SKYLINE CAPITAL PARTNERS

Strategic Investments

Esha Deo

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Project Mandate

Skyline Capital Partners is evaluating the development of a Class B apartment building and aims to determine the **best market** and **optimal unit mix** to maximize profitability while managing risk.

This will be done through:

1. **Market Selection Analysis**
   - Utilize **historical data** to analyze **key performance indicators (KPIs)** and **risk factors** in each city.
   - Assess **trade-offs** between risk and return to identify the most favorable market for investment.

2. **Unit Mix Optimization**
   - Use **simulation-based modeling** to determine the **optimal ratio** of Studio and 1-Bedroom apartments in the selected market.
   - Account for **constraints** such as **total unit count and available space.**
   - Determine **rent pricing** by factoring in **demand constraints**.

These insights will enable Skyline Capital Partners to make a **risk-aware, data-driven investment decision**, ensuring optimal market entry and portfolio growth.

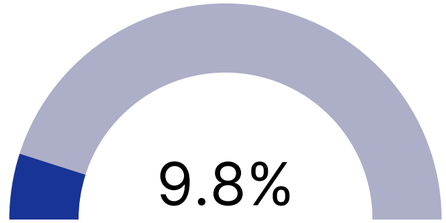
Market Analysis Overview

Highest NOI

$1,108,207

New Hope

Best Rental Demand



Vacancy Rate

Fairview

Fairview

Low-Risk, Stable Returns

New Hope

High-Risk, High Reward

Springfield

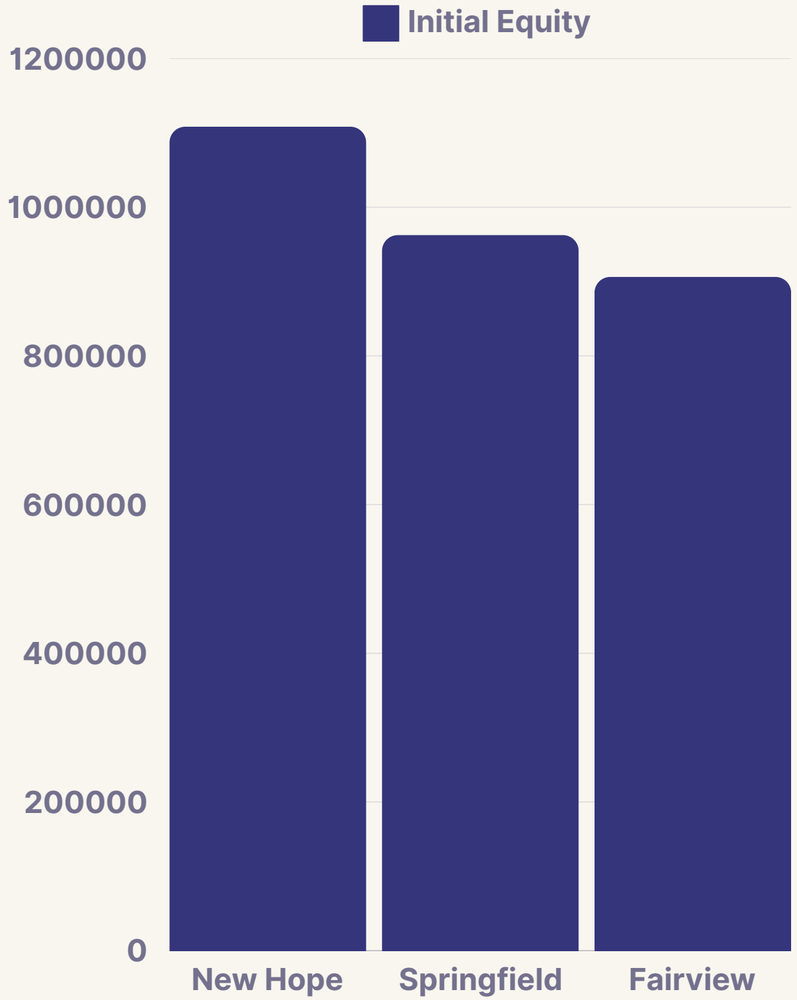
Moderate Risk, Low Reward

New Hope Leads in Profitability with the Highest NOI of $11,082,07

New Hope generates **22.3% more** NOI than Fairview, making it the most profitable rental market.

