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TRANSIT ORIENTED DEVELOPMENT POLICY OF INDIA AND THE BARRIERS IN ITS IMPLEMENTATION

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ABSTRACT

Transit-Oriented Development (TOD) has emerged as a promising urban planning approach globally, aiming to create sustainable, equitable, and livable cities by promoting compact, mixed-use development around transit nodes. In India, where rapid urbanization and burgeoning population densities pose significant challenges to urban mobility and sustainability, TOD has gained traction as a potential solution. However, the effective implementation of TOD policies in Indian cities faces numerous barriers, including deficiencies in public transportation infrastructure, outdated land use regulations, affordability and accessibility concerns, financing constraints, governance issues, and challenges related to gap in policy between state and local bye laws in its implementation. This research paper provides a comprehensive analysis of these barriers and proposes a policy framework to overcome them, drawing on insights from international best practices and case studies from Indian cities. Through an interdisciplinary approach that integrates urban planning, transportation engineering, economics, and public policy perspectives, this paper offers actionable recommendations for policymakers, urban planners, and stakeholders to facilitate the successful implementation of TOD in Indian cities. By addressing the identified barriers and leveraging the potential of TOD, India can realize its vision of sustainable, inclusive, and transit-oriented urban development.

Keywords: Transit-Oriented Development, Indian Cities, Urban Planning, Transportation Infrastructure, Land use Regulations, Affordability, Financing, Governance, Policy Gap

1. INTRODUCTION

Transit-Oriented Development (TOD) has emerged as a key urban planning strategy worldwide, aiming to create vibrant, sustainable, and equitable cities by promoting compact, mixed-use development around transit nodes. In India, where rapid urbanization and burgeoning population densities pose significant challenges to urban mobility and livability, TOD has gained traction as a potential solution. However, the implementation of TOD policies in Indian cities faces several formidable barriers.

This research paper aims to provide a comprehensive analysis of the barriers to Transit-Oriented Development (TOD) implementation in Indian cities and propose a policy framework to address them. Each section delves into specific

challenges, provides case studies and international comparisons, and offers actionable recommendations for policymakers and practitioners. Through interdisciplinary insights and evidence-based analysis, this paper seeks to contribute to the discourse on sustainable urban development in India and facilitate the transition towards transit-oriented, inclusive, and livable cities.

1.1. RESEARCH METHODOLOGY

The research paper is done by reviewing the National TOD policy and the state TOD policies of India, A comparative analysis is done within these policies and the implementation of these policies are checked with the local governing bye-laws. We have studied the Bye-laws of Delhi and Uttar Pradesh (Meerut) and tried to find the gaps or the possible challenges for the TOD policy. We have also studied the successful and failed TOD developments around the world and tried to draw some parallel with the Indian context and provide the possible solutions.

2. LAND USE REGULATIONS MISALIGNMENT WITH TOD PRINCIPLES

TOD Influence Zone (National TOD policy)

2.1. POLICY AND LIMITATIONS

- Land use Traditional zoning codes in Indian cities often prioritize single-use development patterns and impose restrictions on building heights, floor area ratios (FAR), and land use mix. These regulations can inhibit the development of compact, mixed-use neighborhoods around transit stations, which are essential for TOD success. In the context of Transit-Oriented Development (TOD), the Floor Area Ratio (FAR) plays a crucial role in determining the density and land use within the influence area around transit hubs like metro stations. The limitation of usage of FAR up to 30 percent (Uttar Pradesh TOD policy) for other types of activities within an existing land use can be seen as a regulatory measure to maintain a balance between different land uses and ensure that the primary purpose of the TOD is not compromised.

