

NYC REAL ESTATE CASE STUDY

AD 571 BUSINESS ANALYTICS FOUNDATION

ASSIGNMENT 5

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CONTENTS

Executive Summary 2

Solver Analysis 3

Assumptions..... 3

Insights 6

Conclusion 6

Appendices..... 7

Reference 9

Executive Summary

Bushwick, renowned for its vibrant street art and a burgeoning hub for artists, has transformed into one of Brooklyn's most dynamic neighborhoods (*Appendix 4*). The Solver model developed in Excel optimizes the financial and operational aspects of starting a real estate company in Bushwick, aiming to maximize net present value (NPV) profit. It adjusts key variables, such as the number of employees and commission rates, while incorporating a detailed cost structure including office space, employee salaries, and rent and utilities. This approach ensures alignment with budget constraints and uses the GRG Nonlinear method to find the optimal solution for financial sustainability and growth potential in Bushwick's real estate market.

The model is based on several assumptions, such as the average price per square foot for commercial space and the impact of market penetration rates. Using data filtered through RStudio, the average sale price of \$372 per square foot was identified, and monthly rent was calculated accordingly. Additionally, the model assumes a base market penetration rate of 5.5%, with potential increases through strategic hiring and commission adjustments, ultimately projecting a market penetration rate of 7.0%.

Considering the present scenario and the optimized output, Bushwick offers lower operational and initial costs, making it a cost-effective choice for starting operations. The strategic hiring plan and effective commission management are essential for capturing market share quickly. Financially, Bushwick shows a healthy NPV profit and a solid internal rate of return (IRR), indicating strong potential for success. The recommendation is to establish the real estate company in Bushwick due to its cost efficiency, scalability, financial viability, and promising market penetration prospects.

Solver Analysis

Solver Model Construction in Excel:

The Solver model is created to optimize the financial and operational aspects of establishing a real estate company in Bushwick, aiming to maximize the net present value (NPV) profit. The model adjusts variables such as the number of employees and the commission rate (*Appendix 3*). The model incorporates a detailed cost structure, including office space expenses and employee salaries, factoring in base costs, additional costs per employee, and rent and utilities. It calculates total costs on annual, quarterly, and monthly bases to ensure alignment with budget constraints. Solver uses the GRG Nonlinear method, ideal for smooth nonlinear problems, while ensuring variables remain non-negative and within specified operational limits. This structured approach ensures the model finds an optimal solution for financial sustainability and growth potential in Bushwick's real estate market.

Assumptions

Average Price per Square Foot for Commercial Space

Using RStudio, data filtered for commercial property sales in 2021 indicated an average sale price of \$372 per square foot. The optimization model then calculates the monthly rent per square foot based on 1.50% of this sale price. This results in a calculated monthly rent of \$5.58 per square foot for office space. This detailed calculation ensures that the rent cost is accurately reflected in the financial planning for the real estate company (*Appendix 3*).

Market Penetration

The model begins with a base market penetration rate of 5.5%, with each additional employee contributing a 0.5% increase in this rate. Adjustments in commission rates also affect market penetration, where every 1.5% change in commission can alter the market penetration rate. The base sales commission is set at 5%, and each 0.1% change in commission impacts market penetration (*Appendix 3*). The forecasted market penetration is set at 7.0%, indicating a projected increase due to strategic actions and employee additions.

Office Costs

The initial cost for office space is \$250, with an additional cost of \$125 for each new employee. Office space is required at a cost of \$500. The average price for commercial space is \$372 per square foot. Rent and utilities cost 1.5% per square foot monthly, translating to \$5.58 monthly per square foot and \$33,500 annually (*Appendix 3*). This detailed cost structure highlights the significant expenses involved in setting up and operating an office in Bushwick.

Employee Costs

Employee costs include an annual salary of \$65,000 per employee, with the initial plan including 2 employees. The payroll budget is set at \$130,000 annually, which translates to a monthly payroll of \$10,833. This ensures that the company can sustain its workforce within the defined budget, highlighting the importance of maintaining operational efficiency (*Appendix 3*).

Operating Budget

The total annual cost for office and payroll is \$163,500, with a total monthly cost of \$13,625. This fits within the operating budget constraint of \$15,000, ensuring that the company remains financially sustainable. Effective cost management is crucial for maintaining the operating budget within the specified limits.

Commission Strategy

The commission rates are set between 4% and 5%, with the current rate at 4.67%. This range ensures competitive pricing while maintaining profitability. The model demonstrates that adjusting commission rates within this range can optimize market penetration. Lowering commission rates slightly could lead to increased market share, as reflected in the model, but must be balanced against maintaining profitability.

Net Present Value (NPV) and Profitability

By using the forecast data obtained using the regression model from RStudio for the next 8 quarters (*Appendix 2*). The NPV analysis shows a positive forecast, with NPV revenue significantly outweighing the costs. The internal rate of return (IRR) is set at 6% annually, reflecting a healthy return on investment. The forecasted NPV profit of \$3,263,706 indicates strong financial health and viability of the business model, making it a promising venture (*Appendix 3*).

Strategic Hiring

The model suggests that strategic hiring will be beneficial, as additional employees positively impact market penetration. Each new employee contributes to market reach and helps

achieve higher sales volumes. This insight emphasizes the importance of workforce expansion in the company's growth strategy.

