characteristics of a particular property, and will not be able to ascertain if a particular region is **saturated** with competition. This could lead to the selection of properties in spots that have low tenancy rates, hampering the profitability of the investment.

Pain Points to existing landlords

On the other hand, existing Airbnb landlords are not able to make accurate and rigorous pricing decisions based on data. Currently, many investors continuously sift through listings on the Airbnb platform and are unable to determine the extent of competition in the area.

Oftentimes, this leads to a mispricing of the apartment. Landlords who underprice their property limit their earning potential, while other landlords who overprice their property suffer from low tenancy. Both of these cause existing landlords to wrongly guess prices to charge.

In addition, this manual process of sifting through competitors is often time-consuming, and further adds to the workload of managing an Airbnb apartment. There is thus an unserved need for periodic updates and reports on their competitors on Airbnb.

3. Proposed Solution

3.1: Utility of our application

Using a data set on Airbnb rental properties, key indicators such as rental price per night, amenities, location, and other factors are used to estimate the potential income from these properties. Combining this dataset with existing listings on property transaction sites, we will be able to identify the rental yields that properties on these markets can generate, and subsequently, evaluate a predicted return on investment (ROI). Through our application's spatial visualisation, users can then make more informed investment and pricing decisions.

3.2 Target Consumers

Our startup serves two different categories of customers: Investors and existing landlords.

Our startup acts as an intermediary to help investors **accurately value a property for short-term leasing through Airbnb**. In addition, our startup also allows existing landlords to view the actions of their competitors, in order to adapt their pricing strategy to the changing market conditions.

Through the use of data, investors will be able to determine the optimal price to charge their guests, and estimate their *rental yield*, allowing them to sort and select an *ideal investment property* from the list of available properties on the market.

On the other hand, our startup will also serve existing Airbnb landlords as a tool for *competitor analysis*, allowing them to obtain a competitive advantage in pricing decisions.

3.3 Sources of Revenue

The provision of our service will yield 3 main revenue streams:

- **Subscription:**
We will charge a subscription fee to existing Airbnb landlords for the use of our platform to determine the optimal pricing to charge.
- **Advertising Revenue:**
In addition, through the traffic from our website, we plan to run advertisements on a pay-per-click basis. These advertisements will be integrated with Google Adsense. When users on our platform interact with advertisements hosted, some commission will be paid out from Google's Adsense platform to our startup. Based on present estimates, advertisements in the real estate industry have a cost of \$1.36 per click (McCormick, 2022).
- **Commission:**
In the long run, after we amass users and earn a strong reputation, we plan to establish partnerships with larger real estate brokers. Through these partnerships, consumers who use our platform directly will be able to link up directly with these brokers and transact properties seamlessly. For providing this service, we will charge our real estate partners a commission for the investors that we channel to them.

3.4 User's input

Start: Select User Type

The user will choose either the tab of investor view or the landlord view depending on whether they are new investors who want to become a landlord or if they are an existing Airbnb landlord.

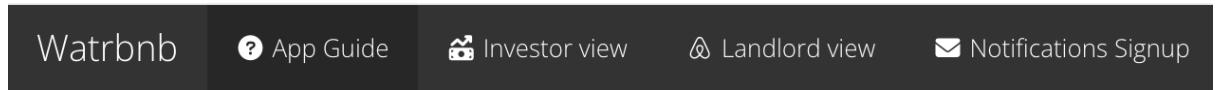


Figure 1: Shiny App Navigation Bar

View 1: Investor view

A. Investor view: Select Characteristics of Property

Investors are able to filter the view of the properties that they can see based on the following criteria:

- Investment capital, where they can enter the minimum and maximum amount they wish to invest in the Airbnb property
- State, where they can select in which state they would like to purchase their property
- Minimum size in sqft, number of bathrooms and bedrooms, which allows investors to specify the minimum size of the property they like to view and the minimum number of bathrooms and bedrooms of the property

A screenshot of a "Property Selector" interface. At the top, there are two tabs: "Property Selector" (which is active) and "Airbnb Map view". Below the tabs is a section titled "Property Filters".

- State:** A series of radio buttons for states: NC, TX, MA, IL, OH, CO, NJ, CA, TN, LA, NY, OR, RI, WA, DC. The radio button for OH is selected.
- Investment Capital:** A horizontal slider scale from 17,000 to 45,000,000. The slider is positioned at 17,000.
- Minimum Size in Sqft:** An input field containing the value "1".
- Minimum Number of bathrooms:** An input field containing the value "1".
- Minimum Number of bedrooms:** An input field containing the value "1".
- Name of Property chosen:** A dropdown menu with the placeholder "Choose".

Figure 2: Shiny App Property Selector Input

B. Investor view: View available investment properties

After setting the filters on the characteristics of the property they wish to invest in, investors will be able to view the location of the property plotted on the map, as shown in the picture below:



Figure 3: Shiny App Map View for Investors

An additional table will be shown below the map, which shows the information (ID, Address, Sale price and ROI) of the properties that are plotted on the map. The default view of the table shows properties with the highest to lowest ROI. Investors can change the order by clicking on the column names. They are also able to change the number of properties they want to view to 25, 50 or 100 and search for a particular property they want to find out more about.

