An Analytical Study of Data Science Project on President Heights: Entrepreneur Perception for Nagpur City

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Abstract

This research paper presents an analytical study of a data science project aimed at understanding the perception of entrepreneurs in Nagpur City toward President Heights, a premium mixed-use real estate development. The study explores how local business owners evaluate the project's location, infrastructure, pricing, and investment potential in the context of their operational needs and market strategies. Primary data was collected through structured surveys and interviews with over 100 entrepreneurs across various sectors including retail, IT, manufacturing, and services. Using data science tools such as sentiment analysis, clustering, and regression modeling, the research identifies key factors influencing investment decisions and business confidence. The findings reveal that while most entrepreneurs view President Heights positively for its strategic location and brand value, concerns remain around affordability and space customization. This study not only highlights the potential of data-driven decision-making in real estate planning but also provides actionable insights for developers seeking to align their offerings with the evolving needs of the entrepreneurial ecosystem in emerging cities like Nagpur.

Keywords: Entrepreneurial perception, President Heights, mixed-use development, real estate investment, Nagpur City, data science, sentiment analysis

1. Introduction

In recent years, data science has emerged as a vital tool for decision-making in business, marketing, real estate, and public policy. This project explores the application of data science in understanding entrepreneurial perceptions toward a residential-commercial project named President Heights located in Nagpur City. The study specifically examines how local entrepreneurs perceive investment potential, accessibility, infrastructure, and ROI (Return on Investment) of this real estate development.

2. Objectives of the Study

- To analyze how entrepreneurs in Nagpur perceive the viability and profitability of President Heights.
- To identify the factors influencing entrepreneurs' decisions to invest in or avoid the project.
- To apply data science techniques such as sentiment analysis, clustering, and visualization in interpreting survey data.
- To provide recommendations for real estate developers and urban planners based on findings.

3. Literature Review

In recent years, data science has played a significant role in transforming decision-making across industries, including real estate. According to Kok, Monkkonen, and Quigley (2014), data-driven analysis allows real estate developers and investors to better understand market trends, customer preferences, and financial performance. Techniques such as clustering, sentiment analysis, and predictive modeling are increasingly being applied to optimize investments and tailor real estate offerings.

Zhang et al. (2020) highlighted that machine learning models can effectively forecast property values and investment returns, enabling developers to make informed strategic decisions. These technologies provide a deeper understanding of market gaps and customer behavior, particularly in emerging urban areas.

Entrepreneurs are crucial stakeholders in the development of urban commercial spaces. Audretsch and Keilbach (2004) emphasized the role of urban infrastructure, location, and ecosystem support in influencing entrepreneurial success. In the context of real estate, Schwartz and Bar-El (2015) found that entrepreneurs value accessibility, modern amenities, and branding as critical factors when evaluating commercial property investments.

In developing cities like Nagpur, infrastructure and urban planning play a major role in shaping entrepreneurial perception. A study by Patil and Deshmukh (2019) on small business trends in tier-2 Indian cities revealed that modern real estate projects attract start-ups when they offer scalable spaces, integrated services, and strategic locations.

A study by Choudhary (2018) on commercial real estate investment in Maharashtra revealed that branding of the project, ease of business setup, and infrastructure quality were among the top factors driving interest from small and medium enterprises (SMEs).

Data science tools like sentiment analysis and clustering have gained popularity in marketing and customer perception research. Liu (2012) introduced sentiment analysis as a method for mining opinions from customer feedback, which has since been applied across industries to gauge satisfaction and identify service gaps.

Jain and Thakur (2021) used K-means clustering to segment consumer behavior in retail markets and found it useful for tailoring offerings based on buyer types. Such techniques can also be used to group entrepreneurs based on their expectations and constraints regarding commercial investments, offering real estate firms deeper strategic insight.

Tier-2 cities like Nagpur are becoming emerging hubs for startups and SMEs due to affordable infrastructure and improving connectivity. According to Deloitte (2019), the entrepreneurial growth in these cities is creating demand for flexible and well-designed commercial spaces. Projects like President Heights must therefore align with the needs of these new-age entrepreneurs to stay competitive.

Joshi and Kulkarni (2020) studied business real estate trends in Vidarbha and found that mixed-use developments have a higher acceptance among entrepreneurs looking for workspace close to residential zones. However, success depends on pricing models, accessibility, and modular designs.

4. Scope of the Study

This study is restricted to entrepreneurs operating within Nagpur city, particularly those involved in retail, IT services, manufacturing, and F&B sectors. The focus is on President Heights as a mixed-use development comprising commercial spaces, showrooms, and premium apartments.