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विद्यमान भू–उपयोग (महायोजना/जोनल डेवलपमेन्ट प्लान के अनुसार)	परिवर्तित भू–उपयोग	विद्यमान उपयोग में न्यूनतम एफ.ए.आर. *	अन्य उपयोग में एफ.ए.आर.**
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(Delhi Tod policy 2022)

- Although the intention of limiting the other activities in existing land use is essential to limit the concentration of certain type of activity in a region and maybe all the buildings may be essentially become a commercial complex or a hospital in a certain locality which may defeat the aim of high density mixed use development but the contradiction is that in most of the Indian cities, the grain of the city is very fine and the plot size is very small , A large number of projects will come from small business owners who owns land parcels like 200-500 sqm .
- So, the problem with the current policy is that it doesn't talk about the small land parcels, the only classification of land size is either below 1 hectare or above 1 hectare where the vertical and horizontal division of activities make sense but in localities where the land parcels are small the limitation of retaining the 70 percent of existing land use is not sustainable.
- Now if someone is opening a Nursing home in residential area, which is permitted under master plan of the city under permitted land use matrix but if the person wants to take the benefit of increased F.A.R of the Influence zone, the limitation of 50 percent of the other type of activity in the existing land use prohibit the developer to take the benefits of TOD policy.

Table 20.1: Mix of Uses/ Distribution of FAR in TOD

Land use/ use premise of plot as per ZDP/ Layout Plan	Permissible Mix of Uses (distribution of FAR in TOD Scheme)			
	Minimum FAR for Residential uses	Minimum FAR for Commercial uses	Minimum FAR for PSP and/or utilities	Other uses
Residential	50%	10%	20%	Other uses* are permitted up to 20%.
Commercial	30%	50%	10%	Other uses* are permitted up to 10%.
Industrial	30%	10%	10%	Remaining 50% of FAR to be for Industrial use.
Government	30%	10%	10%	Remaining 50% of FAR may be for any Government use.
Transportation	30%	10%	10%	Remaining 50% of FAR may be for any use* after meeting all operational requirements for transportation facilities.
PSP(only housing and neighbourhood level PSP plots allowed as per Clause 20.4.ii)	The FAR for such plots shall be entirely utilised for PSPs and/or utilities in the TOD Scheme.			

** This remaining FAR can be utilised as a mix of residential, commercial and PSP in any proportion as per project requirement.*

2.2. SOLUTION

Allowing mixed-use development in clusters of plots rather than on single plots addresses the challenges posed by smaller plot sizes, offering flexibility and fostering vibrant urban environments. To facilitate this, zoning policies should be adapted to permit mixed-use development across multiple adjacent plots, supported by incentives such as density bonuses to encourage collaboration among property owners and developers. Unified development plans that span several plots can ensure cohesive planning and design. Comprehensive design standards should promote consistent architectural styles, building heights, and public space integration, with shared amenities enhancing functionality. Infrastructure planning must support integrated development, focusing on connectivity and public transit access. Common public spaces and placemaking initiatives can create a sense of community and attract residents and visitors. Streamlining approval processes and establishing coordination mechanisms can facilitate multi-plot projects, while community engagement ensures developments meet local needs. Public-private partnerships and innovative financing, such as tax increment financing, can fund infrastructure and public amenities. This holistic approach maximizes land use efficiency and enhances urban life quality by overcoming the limitations of smaller plot sizes.

3. CAR PARKING

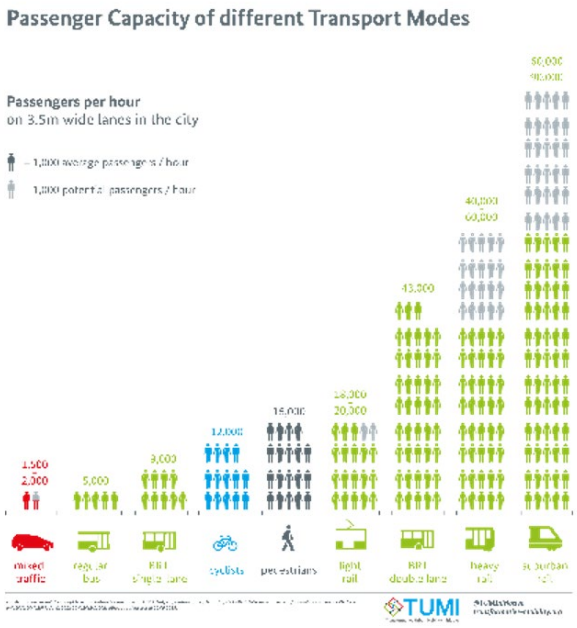
1) Conflict Between TOD and Parking Requirements.

