CHAPTER 36

The Impact of Metro on Real Estate Property Markets: A Case Study of Hyderabad Metro Rail Project

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ABSTRACT

India is undergoing fast urbanization and mass urban transit plays an important role to support it. Metro rail projects have emerged as important mass urban transit projects in India. Such metro projects also affect the development of urban land, their use and also values. In this context, the study investigates on the impact of Hyderabad Metro Rail (HMR) project on land prices of real estate in Hyderabad city, with a particular focus on the changes in land values around metro corridors. The primary objective is to analyses how the development of HMR project has influenced on urban land markets by improvising connectivity, reducing travel time, costs and altering patterns of accessibility. Through a comparative analysis of real estate conditions before and after the HMR project implementation, the study also explores the metro's role in reducing traffic congestion and promoting urban redevelopment. Taking from a comprehensive literature review, the research synthesizes findings from both global and Indian contexts. The study provides empirical insights into the value uplift and spatial redistribution effects associated with major urban transit interventions, thereby contributing to evidence based urban planning and real estate investment strategies in rapidly growing metropolitan regions like Hyderabad.

Keywords: HMR, Rail corridors, Land values, Real estate development, Land use change.

1.0 Introduction

Indian metropolitan cities are going through rapid urbanization, which resuls in more pressure on land resources, transportation systems and also urban infrastructures.

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DOI: 10.17492/JPI/NICMAR/260536 *ISBN: 978-93-49790-68-1*

Here, the studies state that the metro rail systems are appearing as tough parts of sustainable transport of urban, offering high end capacity while also acting on patterns of urban growth and the real estate market variations. Transport infrastructure plays a vital role in developing and changing the distribution of land use, more developed intensity, and also property values by improvising the reaching time and reducing travel time.

Hyderabad is one of the rapid and major growing metropolitan regions in India, which is driven by growing residential areas (sub urbs) and major employment areas. Due to this we can observe a rise in the population, more congestion in traffic, and depending upon private vehicles shows a pathway to the development of the Hyderabad Metro Rail (HMR) as a mass rapid transit system that is main for residential, commercial, and institutional areas of the city. Since becoming operational, the metro network has changed accessibility conditions across several urban areas and created new modes of development around station locations. Improved accessibility is increasing and attracting nearby areas for residential, commercial, and mixed-use developments. Accordingly, metro corridors are experiencing changes in land use patterns, more development intensity, and increase in property and rental values. However, these impacts are not permanent and depending on factors such as distance from metro stations, present land use structures, and local market conditions.

The study focuses on the impact on the Hyderabad Metro Rail on urban land use patterns and real estate property markets within selected station limited areas. A combined research method and designs are adopted to capture both spatial and market transformations. Land use and Land cover changes/differences were between 2015 (pre metro period) and 2025 (post metro period) are analysed using Geographic Information System (GIS) techniques to find the patterns of urban expansion, commercialization, and also land conversion along metro corridors. In parallel, primary data are collected through a structured questionnaire survey of residential and commercial property stakeholders located near selected metro stations to assess changes in accessibility, property values, rental levels, and commercial activity.

By applying Geographic Information Systems (GIS) based spatial analysis with survey-based descriptions, the study provides empirical results on how metro infrastructure influences urban development and property markets in a fast-growing Indian city. The findings are intended to support urban planners, policymakers, and real estate professionals in designing effective transit-oriented development strategies, guiding zoning regulations, and promoting balanced and inclusive growth around metro station areas in Hyderabad.

2.0 Literature Review

Many researchers have identified that impact on the urban rail transport system in real estate market patterns, emphasizes accessibility as the force behind appreciation in

DOI: 10.17492/JPI/NICMAR/260536 *ISBN: 978-93-49790-68-1*

property values. As per the account given by Tang et al. (2022), an urban rail transport system increases transport efficiency, decreases transport costs, and increases economic agglomeration, thus promoting a grow in the values of real estate, specifically focusing properties near stations. Above all, this forms a theoretical premise to analyses the impact on Hyderabad Metro about influencing property demand and appreciation within stations' influence zones in Hyderabad.