Show 10 entries		Search: <input type="text"/>		
ID	Address	Sales price	ROI	
566	3226 681 Frebis Ave, Columbus, OH 43206	209900	20.57%	
12	2635 1053 Kelton Ave, Columbus, OH 43206	59900	16.70%	
616	3061 805 Berkeley Rd, Columbus, OH 43205	95000	16.32%	
404	2643 44 Brunson Ave, Columbus, OH 43203	329900	16.17%	
580	3213 71 Winner Ave, Columbus, OH 43203	199000	16.11%	
338	2683 36 N Westgate Ave, Columbus, OH 43204	140000	15.73%	
20	2695 1088 Merriam Cir 5 (2), Columbus, OH 43220	129900	15.11%	
254	2740 2738 Cleveland Ave, Columbus, OH 43224	179900	14.99%	
527	3040 621 Morning St, Worthington, OH 43085	379900	14.98%	
62	2758 1260 24th Ave, Columbus, OH 43211	77775	14.84%	

Showing 1 to 10 of 660 entries

Previous 1 2 3 4 5 ... 66 Next

Figure 4: Shiny App Detail Listings for Investor

In the case where the filters entered do not match and no data is available, then nothing would be shown, as no data is available.

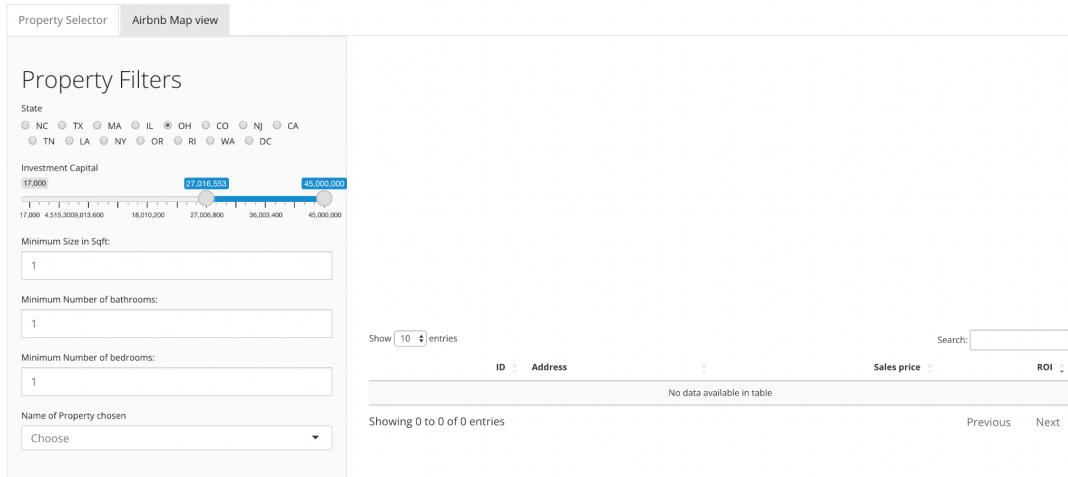


Figure 5: Shiny App Excessive Filter Case

C. Investor view: Select particular investment property

By hovering over a specific property marker, investors will also then be able to know more information about that property, such as the Name, size, sales price, sales price per square foot, number of bedrooms and bathrooms of the property.

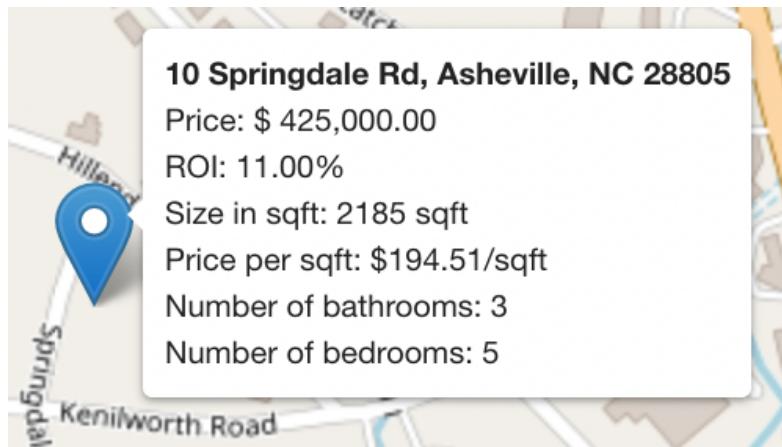


Figure 6: Shiny App Details for a Specific Property

Investors can select the properties that they want to perform an Airbnb competitor analysis on by clicking on the markers or on the row of the property on the table, once a property has been selected, the map will zoom in into the particular property, and a message will be shown to direct the Investor to the Airbnb map view tab

D. Investor view: View rival Airbnb Listings

After selecting the particular property that they may want to invest in, they can switch tabs to the “Airbnb Analysis”. This will allow them to see the Airbnb properties within 500m of the property they would like to invest in.