The Transit-Oriented Development (TOD) policy aims to create high-density, mixed-use neighborhoods with access to public transit to reduce car dependency and promote sustainable urban living.

However, the local bylaws in many Indian cities often require minimum car parking spaces for new developments which incentivize car ownership and use, leading to conflicts in the implementation of TOD policies which are designed to reduce car usage by promoting public transportation, walking, and cycling. This policy mismatch results in developments that cater to car users, with large parking areas taking up space that could be used for housing, green spaces, or community amenities.

2) Increased Costs

- Developers are forced to invest in constructing parking spaces, increasing the cost of development. These costs are often passed on to consumers, making housing less affordable.
- High parking requirements can discourage developers from pursuing TOD projects, which are meant to be more sustainable and cost-effective.
- In the context of the Meerut Development Authority Bye Laws - 2016, for a plot size of 1000 square meters with a ground coverage of 50%, achieving a Floor Area Ratio (FAR) of 2.5 or higher presents significant challenges due to parking requirements. Given that up to two basements are permitted, accommodating the necessary parking spaces to meet FAR requirements and ensure adequate Equivalent Car Spaces (ECS) becomes problematic.
- To achieve the required parking for such a high FAR, four basements would typically be needed. However, as only two are allowed, one viable solution is the use of mechanical parking systems. These systems can efficiently utilize basement space to park a large volume of cars within a compact area.
- Nevertheless, mechanical parking systems come with substantial initial and ongoing costs. The cost of installing a mechanical parking system is approximately 6-8 lakhs per car, leading to a total investment of around 3.6 crores for the necessary capacity. This cost represents about 30-40% of the total building cost, which is prohibitively expensive.
- Therefore, while mechanical parking offers a solution to space constraints, its high costs make it less feasible. Alternatives or policy adjustments, such as allowing additional basement levels or providing incentives/subsidies for mechanical parking systems, might be necessary to address the issue effectively without imposing excessive financial burdens on developers.



3) Land Use Efficiency

- Requiring minimum parking spaces leads to inefficient land use, with valuable urban space being allocated to parking rather than more productive uses like housing or commercial activities.
- In densely populated urban areas, this can exacerbate land scarcity and hinder the development of compact, walkable neighborhoods that TOD policies aim to create.
- In urban areas where plot sizes typically range from 200 to 1000 square meters, achieving high Floor Area Ratios (FAR) under Transit-Oriented Development (TOD) schemes presents significant challenges due to parking requirements and economic viability. For instance, consider a plot of 800 square meters with access from a 12-meter-wide road, aiming for a maximum FAR of 4, which equates to 4000 square meters of built-up area. The required car parking for this development, calculated at 1.5 Equivalent Car Spaces (ECS) per 100 square meters, totals 60 ECS.
- To provide 60 ECS, approximately 2000 square meters of space is needed. On an 800 square meter plot, accommodating this parking would require using 3-4 floors solely for parking. Additionally, utilizing the ground floor for parking diminishes its commercial value and negatively impacts the street and urban character, reducing "eyes on the street" and vibrancy.

Multilevel Car parking at Sector 18 Noida (Source - Hindustan times)