Fairview earns **6.2% less** than Springfield, showing that its rental income is the lowest.

New Hope is the best choice for maximizing rental income, making it ideal for investors focused on high cash flow.

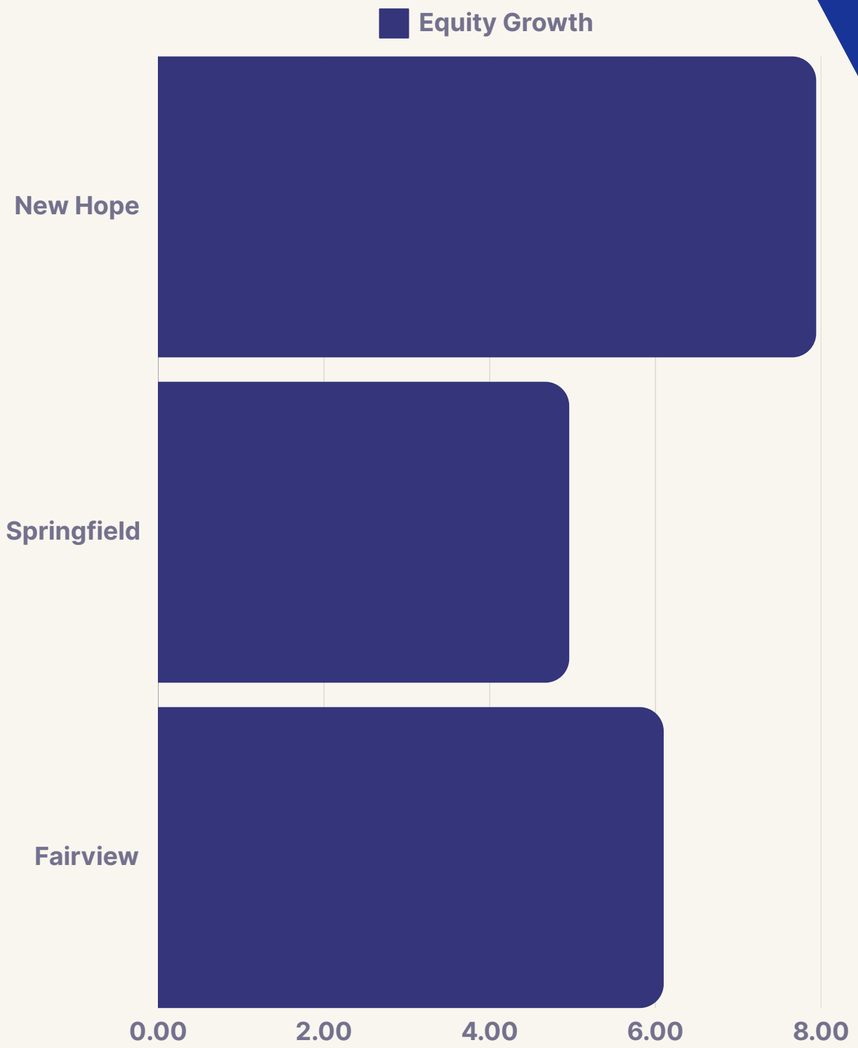


New Hope Achieves the Highest Equity Growth at 7.94%

New Hope's equity growth is **30.1% higher** than Fairview's, and **60.1% higher** than Springfield's.