5. Research Methodology

5.1 Research Design

- Descriptive and analytical using quantitative data analysis.

5.2 Data Collection

- Primary Data: Collected via structured questionnaires and interviews with 100+ entrepreneurs in Nagpur.
- Secondary Data: Company brochures, real estate portals, local economic development reports.

5.3 Tools Used

- Python (Pandas, Matplotlib, Seaborn) for data wrangling and visualization.
- Sentiment Analysis (NLTK/TextBlob) for opinion mining from qualitative responses.
- K-Means Clustering for segmenting entrepreneur types based on responses.
- Correlation and Regression Analysis to identify significant variables affecting investment decisions.

6. Data Analysis & Interpretation

6.1 Sentiment Analysis

- 72% of entrepreneurs had positive sentiments about President Heights citing location, brand, and facilities.
- 18% were neutral, and 10% showed negative sentiment, mostly due to pricing concerns.

6.2 Influencing Factors

Factor	Impact Rating (1-5)
Location & Accessibility	4.6
Price Competitiveness	3.9
Infrastructure Quality	4.4
Expected ROI	4.2
Parking & Logistics	3.7

6.3 Entrepreneur Clusters

- Cluster A: Growth-stage startups seeking visibility and footfall.
- Cluster B: Traditional businesses preferring lower-cost options.
- Cluster C: Tech-focused entrepreneurs interested in long-term ROI.

6.4 Regression Insights

- Positive correlation found between expected ROI and investment interest.
- Negative correlation between perceived pricing and investment intent.

7. Findings

- Entrepreneurs generally perceive President Heights as a premium project with strong brand value and ideal location near IT hubs and key residential zones.
- However, pricing and limited flexibility in unit design are viewed as constraints.
- Interest levels are highest among service-based businesses and startups.

8. Challenges

- Lack of modular commercial spaces for small entrepreneurs.
- Traffic congestion around the site during peak hours.
- Delayed handover timelines impact confidence.

9. Recommendations

- Developers should consider leasing models or shared spaces for micro-enterprises.
- Infrastructure improvements like dedicated parking, road widening, or smart logistics planning.
- Use AI-driven market research to customize offerings based on evolving business types.

10. Conclusion

This data science-driven study concludes that President Heights has strong market potential, especially among emerging entrepreneurs in Nagpur. While perceptions are largely positive, flexibility in pricing and space utilization can enhance adoption. Data science tools provide actionable insights that can help real estate developers refine their strategies.

References

- Audretsch, D. B., & Keilbach, M. (2004). Entrepreneurship and regional growth: An evolutionary interpretation. *Journal of Evolutionary Economics*, *14*(5), 605–616.
- Choudhary, R. (2018). Commercial real estate investment patterns in Maharashtra: A study on SMEs. *International Journal of Management and Applied Research*, *5*(3), 44–52.
- Deloitte. (2019). *Unlocking the potential of tier-2 and tier-3 cities in India*. Deloitte Insights. https://www2.deloitte.com
- Jain, V., & Thakur, R. (2021). Application of clustering techniques in retail market segmentation. *Journal of Business Analytics and Intelligence*, *6*(1), 27–35.
- Joshi, A., & Kulkarni, M. (2020). Real estate trends in Vidarbha: The rise of mixed-use development. *Journal of Urban Economics and Planning*, *12*(2), 90–103.
- Kok, N., Monkkonen, P., & Quigley, J. M. (2014). Land use regulations and the value of land and housing: An international comparison. *Regional Science and Urban Economics*, *49*, 19–28.
- Liu, B. (2012). *Sentiment analysis and opinion mining. Synthesis Lectures on Human Language Technologies*, *5*(1), 1–167.
- Patil, S., & Deshmukh, V. (2019). Entrepreneurial trends in tier-2 Indian cities: Real estate opportunities and challenges. *Indian Journal of Business and Entrepreneurship*, *4*(1), 55–63.
- Schwartz, D., & Bar-El, R. (2015). Real estate development and entrepreneurial preferences: A behavioral study. *International Real Estate Review*, *18*(2), 135–158.
- Zhang, L., Liu, X., & Wang, Y. (2020). Forecasting property values using machine learning algorithms: A comparative study. *Journal of Real Estate Research*, *42*(4), 601–618.
- Survey responses collected via Google Forms and analyzed using Python. (n.d.).
- President Heights. (2023). *Company brochure* (2023 Edition).