- Several potential solutions can address these challenges. Utilizing the allowed two basements for parking is a start, though it alone will not meet the required ECS. Multi-level parking within the building, combining basements with podium levels dedicated to parking, is another option, although it reduces usable area for other purposes. Mechanical parking systems, while expensive, can significantly increase parking capacity within a limited space, compactly fitting 60 ECS within the available plot area. Despite the high initial investment of approximately 6-8 lakhs per car, mechanical parking might be justified in high-value urban areas where land and space are at a premium.
- Policy adjustments and incentives can also help. Allowing more than two basements for parking can alleviate the space issue, although this requires changes to existing building bylaws. Providing subsidies or incentives for developers to offset the high cost of mechanical parking systems, such as tax benefits, grants, or low-interest loans, can make these systems more viable. Encouraging shared parking facilities within TOD zones, where multiple buildings or plots share a common parking structure, optimizes space and cost.
- Design innovations can further address these challenges. Incorporating podium parking designs, where parking levels are integrated within the building but designed to minimize impact on the ground-floor commercial viability and street character, is one approach. Designing ground-level parking with active frontages, where the parking area is masked by commercial or community spaces to maintain street engagement and aesthetics, can also help.
- Promoting public transit and non-motorized transport, enhancing public transit accessibility, and infrastructure for walking and cycling reduce dependency on private cars and hence parking demand. Integrating car-sharing and ride-hailing services into TOD planning to reduce the need for personal vehicle ownership and parking spaces is another effective strategy.
- In conclusion, achieving a high FAR on smaller plots within TOD schemes requires a combination of strategic planning, policy adjustments, and innovative design solutions. By allowing more flexible use of basements, incentivizing mechanical parking, relaxing parking norms and promoting shared and alternative mobility solutions, cities can address parking requirements without compromising urban character and economic viability.

RANK BY FILTER	WORLD RANK	CITY	DAYS WITH LOW TRAFFIC	CONGESTION LEVEL 2020	CHANGE FROM 2019
1	2	Mumbai, India	133 days	53%	↓12%p
2	4	Manila, Philippines	128 days	53%	↓18%p
3	6	Bengaluru, India	147 days	51%	↓20%p
4	8	New Delhi, India	64 days	47%	↓9%p
5	10	Bangkok, Thailand	44 days	44%	↓9%p
6	16	Pune, India	154 days	42%	↓17%p
7	17	Chongqing, China	42 days	42%	↑1%p
8	19	Tokyo, Japan	2 days	41%	↓1%p
9	23	Taipei, Taiwan	2 days	37%	↑2%p
10	25	Tel Aviv, Israel	68 days	37%	↓9%p

Source TomTom Traffic Index | https://www.tomtom.com/en_gb/traffic-index/

4) Environmental Impact

Increased parking availability encourages car use, leading to higher emissions and air pollution. This counteracts efforts to reduce the environmental footprint of urban areas through public transit and non-motorized transport options.

Large parking lots contribute to the urban heat island effect and increase stormwater runoff, causing environmental degradation.

5) Socio-Economic Implications

Housing Affordability:

- Mandatory parking requirements increase construction costs, which are transferred to homebuyers or renters. This makes housing less affordable, particularly for lower-income households who may not even own cars.
- Public resources could be better utilized in enhancing public transport infrastructure or providing affordable housing rather than subsidizing parking.

Equity Issues:

- The requirement for minimum parking disproportionately benefits car owners, who are typically wealthier, while non-car owners still bear the increased housing costs.
- Investing in TOD and reducing parking requirements can promote equity by providing better access to affordable housing and public transportation for all socio-economic groups.
- In CSE analysis it is found that About 4.5 million slum population in Delhi occupies only 3 per cent of Delhi's area. But the parking demand generated by cars makes demand on close to 10 per cent of Delhi's urbanized land. Low-income housing dwelling needs 25 square meters (sqm) to 40 sqm of area. A car parking slot needs 23 sq m to 28 sq m. Billions of rupees of the economy that could provide affordable housing to the marginalized section of the society is diverted into building car parkings.

6) Recommendations and Solutions

Revision of Parking Policies:

- Local governments should consider revising or eliminating minimum parking requirements, especially in TOD zones. This can be replaced with maximum parking limits or flexible parking standards that reflect actual demand.
- Introducing shared parking solutions and promoting car-sharing services can reduce the need for extensive parking facilities.

Incentives for TOD Projects:

- Provide incentives to developers for including TOD features, such as reduced parking requirements, density bonuses, or expedited approval processes for projects near transit hubs.

Public Awareness and Stakeholder Engagement:

- Educate stakeholders, including policymakers, developers, and the public, about the benefits of TOD and the drawbacks of excessive parking requirements.
- Engage communities in the planning process to build support for TOD initiatives and address concerns about reduced parking availability.