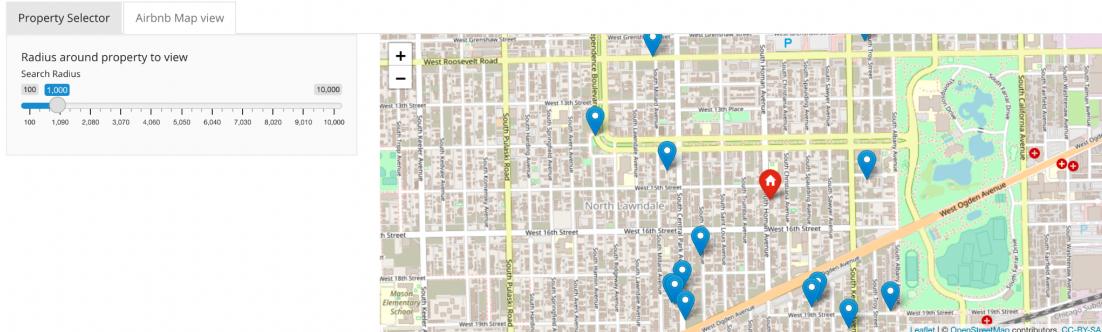


Figure 7: Shiny App Investor View Rival Airbnb Listings

The red marker indicates the location of the property they would like to purchase, hovering over the marker will show the same information as in the Rental property map view

The blue markers will indicate the location of the rival Airbnb listings, by hovering over the marker, investors will be able to see the price per night charged by the Airbnb host as well as other essential information such as the number of tenants the property can accommodate, along with the number of bedrooms and bathroom in the particular property. By clicking on the marker, investors can find the link to the Airbnb listing and will be able to look at the Airbnb listings in greater detail.

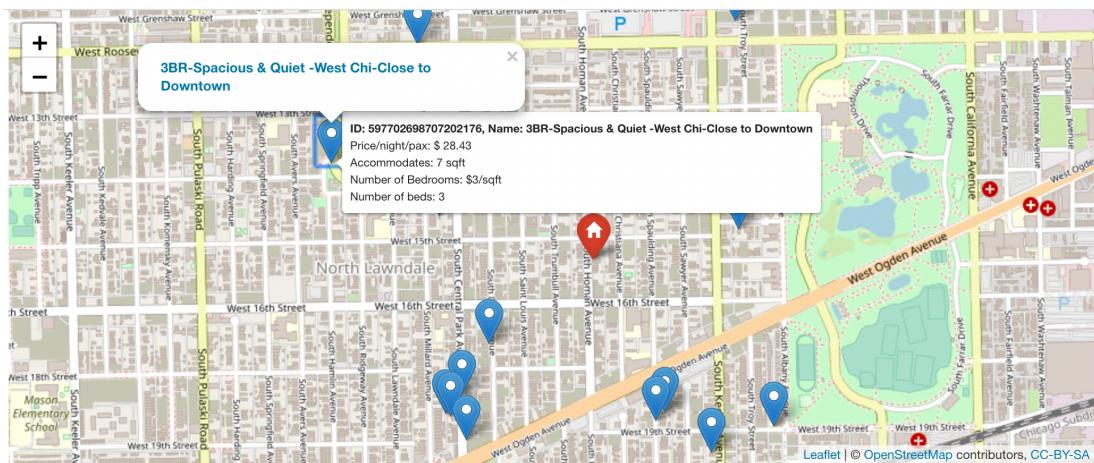


Figure 8: Shiny App Investor view Rival Airbnb Listings

A boxplot will also be displayed in this tab, this boxplot will allow them to see the spread of the price per night per person of the rival Airbnb based on the number of bedrooms these Airbnb have, this will allow them to make a more informed choice on pricing their Airbnb.