Research into the effects of metros on Property Markets has been done using synthesis-based reviews that indicate how rail transit affects residential commodity, along with Commercial Residential Property, in both spatial and temporal patterns. Lyu (2022) explains that rail transit affects residential commodity, along with Commercial Residential Property, in spatial, along with temporal patterns. It is indicated that Hedonic Price Models are primarily used by research papers that aim at identifying the effects of proximity to metros by taking into consideration varied stations such as IT corridors, along with densely populated residential areas.

Evidence from Indian cities indicates that the impact of the Metro Rail network can raise land values significantly, especially within the context of new and rising urban regions. In particular, the study conducted by Sharma and Newman (2018) on Bangalore Metro illustrates that the uplift created by investment expenditure on Metro Rail is very significant around the stations, though varying from station to station depending on the particular region and market dynamics. Notably, the context remains extremely relevant for the Hyderabad Metro due to the rapid expansion of the Hyderabad Metro Region.

The association between rail transport and house price and rent markets with emphasis on proximity impacts has been examined. A research article tells that the rail transport increases house price and rent values due to accessibility improvements and investment demand. Nevertheless, this article further indicates that negativity effects such as noise or congestion might reduce improvements due to rail transport for immediate zones of proximity. Thus, research suggests evaluation of metro effect by distance bands.

Metro systems not only affect land prices, travel patterns, metro station performance, and land use interaction, among others, which eventually affect real estate market performance. Du et al. (2023) emphasize that new rail transit systems, in interaction with land-use factors, affect travel patterns on existing stations, implying spatial differences. In this context, it can thus be understood that land use in the stations, among other factors, determines how metro systems affect stations in shaping development patterns in the market of Hyderabad.

There are some researchers who have associated an expansion in metros with changes in the housing market due to overall economic growth. Hu, Cai & Wen (2024) describe that an increase in the number of miles covered by metros can also depict an increase in the

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housing prices because of economic growth, enhanced connectivity between employment hubs, and overall development activities at an urban level. This shows that Hyderabad Metro, too, can have an effect on property prices, not just due to direct connectivity, but overall economic growth along routes.

Accessibility at the network level has been identified as a key factor influencing residential property appreciation. Wu (2021) finds a positive relationship between urban rail network accessibility and residential property prices, which is particularly significant in suburban or peripheral regions where access to urban areas has improved with the provision of rail transport systems. This highlights the relevance of the Hyderabad Metro in connecting peripheral residential areas to major commercial hubs and suggests that its impact on property values extends beyond immediate station influence zones (Wu, 2021).

A study by Nallathiga et al (2023) finds that the metro systems can affect the residential as well as commercial property markets and there can be differential impacts on rental and ownership properties. Based on the primary survey of property owners, real estate agents and metro commuters, the authors establish the differential impact of Mumbai VAG metro line on property prices and rents. The impact also vary between residential and commercial properties. They also find that the metro systems led to shifts in modal choice towards public transport like metro and suburban rail that also resulted in air pollution reduction. Property markets do not respond in coincidence with the starting of metro operations, but also across a succession of project stages, which include early operational expectations and impacts during the construction phase. Trojanek and Gluszak (2018) illustrate how subway systems produce spatial and time effects on property prices, wherein value adjustments can be gradual and based on market anticipation and improvements in operational access. The above thus lends credence to interpreting Hyderabad Metro impacts as a staged market response rather than a sudden change in values.

The studies done in the emerging megacity scenario support and confirmed that the effect/impacts on residential property values pretend to be positive because of accessibility and transport advantages gained from the metro rail system. The study by Zhang and Jiao in 2019 demonstrated that the positive effect on the values of residential properties influenced by closeness to the metro rail system differs depending on the urban landscape and scenario. The study supports the Hyderabad Metro rail system report because it proves that there are non-uniform effects falling in real estate due to these metro stations and land use patterns.