The conflict between TOD policies and local bylaws requiring minimum car parking highlights the need for a coherent and integrated approach to urban planning. By revising parking policies and aligning them with the goals of TOD, Indian cities can create more sustainable, affordable, and livable urban environments. This shift requires coordinated efforts from policymakers, urban planners, developers, and the community to successfully transition towards a more transit-oriented and less car-dependent urban future.

Congestion on road despite of metro (Source-HT)

4. LAST MILE CONNECTIVITY

Last-mile connectivity is the final leg of a journey, ensuring that passengers can reach their final destination from a major transit hub like a metro station. Achieving effective last-mile connectivity is crucial for maximizing the utility of metro rail corridors and enhancing overall public transport efficiency. Indian cities, characterized by dense populations and complex urban landscapes, present unique challenges for last mile connectivity. The first challenge lies in the distance between metro stations and final destinations, which may necessitate additional modes of transport for commuters to reach their destinations. Inadequate pedestrian infrastructure, such as sidewalks and pedestrian crossings, further complicates the last mile journey, particularly in areas with high traffic volumes and congestion.

Moreover, the lack of integration between metro stations and other modes of transportation, such as buses, auto-rickshaws, and cycle-sharing services, exacerbates last mile connectivity challenges. Limited feeder services, irregular schedules, and inefficient transfer facilities deter commuters from using public transportation for their entire journey, forcing them to rely on personal vehicles or alternative modes of transport. Additionally, issues related to safety and security, particularly during late hours, discourage commuters, especially women and vulnerable groups, from utilizing public transportation for their last mile commute.

Here are some common issues and potential low-cost solutions:

4.1. ISSUES IN LAST-MILE CONNECTIVITY

1) **Lack of Direct Access:** Many metro stations are not directly accessible from residential or commercial areas, requiring additional transportation modes to reach them.
2) **Inadequate Feeder Services:** Insufficient or unreliable feeder services (such as buses, auto-rickshaws, or shuttles) deter people from using the metro.
3) **Poor Infrastructure:** Inadequate sidewalks, bike lanes, and pedestrian crossings make it difficult and unsafe to walk or cycle to metro stations.
4) **Cost:** High costs associated with additional transportation modes can discourage metro usage.
5) **Congestion:** Traffic congestion around metro stations can create delays and inconvenience.
6) **Safety and Security:** Concerns about personal safety, especially during early morning or late-night hours, can reduce metro ridership.

4.2. LOW-COST SOLUTIONS FOR LAST-MILE CONNECTIVITY

Improving Non-Motorized Transport (NMT) Infrastructure:

1) Pedestrian Pathways:

Improving the conditions of pathways and pedestrian movement requires a comprehensive approach that combines policy interventions, infrastructure investments, and community engagement efforts. Here are some policy recommendations to enhance pedestrian infrastructure and promote safe and accessible walking environments:

- Implement a Complete Streets policy that prioritizes the needs of pedestrians, cyclists, and transit users in street design and planning.
- Ensure that new roadway projects and major renovations incorporate pedestrian-friendly features such as wide sidewalks, crosswalks, curb ramps, and pedestrian refuge islands.
- Develop a Pedestrian Master Plan that outlines goals, strategies, and priorities for improving pedestrian infrastructure and connectivity throughout the city.
- Identify areas with high pedestrian activity and prioritize investments in sidewalk upgrades, intersection improvements, and traffic calming measures in these areas.
- Implement a Safe Routes to School program to promote safe walking and biking routes for students and encourage active transportation to schools.
- Invest in infrastructure improvements near schools, such as crosswalks, school zone signage, and traffic calming measures, to enhance safety for students walking to school.
- Adopt a Vision Zero initiative with the goal of eliminating traffic-related fatalities and severe injuries.
- Focus on improving pedestrian safety through measures such as lower speed limits, enhanced crosswalk markings, traffic signal upgrades, and targeted enforcement efforts.
- Prioritize the installation of curb ramps, tactile paving, audible signals, and other accessibility features at key pedestrian crossings and intersections.
- Implement policies to activate public spaces along pedestrian pathways, such as plazas, parks, and pedestrian malls, to create vibrant and inviting pedestrian environments.
- Encourage the development of sidewalk cafes, outdoor seating areas, street vendors, and public art installations to enhance the pedestrian experience and promote social interaction.
- Require developers to incorporate pedestrian-friendly design features, such as wide sidewalks, pedestrian-scale lighting, and active storefronts, into TOD projects.
- Explore innovative financing mechanisms, such as impact fees, tax increment financing, and public-private partnerships, to support pedestrian improvements and enhancements.