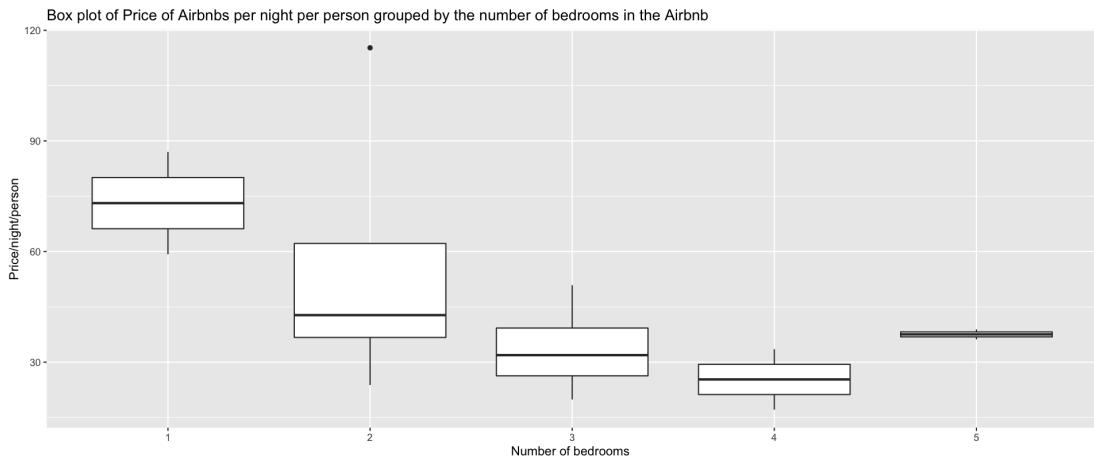


Figure 9: Shiny App Box plot Comparison

View 2: Landlord View

A. Existing Airbnb Landlord view: Insert the ID of the current property

Currently, Airbnb landlords are given an ID by Airbnb for each of their listings. By inputting this ID into our application, the landlord of a property is able to view the surrounding Airbnb listings based on the radius defined in the slider input. This allows them to have better access to insightful market information which helps in terms of competitive price setting. For instance, if their Airbnb property is not doing so well, they would be able to pinpoint whether they price their room way above the market price, and then adjust it accordingly.

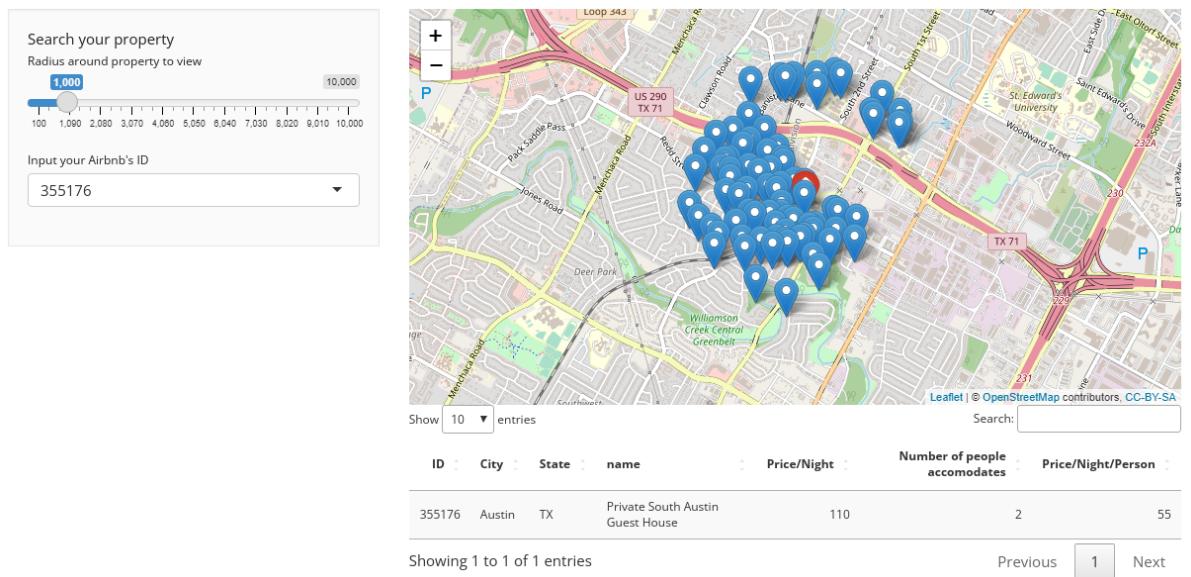


Figure 10: Shiny App Existing Landlord View

B. Get pricing recommendation

The box plot below shows the price range of rival Airbnbs within the radius specified in the user's current Airbnb.

This will allow the user to see how the pricing of their Airbnb compares with the other Airbnb listings nearby their area.

