Title: Economic evaluation of the transformation of a residential property into an Airbnb type property

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Introduction

Airbnb was founded in 2007 by two industrial designers; they developed a digital platform dedicated to the supply of accommodations, in which hosts have the option to advertise and contract the rental of their properties with their guests (Airbnb News, 2022).

A rented rooming house such as Airbnb can perceive higher profits in short periods, even in some cases approaching the profits of a hotel room, but with lower infrastructure investment, maintenance costs and permits.

The economic evaluation of the study seeks to confirm from the available information the appropriateness of the conversion. It is not clear whether the hosts who decide to rent their space, when calculating the income per night, consider the value of the property (product of a previous appraisal), since Airbnb calculates the price per night, using parameters such as location, number of bedrooms, maximum occupants, bathrooms, parking and comfort equipment.

Methodology

The property under analysis is a house located in Manantiales Poniente (Figure 1), west of the city of Morelia, Michoacán. The area is upper middle class, has private security and surveillance.

To determine the value of the property, included in the simulation and considered as equity (no financing was requested for its purchase), a real estate appraisal was performed (Table 1), determining that the most representative value is the market value. Therefore, the property has a value of $85,625.61 USD as of April 20, 2022 (Moreno, 2022).

Consequently, the initial investment of the transformation is $89,136.61 USD (property value, $85,625.61 USD and initial adjustments, $3,511.00 USD).

Figure 1 Map of the city of Morelia divided by Colonies (Instituto Municipal de Planeación de Morelia, 2022)

Table 1 Property values according to valuation approaches in USD (Moreno, 2022)

Comparative or market value:	**$85,625.61**
Physical or direct value:	$77,106.99
Residual value:	Not applicable
Value by capitalization of income:	$34,412.86

Methodology

The property offered was named "Casa Moreno" and was available as a complete house (Figure 2), with 3 bedrooms, equipped kitchen, 1 ½ bathrooms, 2 parking spaces, backyard, outdoor furniture, washing machine, iron, cable TV, wifi, basic elements, available 365 days a year for analysis and with a maximum of seven people to accommodate, in addition to accepting pets.

With occupancies of 12, 15, 17, 17, 19 and 20 nights per month and two periods of useful life for the project (10 and 15 years). For the operation of the business, fixed costs (Table 2) and variable costs (Table 3) were quantified.

Figure 2 Baseline ad information on the platform (Airbnb, 2022).

Table 2 Monthly fixed costs of the property per occupancy in USD

Fixed costs for different occupancies	
Nights/month	Monthly fixed cost (FC)
12	$506.51
15	$611.79
17	$681.97
19	$752.16
20	$787.25

Table 3 Monthly variable costs of the property per occupancy in USD

Variable costs for different occupations	
Nights/month	Variable cost (VC)
12	$73.59
15	$85.59
17	$93.20
19	$107.97
20	$119.33

Methodology

In order to know the estimated revenue per night, the economic analysis was performed with three different options, including cleaning fee, service and taxes.

a) Revenue per night, Airbnb

Using an algorithm, the Airbnb platform calculates an average price per night of $96.57 USD or $1,885.00 MXN (Figure 3).

b) Revenue per unit with the break-even point (r)

The revenue per unit or per night (r) was calculated (Table 4), with the break-even point (Q) corresponding to the number of nights it is possible to rent (from 12 to 20), the fixed (FC) and variable (v) costs per show(Tables 2 and 3) with the equation (Arbones, 2009):

$$r = \frac{FC}{Q} + v \quad (1)$$

Previsualiza cuánto pagan los huéspedes

Selecciona cualquier combinación de noches, huéspedes y mascotas para que te mostremos el precio final.

| 1 noche ∨ | 1 huésped ∨ | Sin mascotas ∨ |

$1,200 MXN por 1 noche	$1,200 MXN
Promedio de Precios inteligentes ⓘ	
Tarifa de limpieza para estancias cortas	$200 MXN
Tarifa de servicio para huéspedes	$261 MXN
Impuestos	$224 MXN
Total	**$1,885 MXN**

Figure 3 Breakdown of prices shown on the platform in MXN (Airbnb, 2022).