By implementing these policy recommendations, cities can create safer, more accessible, and more enjoyable walking environments that promote active transportation, support public health, and enhance overall quality of life for residents.

2) Bike Lanes and Sharing Programs:

Develop dedicated bike lanes and implement bike-sharing programs. Providing secure bike parking at metro stations can encourage cycling. Bike-sharing models have been successfully implemented in various cities around the world and can serve as effective last-mile connectivity solutions for metro stations in India. Here are some models and their key features that can be adapted to the Indian context:

Station-Based Bike Sharing (Docked Systems)

Example: Citi Bike (New York City, USA)

Features:

- **Fixed Stations:** Bikes are picked up and returned at designated docking stations.
- **Membership Options:** Offers daily, monthly, and annual membership plans.
- **Integration with Public Transport:** Often located near metro stations and other transit hubs.

Adaptation for India:

- Install docking stations at metro stations and key locations within a 2-3 km radius.
- Offer affordable membership plans tailored to different user groups (students, daily commuters).
- Ensure reliable maintenance and redistribution of bikes to balance supply and demand.

Dockless Bike Sharing

Example: Ofo and Mobike (China)

Features:

- **App-Based Unlocking:** Bikes are equipped with GPS and can be unlocked using a mobile app.
- **Flexible Parking:** Bikes can be parked anywhere within designated zones.
- **Real-Time Tracking:** Users can locate and book bikes in real-time through the app.

Adaptation for India:

- Develop a robust mobile application for bike rental, incorporating features like bike location tracking and digital payments.
- Define specific parking zones near metro stations to avoid clutter and ensure orderly parking.
- Implement incentives and penalties to encourage proper bike parking and reduce vandalism.

Hybrid Systems (Combination of Docked and Dockless)

Example: Next bike (Various Cities, Germany)

Features:

- **Docking Stations with Dockless Option:** Users can return bikes at docking stations or within a defined radius of virtual stations.
- **Flexible Usage:** Combines the reliability of docked systems with the flexibility of dockless systems.
- **Membership and Pay-As-You-Go Options:** Offers a variety of pricing models to cater to different user needs.

Adaptation for India:

- Install docking stations at high-traffic metro stations while allowing for flexible drop-off points within a certain distance.
- Offer multiple pricing models, including pay-as-you-go, daily passes, and longer-term memberships.
- Implement technology to monitor and manage bike availability and ensure equitable distribution.

Electric Bike Sharing

Example: Jump Bikes (San Francisco, USA)

Features:

- Electric Assist: Bikes are equipped with electric motors to assist riders, making it easier to travel longer distances or uphill.
- App Integration: Users can locate and unlock bikes through a mobile app.
- Environmental Benefits: Promotes the use of clean energy for transportation.
- Adaptation for India:
- Introduce electric bikes to cater to areas with challenging terrains or longer distances from metro stations.
- Ensure charging infrastructure is available at docking stations and key locations.
- Promote the use of electric bikes as an eco-friendly and efficient mode of last-mile connectivity.

Implementation Strategies for India:

- Pilot Programs: Start with pilot programs in major cities like Delhi, Bangalore, Mumbai, and Chennai to test the feasibility and scalability of bike-sharing systems.
- Government Support: Seek support from local and state governments for funding, infrastructure, and policy regulations.
- Public Awareness Campaigns: Conduct awareness campaigns to educate the public about the benefits of bike-sharing and how to use the systems.