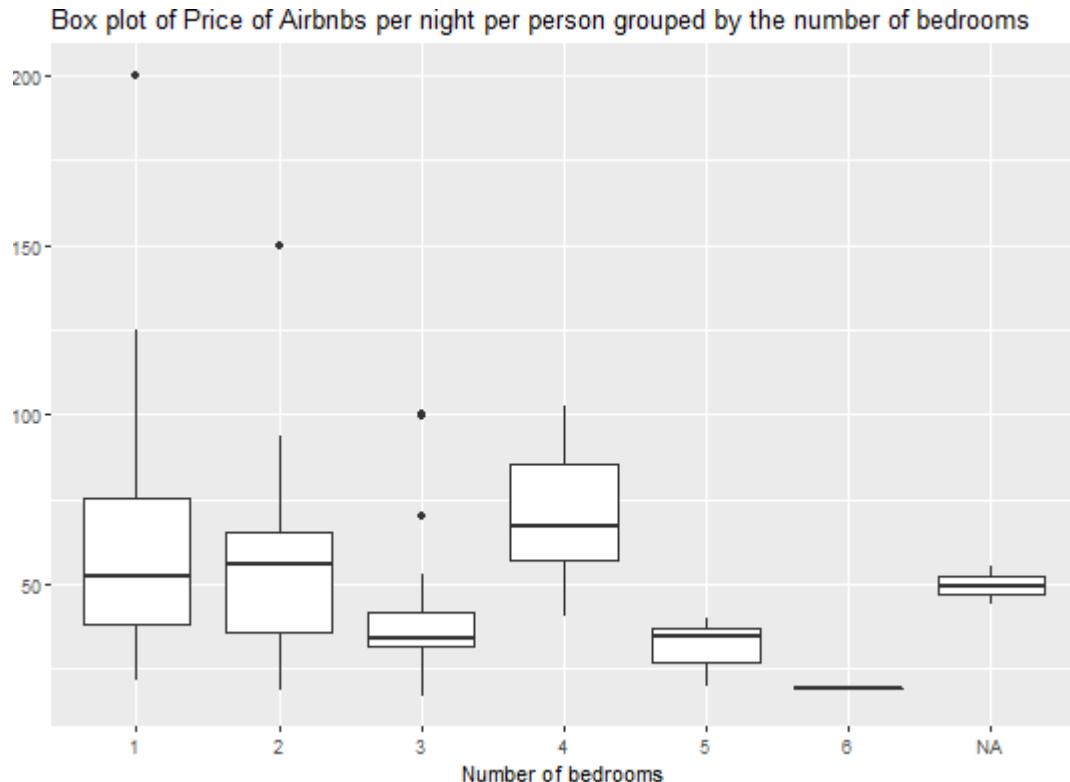


Figure 11: Shiny App Box plot Comparison

View 3: Notification View

Watrbnb [App Guide](#) [Investor view](#) [Landlord view](#) [Notifications Signup](#)

Please fill in your details below if you would like to receive notifications from us:

What is your purpose for using this app:

I am an Investor
 I am an existing Airbnb landlord

Enter your email:

Figure 12: Shiny App Notification View

4. Competitive Advantage and Unique Selling Point

Through the use of our platform, investors and existing landlords will now be able to make informed decisions that aid in maximising profits. Unlike our competitors, we provide our users with the ability to view properties that are on the market and simultaneously analyse their potential Airbnb rental incomes. Furthermore, based on the characteristics of the property, we are able to assess competitors who have **similar** Airbnb properties. This provides our users with a more accurate and reliable estimate of the competition in the area, which then allows them to make optimal pricing decisions.

In addition, a unique selling point that sets us apart from our competitors is the convenience factor of receiving periodic updates.

For Airbnb Landlords

Property management is already time-consuming and challenging. Evidently, some Airbnb landlords already spend upwards of 10 hours per week managing their units (Rae, 2020). This leaves little time for conducting competitor analysis, and likely results in low responsiveness to competitors' behaviours. Through the use of periodic market updates, our app automates the competitor analysis process allowing Airbnb to easily respond to changes in the competitive landscape.

For Prospective Investors

Investors can also opt for updates on new listings in a particular location, which allows them to keep informed of new investment opportunities. Through this service, these investors can monitor new properties in a particular location and swiftly respond to new listings to secure an investment unit.

5. Implementation Timeline

Throughout the entire process of building the Shiny App, our team has always been impressed and followed very closely the advice from The Lean Startup, one of the most popular business strategy books written by Eric Ries. We learn to adopt the culture of “Learn, Measure, and Build” for developing early-stage ideas (Blank, 2013). Closely related to the notion of Design Thinking, our team strongly believes in constant and never-ending improvement to improve user experience. Indeed, the current app that we are building merely serves as a working prototype, referred to as a Minimum Viable Product (MVP) in the startup realm, and future iterations would be required to do testing and deploy the product into the market.

Business success requires strategies to be broken down into concrete and actionable plans, and our team has devised a startup roadmap using a Gantt visualisation to keep our team accountable and on track.

Table 2: Gantt Visualisation of Product Development Timeline

Table 3: Gantt Visualisation of Business Development Timeline

	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV
Business Development												
P1. Building Social Media Presence	Green	Green		Green	Green	Green	Green		Green	Green	Green	
P2. Feature Testing		Green										
P3. Building Real Estate Investor Community			Green									
P4. Fundraising				Green	Green	Green		Green		Green	Green	
P5. Soft Launch					Green			Green				
P6. Community Events								Green	Green	Green		Green

From the Gantt Visualisation above, we note that both the product and business development plans should indeed be executed hand-in-hand to ensure that we could test our product feature periodically to match our potential users' feedback. For the product development side, we strive to provide investors with sufficient and the most updated information with regards to the neighbourhood of the properties in their watchlist whilst building supplementary features to facilitate their decision-making process. These include enhancing visualisation features, integrating Google Earth and Safe Chat to facilitate communication between investors and sellers, as well as real-time notification to investors once there are new listings that match their predefined criteria.

For the business development roadmap, we plan to build our brand awareness through multiple platforms such as social media (Reddit, Twitter, etc.) and the real estate investment community in the area where we are focusing our effort in the initial stage. Through these networks of early adopters and enthusiasts, we would do multiple rounds of feature and hypothesis testing to ensure that we pass through the product-market fit which is quintessential to building a successful startup. Once we received early traction for our services, we would proceed to do fundraising to scale and accelerate the growth of our services. Following the initial success, we would continue with a soft launch of our products and host community events to bring greater awareness to our service.

6. Monetisation Strategies

From the implementation plan in Section 5, we plan to build a base of early adopters starting from our initial phase of testing. This would eventually allow us to build content for our marketing and publicity efforts to provide real value for our audiences. Indeed, in order to achieve long-term financial success and sustainability for our business, we intend to monetise our app once we have already provided direct positive value for our target

audience. Once we hit a certain Key Performance Indicator (KPI) such as periodic active users, success rate, and user satisfaction, we plan to introduce a revenue stream based on the following table.