Insights

Considering the present scenario and optimizing the output using Solver, It is evident that Bushwick offers lower operational and initial costs, which is crucial for a new business aiming to manage its budget effectively. The lower office space costs and rent/utilities make it a cost-effective choice for starting operations. Additionally, the initial plan in Bushwick includes hiring two employees, which allows for better market penetration and scalability from the outset. This strategic hiring plan is essential for capturing a significant market share quickly. Financially, Bushwick shows a healthy Net Present Value (NPV) profit and a solid Internal Rate of Return (IRR), indicating a strong return on investment and making it a financially sound choice. The higher forecasted market penetration rate in Bushwick further provides a solid foundation for capturing market share quickly, ensuring that the company can establish a robust presence (*Redfin, n.d.*) in the real estate market right from the start.

Conclusion

The optimization output provides a comprehensive framework for starting a real estate company in Bushwick, emphasizing strategic hiring, effective commission management, and cost control to achieve financial and market penetration goals. Positive NPV and IRR ensure long-term profitability and growth. The cost structure and forecasted financial health demonstrate strong potential for success. I recommend starting the real Estate company in Bushwick for its cost efficiency, scalability, financial viability, and market penetration prospects.

Appendices

Appendix 1: (Average price per square foot commercial real estate sale price calculated using RStudio)

	SaleYear	TotalSales	Totalsqft	Avg_Price_per_sqft_Bushwick
3	2005	17506714	269646	64.92481
4	2006	20330606	137839	147.49531
5	2007	7882099	25486	309.27172
6	2008	11146862	75811	147.03489
7	2009	15940687	80521	197.96931
8	2010	4027500	30930	130.21339
9	2011	10802500	83309	129.66786
10	2012	22201574	153545	144.59327
11	2013	14805000	54989	269.23567
12	2014	46785500	232437	201.28250
13	2015	85567511	339967	251.69358
14	2016	47032000	63796	737.22490
15	2017	27443355	53952	508.66242
16	2018	96742124	325823	296.91619
17	2019	36663750	82323	445.36460
18	2020	96195000	166915	576.31130
19	2021	50899325	136744	372.22346

Appendix 2: (Regression forecast for residential real estate sales in Bushwick obtained for next 8 quarters using RStudio)

	fit	lwr	upr
1	125579963	66930237	184229689
2	143439909	84790183	202089635
3	124782584	66132857	183432310
4	174060758	115411032	232710484
5	134451064	71751869	197150258
6	152311010	89611815	215010204
7	133653685	70954490	196352879
8	182931859	120232664	245631053

Appendix 3: (Solver in Excel for Strategic Insights on Opening a Real Estate Company in Bushwick)

	A	B	C	D	E	F	G	H	I	J
1	MARKET PENETRATION			FORECAST					MONTHLY COSTS	
2	Base market penetration	5.50%		Quarter	Forecast (total sale)	Forecasted (revenues)			1	\$ 13,625
3	Base sales commission	5%		1	125579963	410228			2	\$ 13,625
4	MP increase step per employee	0.50%		2	143439909	468570			3	\$ 13,625
5	MP change factor by commission change	1.50		3	124782584	407623			4	\$ 13,625
6	Commission charge change step	0.10%		4	174060758	568598			5	\$ 13,625
7	Commission	4.67%		5	134451064	439207			6	\$ 13,625
8	Market penetration factual	7.0%		6	152311010	497549			7	\$ 13,625
9				7	133653685	436602			8	\$ 13,625
10	OFFICE			8	182931859	597577			9	\$ 13,625
11	Office space - base	250		CONSTRAINTS					10	\$ 13,625
12	Office space - additional per employee	125		Commission	>=	4.00%			11	\$ 13,625
13	Office space factual (required)	\$ 500		Commission	<=	5.00%			12	\$ 13,625
14	Avg price per sq.foot commercial	\$ 372		Employees	>=	0			13	\$ 13,625
15	Rent & Utilities per sq.foot monthly	1.50%		Employees	<=	3			14	\$ 13,625
16	Rent & Utilities - monthly per sq.foot	\$ 5.58		Employees	Int	Int			15	\$ 13,625
17	Rent & Utilities total yearly	\$ 33,500		Operating budget	<=	\$ 15,000			16	\$ 13,625
18	Rent & Utilities total quarterly	\$ 8,375							17	\$ 13,625
19	Rent & Utilities total monthly	\$ 2,792							18	\$ 13,625
20									19	\$ 13,625
21	EMPLOYEES			NPV					20	\$ 13,625
22	Employee salary yearly - given	\$ 65,000		IRR Annual	6%				21	\$ 13,625
23	Employees	2		IRR Quarterly	1.50%				22	\$ 13,625
24	Payroll budget yearly	\$ 130,000		IRR Monthly	0.500%				23	\$ 13,625
25	Payroll budget quarterly	\$ 32,500		NPV Revenue	\$3,571,124				24	\$ 13,625
26	Payroll budget monthly	\$ 10,833		NPV Costs	\$307,419					
27				NPV Profit	\$3,263,706	Maximize				
28	TOTAL COST (office & payroll)									
29	Total cost per year	\$ 163,500								
30	Total cost per quarter	\$ 40,875								
31	Total cost per month	\$ 13,625	<= 15000	constraint						
32	Operating budget monthly - given	\$ 15,000								
33										

Appendix 4: (Vibrant Bushwick street art)



Stories behind the street art of Bushwick collective, NYC

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Creator: Anita Sane
Copyright: © Anita Sane



Brooklyn Bushwick neighborhood
New York City street art graffiti...

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Reference

Redfin. (n.d.). Bushwick, New York housing market: House prices & trends. Redfin.com.

<https://www.redfin.com/neighborhood/208206/NY/New-York/Bushwick/housing-market>