New Hope is the best for long-term property appreciation

Fairview grows steadily but at a much lower rate than New Hope

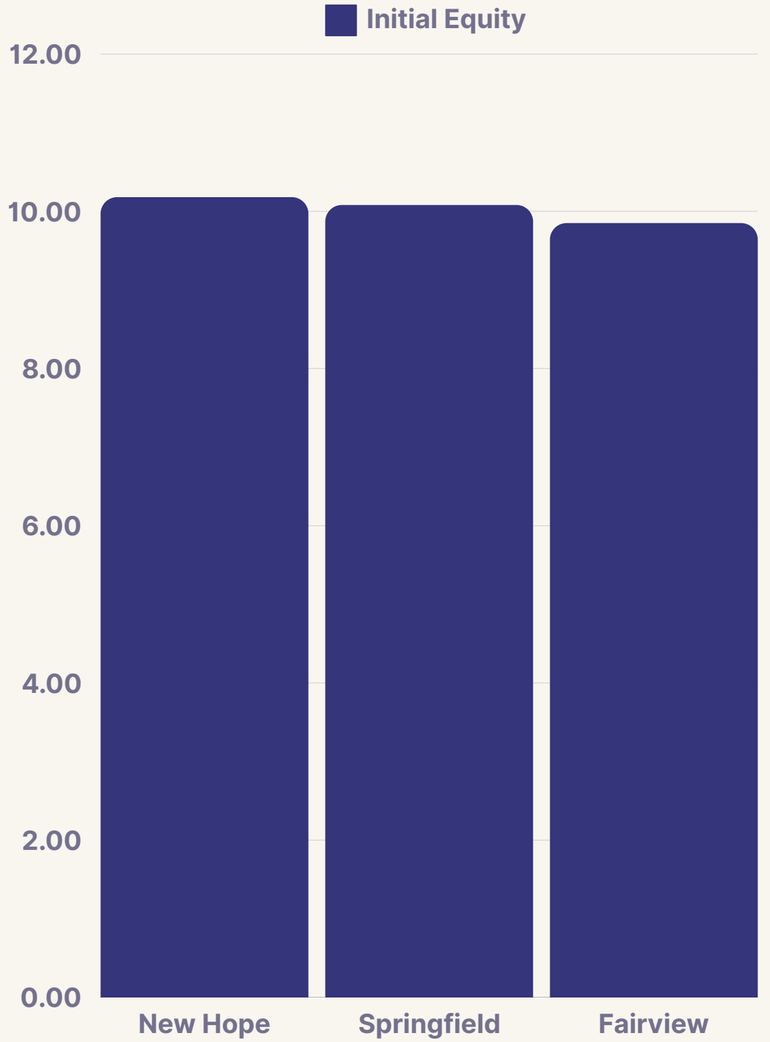


New Hope’s Profitability Offset by a 10.18% Vacancy Challenge

New Hope’s vacancy rate is **3.3% higher** than Fairview’s, making it harder to fill rental units.

Fairview has the **strongest rental demand** → It’s easier to rent out properties here.

New Hope has a higher vacancy risk, meaning investors may face longer rental gaps.