Table 4 Dynamic revenue per unit, r in USD

Dynamic revenue per unit (r)	
Nights/month	r
12	$115.80
15	$126.37
17	$133.32
19	$147.56
20	$158.69

Methodology

c) Average income per night

As a third option, an average is calculated between the total amount expressed on the Airbnb platform and the break-even point of the occupancies per night (Table 5).

A Minimum Acceptable Rate of Return (MARR) was used, which considered a real interest rate of 3.49% representative of the turn; the inflation rate used, was the average from May 2021 to May 2022, being 6.7131% (BANXICO, 2022); while the risk premium due to its complexity and subjectivity, was 3.1969% average of the financial analysis of two applicable sources of the hotel business (Rivera, 2018) and (Demuner and Lopez, 2017). Therefore:

$$MARR = real\ rate + inflation\ rate + risk\ prime \quad (2)$$

$$MARR = 13.40\%$$

Table 5 Average revenue per night Airbnb and r in USD

Summary revenue per night (Airbnb and r average).	
Nights/month	Per night revenue
12	$106.18
15	$111.47
17	$114.94
19	$122.06
20	$127.63

Methodology

Net Present Value (NPV) (eq. 3) and Internal Rate of Return (IRR) (eq. 4) calculations were used as acceptability criteria.

A positive NPV indicates that the present value of the net income fully covers the cost of the investment (Alvarado, 2015), as well as an IRR greater than the MARR.

$$NPV = \sum_{n=0}^{N} \frac{A_n}{(1+i)^N} = \sum_{n=0}^{N} \frac{A_n}{(1+MARR)^N} \qquad (3)$$

$$NPV = \sum_{n=0}^{N} \frac{A_n}{(1+MARR)^N} = 0 \quad (4)$$

Donde:
NPV= Net Present Value
A_n= net cash flow at the end of the period N
i= MARR (13.40%)
N= service life of the project (10 and 15 years)

Results

After the application of the proposed methodology, the results are shown for the three options, depending on the income per night.

a) Revenue per night, Airbnb

For this first option, it is essential to individually calculate the NPV (Table 6), with Eq. 3 and the IRR (Table 7), using Eq. 4, for each number of nights rented per month (12, 15, 17, 19 and 20), since the income per night provided by Airbnb is a static profit and when calculating net cash flows, the fixed and variable expenses are directly proportional to the number of nights, as shown in Tables 6 and 7.

Results

Table 6 Summary of 10- and 15-year NPV analysis with Airbnb's recommended static income in USD.

N	Night /month	NPV		
Airbnb recommendation $96.57 USD per night				
Useful life 10 years				
10	12	-$29,031.08	< 0	Rejected
10	15	-$17,980.86	< 0	Rejected
10	17	-$10,589.25	< 0	Rejected
10	19	-$3,656.62	< 0	Rejected
10	20	-$444.62	< 0	Rejected
Useful life 15 years				
15	12	-$46,710.30	< 0	Rejected
15	15	-$33,610.69	< 0	Rejected
15	17	-$24,848.21	< 0	Rejected
15	19	-$16,629.84	< 0	Rejected
15	20	-$12,822.14	< 0	Rejected

Table 7 Summary of 10 and 15 year IRR analysis with Airbnb's recommended static income.

N	Night /month	IRR	MARR (13.40%)	
Airbnb recommendation $96.57 USD per night				
Useful life 10 years				
10	12	7.221%	< 13.40%	Rejected
10	15	9.575%	< 13.40%	Rejected
10	17	11.148%	< 13.40%	Rejected
10	19	12.623%	< 13.40%	Rejected
10	20	13.306%	< 13.40%	Rejected
Useful life 15 years				
15	12	1.532%	< 13.40%	Rejected
15	15	5.306%	< 13.40%	Rejected
15	17	7.585%	< 13.40%	Rejected
15	19	9.596%	< 13.40%	Rejected
15	20	10.495%	< 13.40%	Rejected

Results

b) Revenue per unit with the break-even point (r)

For the second option, the revenue per night (r) obtained through the break-even point (eq. 1), it is not necessary to estimate individually the NPV and IRR (Table 8) for each number of nights rented per month, since the net cash flow is direct.

c) Average revenue per night

As in option b), it is possible to summarize the net cash flows for the two life periods (Table 9).