Metro-impact changes are not only observed in the case of heavy metros but have been noticed for light rail transit modes of public transport. Pan (2013) mentions that the rail-transit system is found to have good impacts on the values of residential areas by enhancing accessibility but could face some negative factors in the vicinity of stations. This helps in

DOI: 10.17492/JPI/NICMAR/260536 *ISBN: 978-93-49790-68-1*

supporting the consideration of Hyderabad Metro stations' impact zones for a closer examination in view of the difference in levels of impact potential.

3.0 ATA and Methodology

This research study defines about the data sources, research design, and some analytical methods used to find the main impact of Hyderabad Metro Rail on land use patterns and real estate property markets. The study uses and follows an approach of combined method by integrating spatial analysis of land use changes with primary survey-based assessment of property market behavior. This combined method helps us in understanding both the physical development trends as well as the market responses in influenced areas of metro station.

The research methodology is divided into two major components: Analysis of land use changes using Geographic Information System (GIS) based mapping techniques and assessment of property market changes using a questionnaire survey and descriptive statistical analysis.

3.1 Analysis of land use changes

To Evaluate the impact of Hyderabad Metro Rail on patterns of urban development, land use changes in metro areas were analyzed using GIS-based approach. Few selected metro station areas were chosen for the study based upon their high passenger usage, mixed land use characteristics, and main real estate development activity. These locations represent major growth ccorridors in Hyderabad that experienced improved accessibility due to implementation of metro.

Land use mapping was initiated for two distinct time periods which are "2015, representing the pre-metro phase and 2025 represents the post-metro phase". This temporal comparison was undertaken to identify changes in land use distribution linked with the introduction and operation of the metro systems. Major land use categories such as residential areas, commercial areas, mixed use areas, institutional areas and open spaces were found within the station influence zones for both respective years.

Geographic Information System techniques were employed to prepare and analyses land use maps for the selected metro station areas. The Geographic information system based analysis enabled visual comparison of land use patterns between years 2015 and 2025, highlighting spatial transformations and development increase in metro accessible areas. The mapping results provided spatial evidence of increased commercial and mixed-use developmental areas around metro regions, which supports the assessment of metro induced land use changes

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3.2 Analysis of property market changes

To assess the main effect of Hyderabad Metro Rail based on real estate prop markets property, primary data were collected using a set of structed questionnaire survey. This survey-based approach was adopted to reveal the perceptions and experiences of residents and commercial stakeholders those are located within metro station influenced areas. Property markets are influenced not only through physical infrastructure but also through perceived accessibility and market expectations making this survey data an effective tool for analysis.

The questionnaire was designed to collect information related to respondent profiles location and distances from the very nearest metro stations, radius of metro usage, required changes in accessibility and congestion, and perceived changes in property values and rental levels after metro implementation. For commercial respondents, additional questions related to changes in customer footfall and business activity were included in understanding the metro's influence on commercial performance.

Respondents were selected from areas located within and around metro regions using an appropriate sampling method. A total of 46 respondents were seen participating in our survey, concluding both the residential and commercial property stakeholders from selected metro station areas. The gap/space exactly from the metro station was considered as the main constraint, as its effects/impacts of metro infrastructure on the property markets tends to vary based on proximity. Data from respondents were differentiated and put according to the distance from metro stations to examine differential impact patterns.

The primary data collected is analyses using descriptive statistical techniques such as frequency analysis and percentage analysis. Graphical representations were used to interpret trends related to metro usage behavior, perceived changes in property values and rental levels and variations in commercial activity near metro stations. This descriptive analysis has helped in finding the complete market trends and helped in understanding the relationships between metro usage and real estate market behavior.

3.3 Integration of methodology

The use of GIS-based land use analysis and survey-based property market assessment provided a comprehensive understanding of the spatial and economic impacts of Hyderabad Metro Rail. While land use mapping captured physical development patterns around the metro's stations, the questionnaire survey showed market usage positions and behavioral responses. Together, these methods enabled a comprehensive evaluation of the influence of metro infrastructure on urban land development and real estate property markets in Hyderabad.