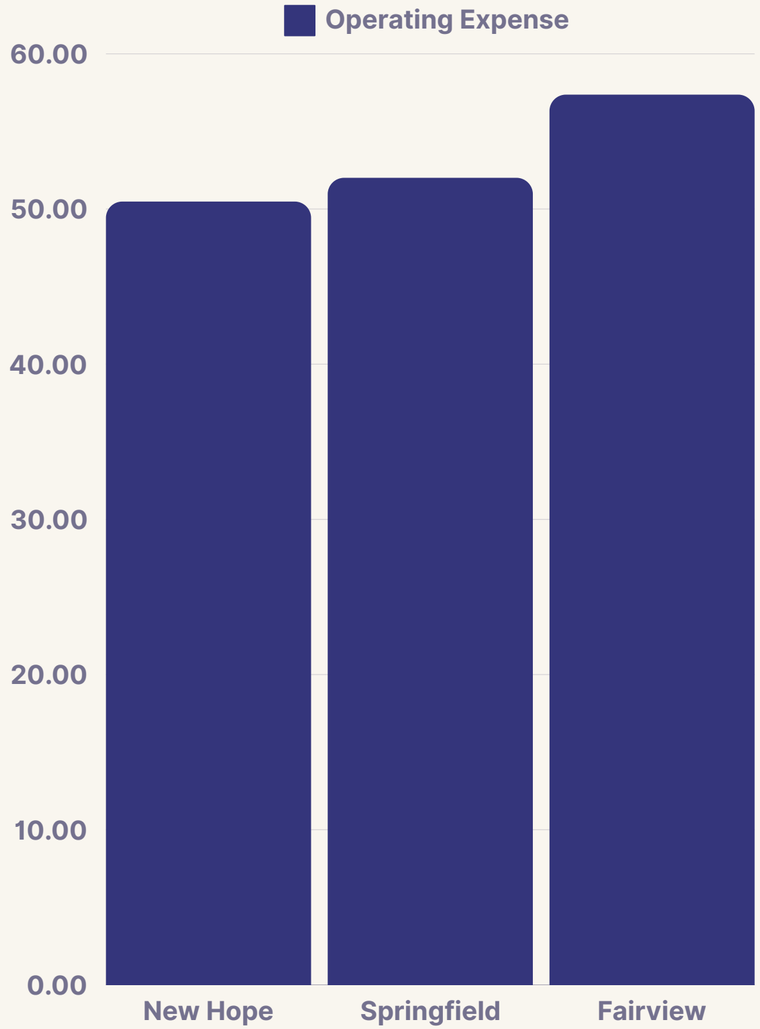


Fairview’s Low Cost Inefficiency Weakens Its Investment Appeal

New Hope is the most cost-efficient city, spending only **50.48%** of its revenue on expenses.

Fairview has the worst cost efficiency, with **57.37%** of its revenue going to expenses.

Springfield is in the middle, but still less efficient than New Hope.



Risk & Stability Assessment Across Markets

Metric	Fairview	New Hope	Springfield
NOI Standard Deviation ($)	385,123.85	481,472.90 (📈 +25.0%)	413,986.98 (📈 +7.5%)
Vacancy Rate Std Dev (%)	3.00	2.83 (📉 -5.7%)	2.89 (📉 -3.7%)
Operating Expense CV	0.074	0.087 (📈 +17.6%)	0.083 (📈 +12.2%)