- Safety and Maintenance: Ensure regular maintenance of bikes and infrastructure, and implement safety measures such as dedicated bike lanes and proper lighting.

By adopting and adapting these bike-sharing models, India can significantly enhance last-mile connectivity around metro stations, making urban transportation more efficient, sustainable, and accessible.

3) Para-transit

Para-transit refers to various modes of transportation that complement traditional public transit systems by providing flexible, on-demand, and often informal services to meet the specific mobility needs of passengers. These services typically operate in areas where fixed-route public transit may be inadequate or inaccessible, offering door-to-door or point-to-point transportation options. Examples of para-transit services include auto-rickshaws, cycle rickshaws, e-rickshaws, shared taxis, and informal minibus services. The integration of para-transit into Transit-Oriented Development (TOD) policies in India is crucial for several reasons:

Illegally parked autorickshaw outside Sector 52 Metro station in Noida on Wednesday. (Sunil Ghosh/HT Photo)

Need of Para-transit

- **Accessibility:** Many areas in Indian cities lack adequate public transportation infrastructure, especially in peri-urban and low-income neighborhoods. Para-transit fills this gap by offering flexible and affordable transportation options, improving accessibility for residents.
- **Complementary Services:** Para-transit services complement fixed-route public transit by catering to specific travel demands, such as short-distance trips, irregular routes, or off-peak hours, which may not be efficiently served by traditional modes.
- **Flexibility and Affordability:** Para-transit services are often more flexible and affordable than traditional public transit options, making them particularly suitable for marginalized communities and areas with lower levels of car ownership.
- **Reduced Congestion and Pollution:** Integrating para-transit into TOD policies can help reduce congestion and air pollution by encouraging modal shifts from private vehicles to shared and more sustainable modes of transportation.
- **Social Equity:** By ensuring the inclusion of para-transit services in TOD planning, policymakers can address the mobility needs of diverse population groups, including seniors, persons with disabilities, and low-income households, promoting social equity and inclusion.

Integrating para-transit into Transit-Oriented Development

Integrating para-transit into Transit-Oriented Development (TOD) policies in India requires several policy changes and initiatives to ensure the seamless inclusion of para-transit services within the broader urban transport framework. Here are some additional policy changes that could facilitate this integration:

- **Formal Recognition:** Recognize para-transit services, such as auto-rickshaws, cycle rickshaws, and e-rickshaws, as integral components of the urban transport system.

- **Interchange Facilities:** Design transit stations and hubs with designated pick-up/drop-off points and facilities for para-transit vehicles to seamlessly connect with other modes of transport.
- **Financial Incentives:** Provide subsidies, grants, or tax incentives to para-transit operators for adopting cleaner and more efficient vehicles (e.g., e-rickshaws) and improving service quality.
- **Training and Capacity Building:** Offer training programs and technical assistance to para-transit drivers and operators to enhance professionalism, customer service, and road safety practices.
- **Parking and Waiting Areas:** Create designated parking and waiting areas for para-transit vehicles near transit stations and key destinations to reduce congestion and improve accessibility.

By implementing these policy changes and initiatives, India can effectively integrate para-transit into TOD policies, fostering a more sustainable, inclusive, and efficient urban transport system that provides seamless connectivity, enhances accessibility, and promotes sustainable mobility options for all residents.

5. CONCLUSION

Overcoming barriers to TOD implementation in Indian cities requires a concerted effort from policymakers, planners, developers, and community stakeholders. By reforming zoning and land use regulations, integrating planning authorities, promoting transit-oriented zoning, providing incentives for TOD development, strengthening community engagement, and investing in capacity building, Indian cities can unlock the full potential of TOD to create sustainable, liveable, and inclusive urban environments. With effective policy interventions and collaborative action, cities can enhance last-mile connectivity, making metro rail corridors more accessible and attractive to a broader population. This can significantly improve the efficiency and appeal of public transportation systems while keeping costs manageable. TOD can play a transformative role in shaping the future of urban development in India.

CONFLICT OF INTERESTS

None.

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None.

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