DOI: 10.17492/JPI/NICMAR/260536 ISBN: 978-93-49790-68-1

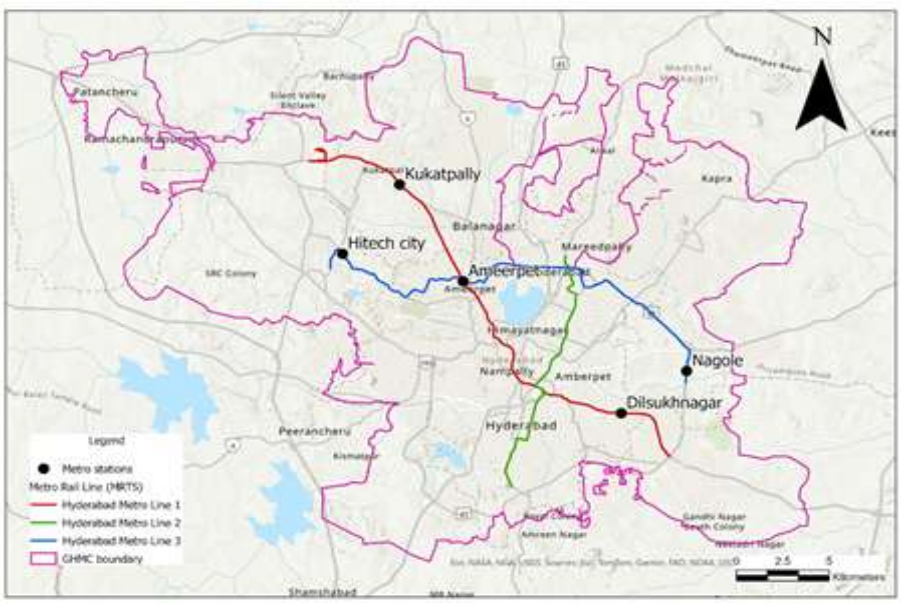
4.0 Results

This section explains the results that are obtained from the primary survey conducted and the spatial analysis to implement the effect/impacts of Hyderabad Metro Rail focusing land use patterns and property rates within selected metro station ranged influence areas. The results are presented using tabular columns, maps, and graphical representations, followed by brief descriptive explanations.

4.1 Metro network and influence areas

Figure 1 shows the Hyderabad metro rail network with select stations chosen for the study. These are the stations that are terminal origin and destination points. Figure 2 shows the influence zones of metro station areas of Hyderabad metro project. These are essentially the areas surrounding stations chosen for the study.

Figure 1: Hyderabad Metro Rail Network with Selected Stations



Source: Created by authors

4.2 The land use and land cover change analysis (2015 - 2025)

Figure 3 shows the map representing land use and land cover of study areas along metro corridors in the year 2015 before metro project was laid down. Figure 4 shows the map depicting land use and land cover of study areas along metro corridors in the year 2025 after metro became fully operational.

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Figure 2: Metro Station Influence Zones in Study Area