Fairview (Most Stable)

- Lowest NOI Volatility ($385K) → Steady revenue.
- Highest Vacancy Volatility (3.00%) → Fluctuating occupancy.
- Lowest Operating Expense CV (0.074) → Cost-efficient.

New Hope (High Risk)

- Highest NOI Volatility ($481K, +25%) → High income fluctuations.
- Lowest Vacancy Volatility (2.83%, ⬇ -5.7%) → Stable leasing.
- Highest Operating Expense CV (0.087, ⬆ +17.6%) → Cost fluctuations.

MOO

Challenges:

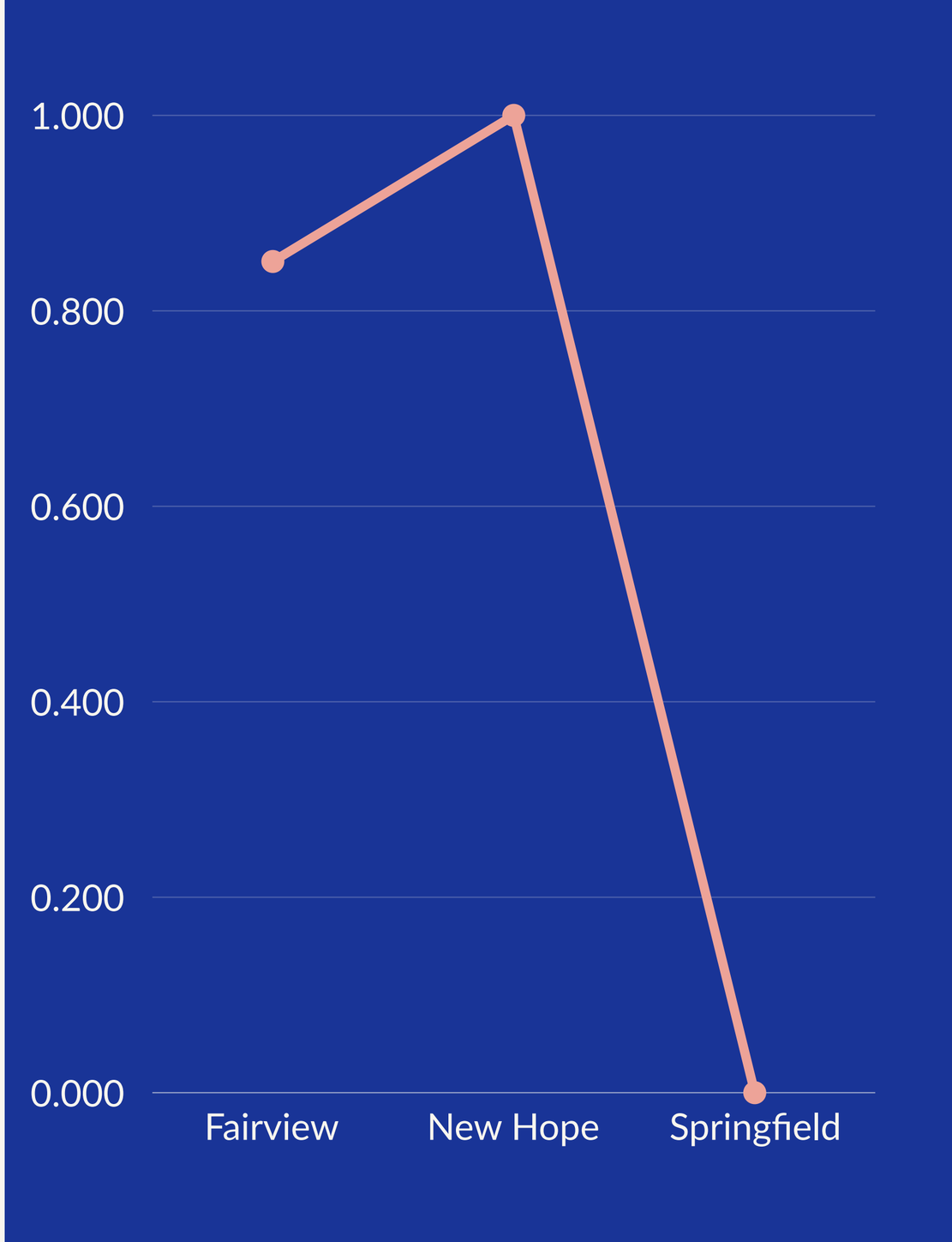
This evaluates the risk-adjusted return for each market, balancing profit potential with risk exposure. A higher MOO Score means the market offers strong returns with acceptable risk.