Table 4: Subscription Plan

	Free	Pro (\$9.99)	Premium (\$29.99)
Full Information on Neighbourhood	✓	✓	✓
Basic Visualisation for Property Comparison	✓	✓	✓
Advanced Visualisation for Property Comparison		✓	✓
Integrated Google Earth View		✓	✓
Listing Notifications and Watchlist			✓
Integrate Safe Chat Feature			✓

On top of the revenue stream generated from the subscription plan, we would also be generating income from advertising revenue. Our app would allow real estate agents to put up their offer for their services and the system would be on a pay-per-click basis (an online advertising model in which an advertiser pays a publisher every time an advertisement link is “clicked” on). Based on the trend for the past couple of years for Google Adwords, we estimate that the average cost would be approximately \$1.36 per click (McCormick, 2022).

7. Key Financials

Initially, our start-up will focus on generating revenue from the 2 key sources mentioned previously, which are the subscription fees and the advertising revenue generated. As these two sources of revenue vary directly with the number of users on our platform, a projection on user growth must first be made.

7.1 User Growth

Currently, other property listing sites like Zillow are receiving a large amount of traffic on a monthly basis. Zillow has a monthly visitor count of around 300 million (SimilarWeb, 2022). However, Zillow is a mature company that has already established a strong brand and reputation. We target for our application to gain traction and earn 5% of this figure in the first year.

Thereafter, using the revenue and profits generated, we plan to reinvest earnings into marketing and increasing traffic flow. Through these extensive marketing campaigns, we then are projecting a yearly user growth of 50% on an annual basis for the next 5 years.

User growth data

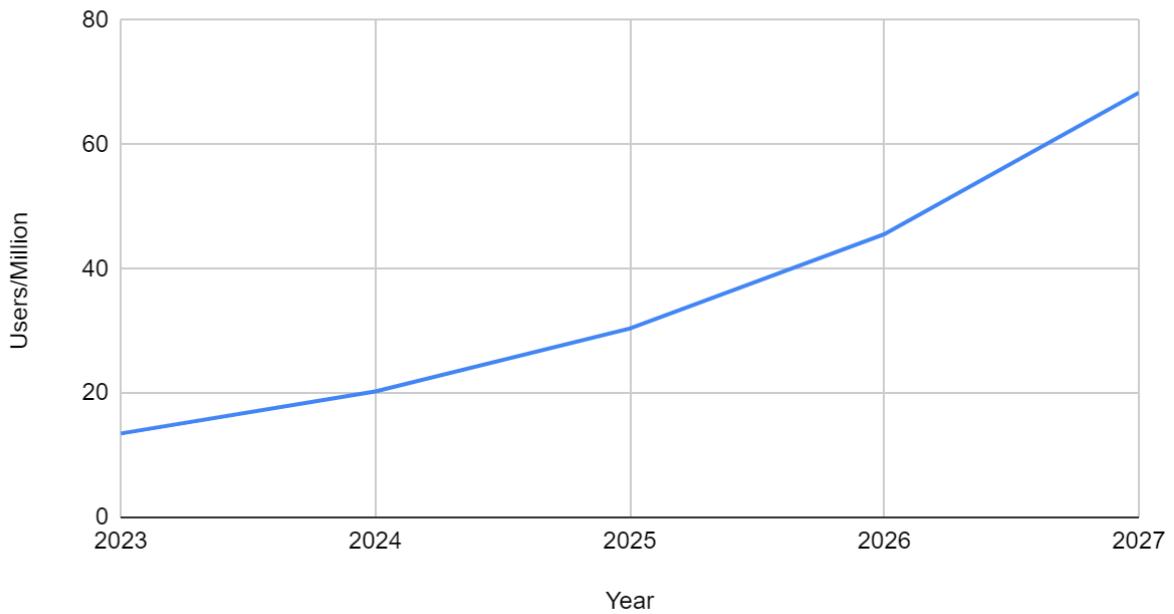


Figure 13: Projected User Growth Data

7.2 Subscription Revenue Projections

Based on current estimates, other companies running similar business models that rely on the “*freemium*” model have a range of 2-5% of total users being paid users (Kumar, 2014). Applying this same percentage, we project an average of 3.5% of our users to be paying subscribers. Conservatively, we then project that 0.5% of these users will be Premium, while the remaining 3% will be Pro-users.