Table 8 Summary of NPV and IRR analysis at 10 and 15 years with dynamic revenue per unit (r) in USD

Calculated dynamic revenue per unit (r)			
N		NPV	
10	$21,223.15	> 0	Accepted
15	$23,613.86	> 0	Accepted
N	IRR	MARR (13.40%)	
10	17.300%	> MARR	Accepted
15	17.306%	> MARR	Accepted

Table 9 Summary analysis of NPV and IRR at 10 and 15 years with average revenue per night (Airbnb and r) in USD.

Average revenue per night (Airbnb and r)			
N		NPV	
10	$2,641.57	> 0	Accepted
15	-$2,351.83	< 0	Rejected
N	IRR	MARR (13.40%)	
10	13.907%	> MARR	Accepted
15	12.968%	< MARR	Rejected

Results

In order to have greater certainty in the analysis and to corroborate that it is appropriate to consider the value of the property within the initial investment, a financial run was made, where the start-up expenditure is clearly equal to the initial adjustments ($3,511.00 USD), i.e., disregarding the value of the property obtained by the appraisal.

Showing that the NPV (Table 10) is disproportionate with reference to the investment, the NPV rises to $109,239.47 USD in comparison with the maximum value of $23,613.86 USD of the analysis that does consider it. The same happens with the IRR (Table 11), obtaining a maximum of 283.627%, 31.17 times higher than the proposal (13.40%).

Table 10 Summary of 10- and 15-year NPV analysis with the three income per night: a), b) and c); not including the property value in USD.

N	NPV		
a) Revenue per night, Airbnb (average of NPVs)			
10	$48,936.57	> 0	Accepted
15	$58,701.37	> 0	Accepted
b) Revenue per unit with the break-even point (r)			
10	$82,500.21	> 0	Accepted
15	$109,239.47	> 0	Accepted
c) Average revenue per night (Airbnb and r)			
10	$63,918.63	> 0	Accepted
15	$83,273.77	> 0	Accepted

Table 11 Summary of 10- and 15-year IRR analysis with the three nightly incomes: a), b) and c); excluding property value

N	IRR		
a) Revenue per night, Airbnb (Average IRR)			
10	283.626%	> 13.40%	Accepted
15	283.627%	> 13.40%	Accepted
b) Revenue per unit with the break-even point (r)			
10	283.098%	> 13.40%	Accepted
15	283.099%	> 13.40%	Accepted
c) Average revenue per night (Airbnb and r)			
10	242.545%	> 13.40%	Accepted
15	242.548%	> 13.40%	Accepted

Conclusions

The results obtained from the financial run through the NPV and IRR, show that, in a first moment, where the useful life is equal to 10 years, acceptability is shown in options a) and b); as well as in option b) when the useful life is 15 years; simplifying, we can answer that it is convenient to transform a property with a housing vocation in Airbnb, if fixed and variable costs are considered.

The analysis discarded at both times (10 and 15 years), the income per night, which yields the Airbnb platform with the intelligent algorithm; the most likely reason lies in the exclusion of the costs mentioned above, because the profits are not real and it would be necessary to keep the property rented for the entire month; to prorate the outgoings for the service of the property.

Conclusions

The MARR used is moderate, but representative of the hotel and lodging business, if it were imperative to increase it, we would have to consider extending the useful life of the business beyond 15 years and carefully analyze inflation, micro and macroeconomic conditions, as well as emerging businesses of the same type.

Airbnb in spite of being a rising business, where more and more owners undertake the adventure of being hosts, begins to show signs of market saturation, if to such context we add the national and international conditions, which momentarily, show a hindered future, at least in the immediate, it is prudent to invite the management of production assets with caution.

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