MOO score Analysis

- New Hope (MOO Score: 1.00) – The Optimal Choice
- ✅ Best balance between profit potential and manageable risk.

- 2️⃣ Fairview (MOO Score: 0.85) – A Strong Contender
- ✅ Ideal for risk-averse investors, but slightly lower profit potential.

- 3️⃣ Springfield (MOO Score: 0.00) – Not a Viable Investment
- ❌ Does not provide a competitive balance of risk and reward.



Process Overview

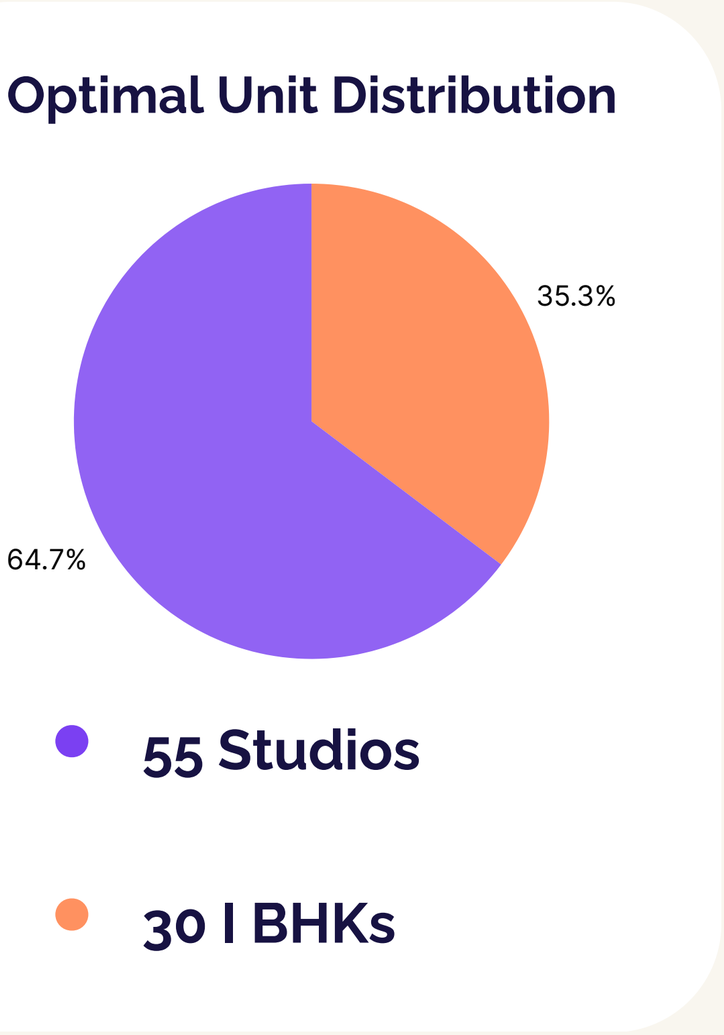
Key Constraint Considerations

- A maximum of 85 apartments could be allocated.
- Floor Space Limitation: Studios = 800 sqft, 1-Bedrooms = 1200 sqft, Total capacity ≤ 80,000 sqft.
- Each rent range has a cap on maximum allowable leases (higher rents reduce demand).
- The model could only select one rent level for Studios and one for 1-Bedrooms.

How the Optimization Was Done

- Defined decision variables: Number of Studios & 1-Bedrooms to allocate at each rent level.
- Developed a Linear Programming (LP) model to maximize profit while adhering to constraints.
- Ensured rent selection aligned with market demand caps (e.g., high rents reduce lease potential).
- Final allocation was chosen based on the highest profit outcome.

Optimal Unit Allocation



Studios Dominate the Allocation (55 Units)

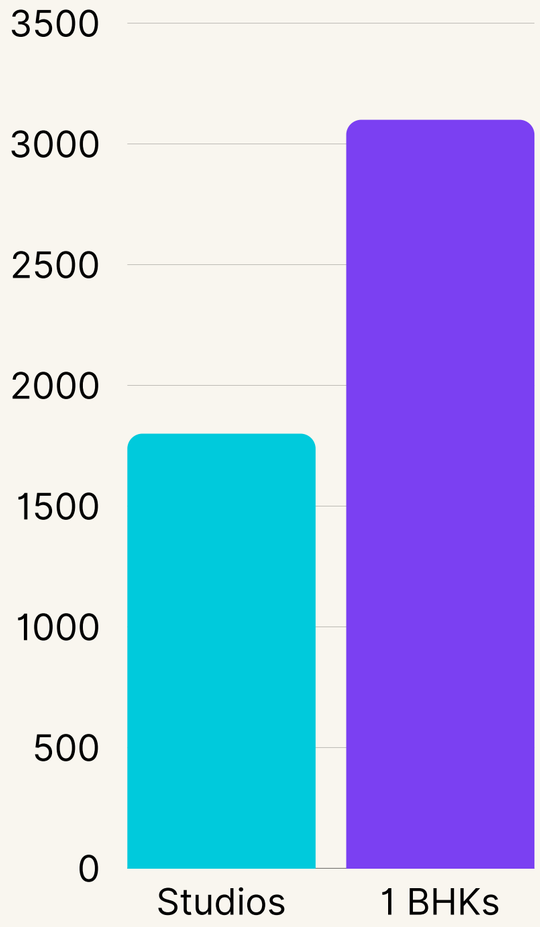
Lower rent pricing increases demand, allowing for more leases.

Fewer 1-Bedroom Units (30 Units) at Higher Rents

Higher-priced 1-bedroom units contribute more revenue per lease.

Studios drive steady leasing, while 1-bedrooms boost total revenue.

Unit MixOptimization Overview



Studios

$ 1500- 1800

1 BHKs

$ 2800 - 3100

Studios Priced at Lower-Mid Range ($1,500 - $1,800). Keeps demand high while ensuring maximum occupancy.

1-Bedrooms Priced at Higher Range ($2,800 - $3,100). Higher pricing maximizes per-unit revenue despite fewer leases

Optimized Pricing Ensures Profit Maximization

Total Profits

Optimal Profits in Simulation

$99,58,00

Total Annual Profit: $995,800

The selected unit mix and rent levels optimize occupancy and revenue generation.

Lower-tier studios keep demand strong, while premium 1-bedrooms drive revenue.

This hybrid pricing approach optimizes total profit without exceeding market constraints.