Annual Subscriber Count / Million

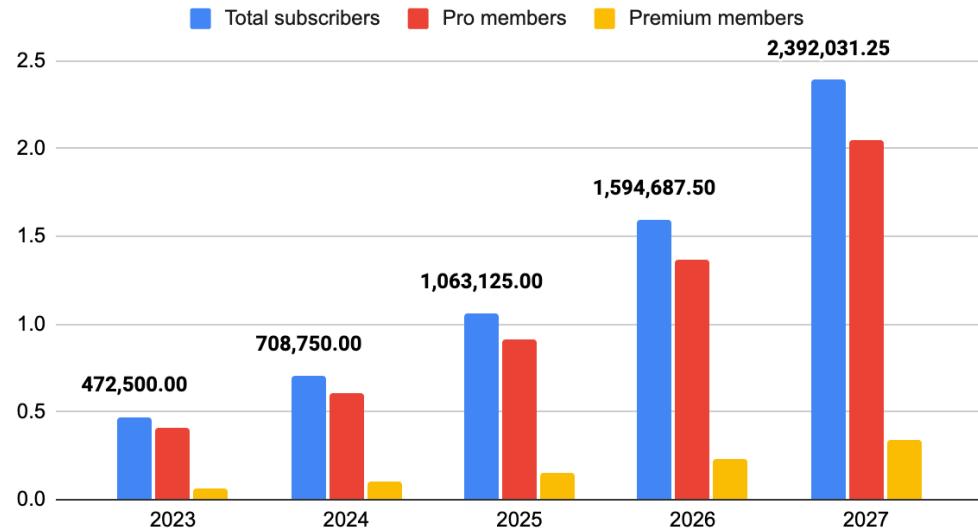


Figure 14: Projected Annual Subscriber Count

As seen below, we project that our subscription revenue will grow healthily from approximately \$6 million to \$30 million over the next 5 years.

Projected Subscription Revenue / Million

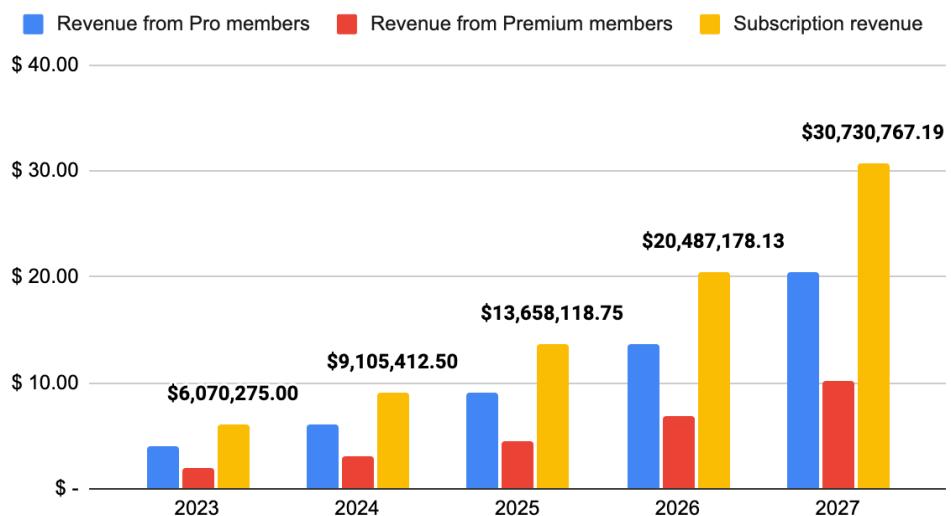


Figure 15: Projected Subscription Revenue

7.3 Advertising Revenue Projections

Currently, advertisements on real estate have a clickthrough rate of 1.08% (Laubenstein, 2022). Assuming that the average cost-per-click for real estate revenue remains consistent at \$1.36 over the next 5 years, we project that our advertising revenue will grow from around \$200,000 to \$1,000,000.

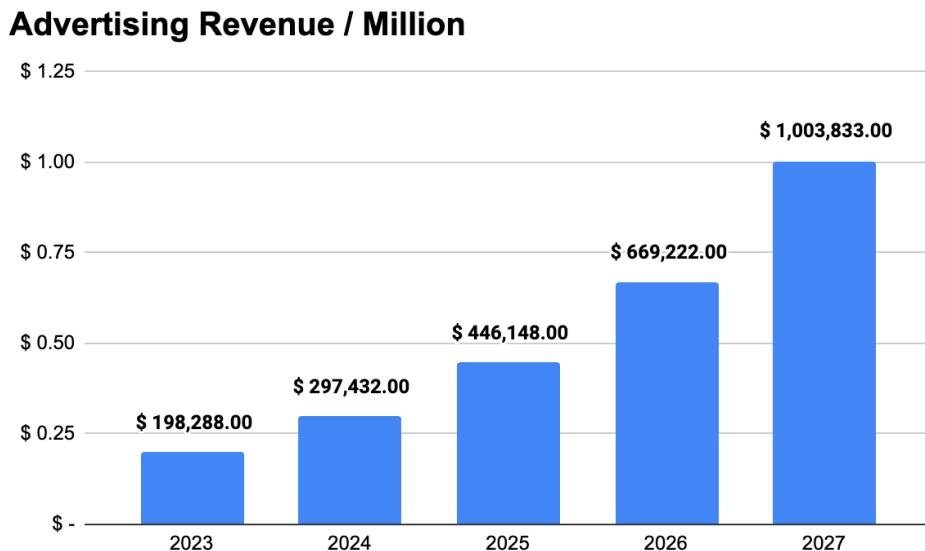


Figure 16: Projected Advertising Revenue

7.4 Combined Pro Forma Revenue Projections

Through our projections, Pro forma revenue streams have been created for the next 5 years based on the 2 key sources of income.