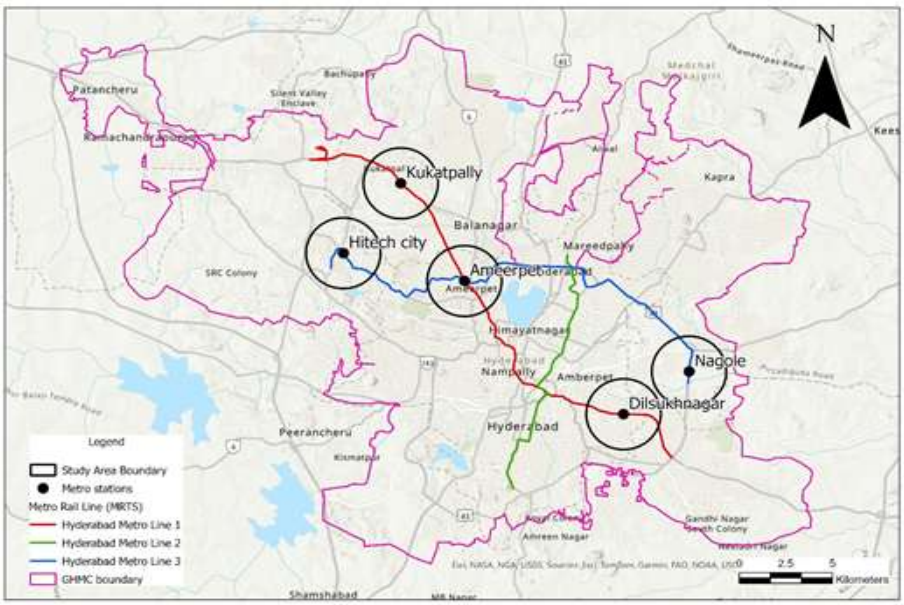

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Figure 3: Map Representing Land Use and Land Cover of Study Area - 2015

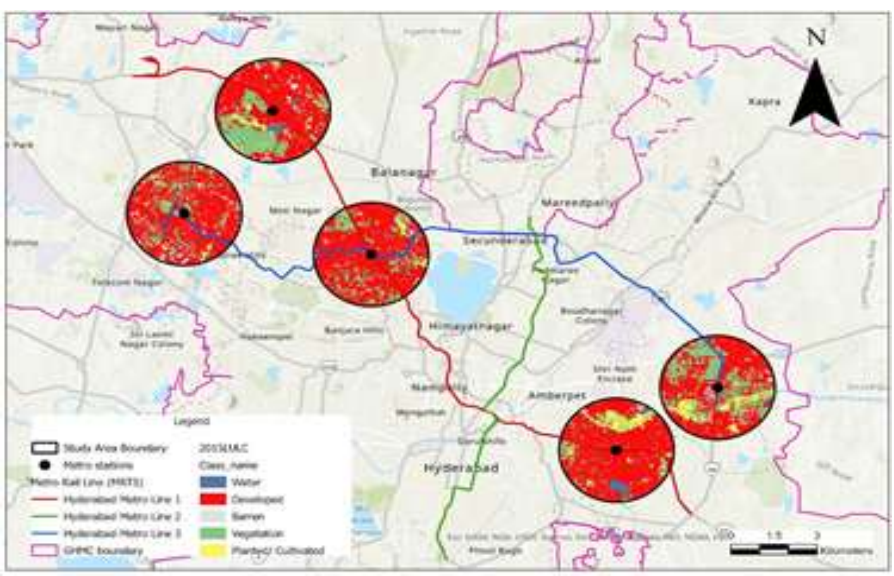

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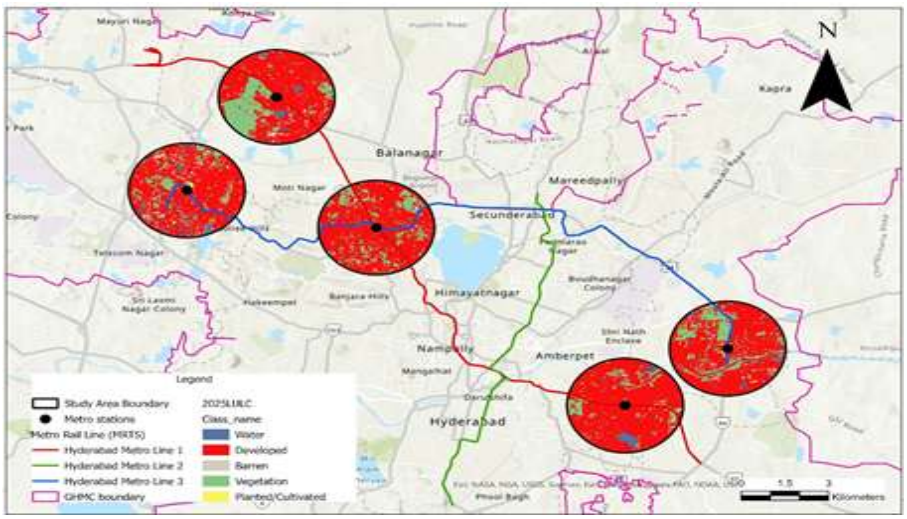
Figure 4: Map Depicting Land Use and Land Cover of Year - 2025