Final Recommendation: Optimal Selection

- New Hope is the Best Investment Choice
- 55 Studios and 30 1BHKs maximize profits
- Pricing studios at $1800 and 1 BHKs at $3100

Appendix

Esha Deo

```python
# aggregate financials data by city
financial_summary = financials_df.groupby('City').agg(
    avg_noi=('Net Operating Income', 'mean'),
    avg_vacancy= ('Vacancy Rate', 'mean'),
    avg_op_exp_ratio= ('Operating expense ratio', 'mean'),
).reset_index()
```

[24] ✓ 0.0s Python

```python
# calculating equity growth
equity_df['Equity Growth (%)'] = ((equity_df['Equity Reversion'] - equity_df['Initial Equity Investment']) / equity_df['Initial Equity Investment']
```

[25] ✓ 0.0s Python

```python
#aggregation equity data by city
equity_summary = equity_df.groupby('City').agg(
    avg_equity_growth=('Equity Growth (%)', 'mean')
).reset_index()
```

[26] ✓ 0.0s Python

+ Code + Markdown

```python
# merging financials and equity
market_analysis = pd.merge(financial_summary, equity_summary, on='City')
```

[27] ✓ 0.0s Python

```python
print(market_analysis)
```

[28] ✓ 0.0s Python

```
          City       avg_noi  avg_vacancy  avg_op_exp_ratio  avg_equity_growth
0     Fairview  9.061587e+05     9.857040         57.371485           6.099268
1     New Hope  1.108207e+06    10.177771         50.482743           7.941389
2  Springfield  9.623995e+05    10.079560         52.012729           4.963281
```

```python
# Compute Total Risk Exposure as a weighted sum of different volatilities
tradeoff_analysis["Total Risk Exposure"] = (
    tradeoff_analysis["noi_volatility"] * 0.5 +
    tradeoff_analysis["vacancy_volatility"] * 0.3 +
    tradeoff_analysis["op_exp_ratio_volatility"] * 0.2
)
```

```python
# Compute MOO Score (Risk-Adjusted ROI)
tradeoff_analysis["MOO Score"] = (
    tradeoff_analysis["ROI"] / tradeoff_analysis["Total Risk Exposure"]
)
```

```python
# Normalize the MOO Scores (Scaling between 0-1 for comparison)
tradeoff_analysis["MOO Score"] = (tradeoff_analysis["MOO Score"] - tradeoff_analysis["MOO Score"].min()) / (
    tradeoff_analysis["MOO Score"].max() - tradeoff_analysis["MOO Score"].min()
)
```

+ Code + Markdown

```python
print(tradeoff_analysis[["City", "ROI", "Total Risk Exposure", "MOO Score"]])
```

```
          City       ROI  Total Risk Exposure  MOO Score
0     Fairview  6.135842        192563.677724   0.850494
1     New Hope  7.998054        240738.179077   1.000000
2  Springfield  4.995328        206995.228909   0.000000
```

```
selected_bedroom_rent = [r for r in rent_levels if bedroom_rent_selection[r].varValue == 1][0]
total_profit = model_dynamic.objective.value()
```

4] ✓ 0.0s

```
# Prepare DataFrame for output
results_df = pd.DataFrame({
    "Rent Level": rent_levels,
    "Optimal Studios": [optimal_studios[r] for r in rent_levels],
    "Optimal 1-Bedrooms": [optimal_bedrooms[r] for r in rent_levels],
})
```

5] ✓ 0.0s

```
# Print summary of selected rent levels and total profit
results_summary = {
    "Selected Studio Rent Level": selected_studio_rent,
    "Selected 1-Bedroom Rent Level": selected_bedroom_rent,
    "Total Annual Profit": total_profit,
    "studios": optimal_studios,
    "1 bhk": optimal_bedrooms
}
results_summary
```

6] ✓ 0.0s

```
{'Selected Studio Rent Level': '1500-1800',
 'Selected 1-Bedroom Rent Level': '2800-3100',
 'Total Annual Profit': 995800.0,
 'studios': {'<1500': 0,
  '1500-1800': 55,
  '1800-2100': 0,
  '2200-2500': 0,
  '2500-2800': 0,
  '2800-3100': 0},
 '1 bhk': {'<1500': 0,
  '1500-1800': 0,
  '1800-2100': 0,
  '2200-2500': 0,
  '2500-2800': 0,
  '2800-3100': 30}}
```