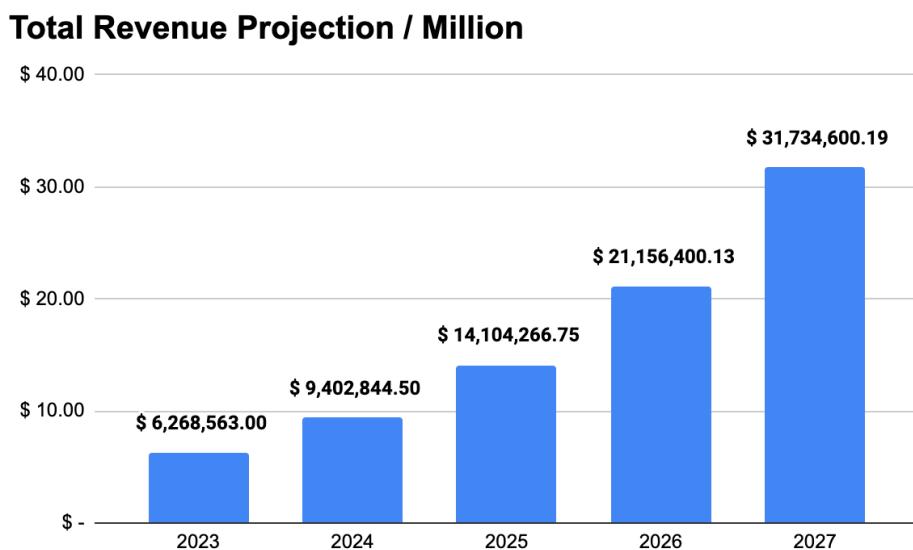


Figure 17: Projected Total Revenue

Furthermore, to be conservative, our team has not factored in the potential revenue that we will earn from establishing partnerships with real estate brokers. This was done deliberately, as we are unable to determine the time required to establish these working partnerships. It will take some time for our start-up to build a strong reputation, which can then be leveraged. We project that this source of income will likely come in within the first three years of business.

It is worth noting that the multiple sources of income provide a healthy diversification benefit, reducing our reliance on a single source of revenue. This provides greater financial stability for the company, reducing the risks of insolvency should one source of revenue be negatively impacted.

8. Risk and Mitigation Strategies

Risk identification and analysis are crucial before the commencement of any startup project. Indeed, every project does contain elements of risk and uncertainty and thus it becomes one of our main priorities to ensure that we take active steps to mitigate the negative repercussions. The following are some examples of risks that could be associated with our project.

8.1 Complexity of feature development leading to delay

As users' needs continue to evolve, our team needs to ensure that the product development process can cater to the flexible nature of the demand. Certain app features are particularly following the standard convention which should be easy and fast to implement. However, upon building new specialised features, technical difficulties might arise which could potentially be a bottleneck to the entire development process and eventually snowball. Our team believes that this risk could be mitigated by following the AGILE process, which is an iterative approach to project management and software development that helps teams deliver value to their customers faster and with fewer headaches (Agile Alliance, 2022). In short, it involves breaking down projects into several phases, and constant collaboration with stakeholders to achieve continuous improvement at every stage. Of course, our team would want to engage in a quality talent recruitment process to ensure we work with the best people possible who are not only knowledgeable in technical skills but also passionate about what we are doing.

8.2 Incoming competitors and product imitation

Virtually in every realm of competitive business and early startup stage, the risk of new competitors with very similar products and services exists. Access to technology and globalisation have indeed lowered the barrier-to-entry for many startup ideas, and ideas are in fact easily replicable provided one has the knowledge to leverage the power that technology confers. We believe that while this is a serious threat, our AGILE development process would mitigate this issue as we are constantly evolving and following what the market actually needs through involving our clients in every single stage of our development process. As such, we are confident that we could stay on top of the competition and leverage network effects to build up our market share.

8.3 Risk of low demand and failure of product-market fit

Indeed, early-stage ideas often face this challenge before it experiences exponential growth. We believe that through multiple rounds of market validation and product validation, we could work towards providing real value to our audiences. Our group is persistent in the goal and flexible in the process. We are ready to embrace technological changes and market changes, as well as pivot our idea if required.

9. Conclusion and Limitations

Ultimately, Waterbnb seeks to fill a large gap in the market. Through the use of data, we seek to provide insights to our users to make more optimal choices. Through this, we hope to reduce the uncertainty in real estate investments and make this investment vehicle more accessible to the average investor.

We must acknowledge that certain planned features have not yet been implemented including the notification system for our investors and landlords. Also, there may be difficulty in initially gaining exposure and traction to using our software.

Considering the large financial cost associated with marketing, the initially suggested figures for the marketing budget may have to be changed. This may require an additional heavy investment from early backers, in order to gain traction.

Regarding the sources of revenue, initially charging commissions on purchases of real estate units might not be possible as it is fairly easy to circumvent the system and go directly towards the company. However, this feature could be considered if the startup makes strategic partnerships with real estate companies.

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