Source: Created by authors

4.3 Survey-based descriptive analysis of property market changes

Table 1 shows the distribution of survey respondents with reference to the proximate metro stations identified and shown in the maps earlier. Figure 5 shows the distribution of survey respondents in terms of their residence location proximity to metro rail station. Through this chart, it is observed that respondents have metro stations at a distance of 500-1000m located from their localities.

Table 1: Distribution of Respondents by Metro Station

Station Area	**No. of Respondents**
Dilsukhnagar	17
Hitech City	13
Kukatpally	7
Ameerpet	5
Nagole	4
Total	**46**

Source: Created by authors

Table 2 shows the respondents in terms of property they are associated with; there was an almost equal representation. Figure 6 shows the metro usage pattern of the survey respondents. From this pie chart, the results show that metro usage by respondents is done through "Weekly" at 41.7% depicting more compared to daily, monthly and rarely.

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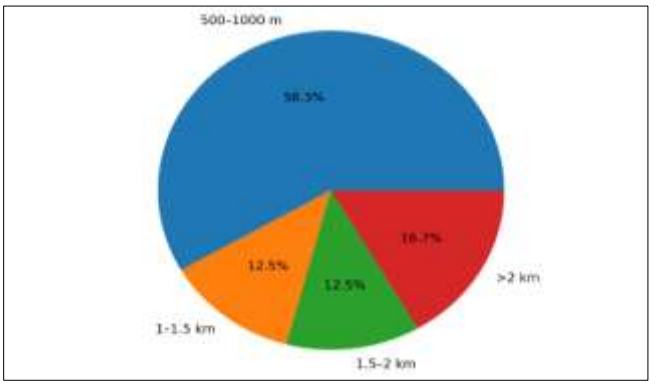
Figure 5: Respondent Distribution by Metro Station Area



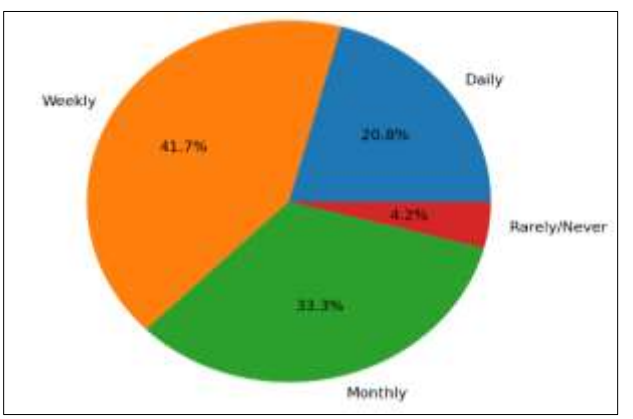
Source: Created by authors

Table 2: Classification of Respondents by Property Type

Respondent Type	Count
Residential	24
Commercial	22
Total	**46**

Source: Created by authors

Figure 6: Metro Usage Pattern of Respondents



Source: Created by authors

4.4 Metro impact on property markets

Figure 7 shows the distribution of changes in property values after the implementation of Hyderabad metro rail project. Through this table, a 10 – 25% of estimated property value is observed to be increased/more with the help of number of respondents.

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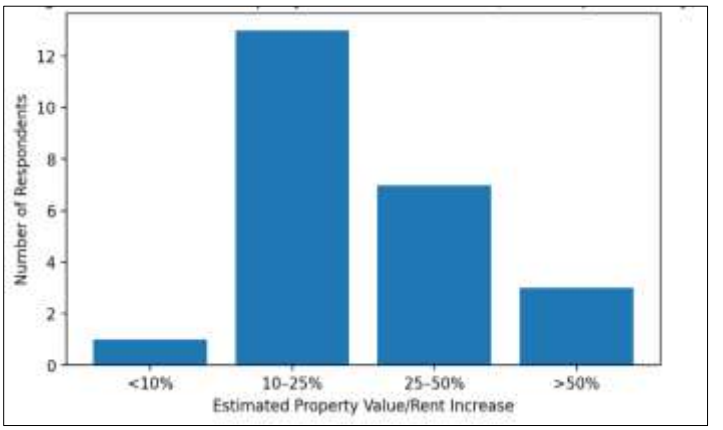
Figure 7: Required Change in Property Values



Source: Created by authors

Table 3: Change Represents in Commercial Footfall after Metro Implementations

Footfall Change	Count
Increased >50%	3
Increased 25–50%	12
Increased <25%	4
No change	3
Decreased <25%	2
Total commercial responses	**24**

Source: Created by authors

Figure 8: Customer Footfall Changes

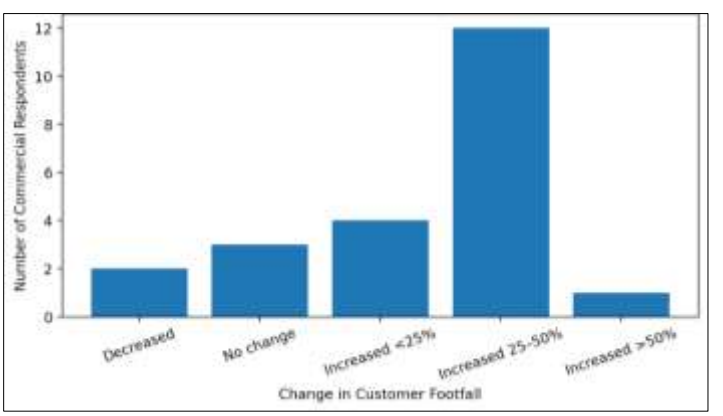


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Table 3 shows the change represented in commercial footfall after metro operations. Figure 8 shows the distribution of such commercial footfall changes. The results from this chart represents those high changes in customer footfall is seen as 25 – 50% more from the respondents.

5.0 Conclusion

The study represents us with the data about how the impact of Hyderabad Metro Rail on land use patterns and also the real estate property markets mainly by focusing GIS analysis and main survey data.Land use and Land cover results from year (2015 - 2025) shows us a clear increase in developed metro areas, indicating boosted growth in urban areas. Vegetations, agricultural lands, and barren land areas rejected, after showing conversions of lands for commercial and urban purposes.

Survey findings showed better accessibility and also has improved based on frequent metro usage among residents and property stakeholders. Residential people helped in reporting and based on their reports, increase in property values were seen after metro implementation, showing full positive real estate market responses. Commercial properties also showed that they experience more customer footfall near metro stations, after confirming the metro's role in increasing business activities and location attractiveness.

6.0 Implications

Hyderabad Metro Rail has quite improved its connectivity along major urban areas, which has contributed to changes in land use patterns and real estate market behavior in station influence areas. The observed increases in development intensity and commercial activity highlight the importance of integrating metro projects with urban land use planning of urban areas to make sure properly structured and sustainable growth.

Survey findings indicate that nearest to metro stations is linked with increases in property values and rentals levels, showing the value lifts potential of infrastructures. Hence this supports the usage policies of transit-oriented development and appropriate zoning controls around metro stations to guide future development.

The study also represents how metro connectivity enhances commercial footfall and business performance near stations, indicating that these areas can be developed as economic activity hubs with improved pedestrian infrastructure and supporting services.

At the same time, increasing property values may create concerns for lower-income households and small businesses. Therefore, inclusive housing strategies and rental monitoring mechanisms should be considered as part of station area development policies.

DOI: 10.17492/JPI/NICMAR/260536 *ISBN: 978-93-49790-68-1*

Overall, the findings reveal that metro investments will and can influence and increase urban development zones and property markets when supported by perfect coordinated planning, effective last mile connectivity, and also including balanced regulatory frameworks.

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