

# Transit Oriented Development In India: A Critical Review Of Policy Measures

Ar. Deepshikha Jain, Ekta Singh

**Abstract:** *Transit oriented development (TOD) is an effective urban planning technique that addresses the present-day concerns of sustainability. It relies on integrating land use and transport network systems. It is the concept with utmost effective solution for accommodating a better and controlled urban growth. Although, National TOD policy is already been published by the Indian Government and it has envisaged a substantial optimistic influence in eradicating problems. India is one of the fastest growing economies of the world and is also the second most populous nation, furthermore it has a rapidly growing urban population owing to which the cities are facing severe problems and challenges related to mobility, congestion and subsequently pollution. Even though, a diversity of criteria and indicators are listed by various authors that impacts the use of TOD techniques. Nonetheless, every country has its own challenges and problems for applicability and effective implementation of TOD. This paper attempts to identify those challenges pertaining to adoption and implementation at the urban body level. The study mainly adopts primary means of data collection. It reviews policies and case studies and captures the stakeholder's perception on the identified concerns from the secondary study.*

**Keywords:** *Transit oriented development, policy, sustainable development, public transport, measuring criteria, Indian cities.*

## I. INTRODUCTION

Globalization and urban development have led to tremendous traffic expansion and even increasing the number of journeys made by private motorized vehicles to travel from one place to another. Thus, leading to road congestion, harmful gas emission leading to environmental deterioration and endless severe problems without any solutions. Thus, there is a need to make environment sustainable which will act as a potential countermeasure to the abovementioned problems. Sustainable growth can be achieved through, the crucial element is the organization of land use planning with transportation system planning for which the most suitable tool is TOD i.e., Transit Oriented Development. TOD is a concept which develops good transit system such that an area could be developed which is less automobile-dependent land. Transit oriented development (TOD) is an effective urban planning technique that addresses the present-day concerns of sustainability. It relies on integrating land use and transport network systems. It is the concept with a greatest effective solution for accommodating a better and controlled urban growth.

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Although, National TOD policy is already been published by the Indian Government and it has envisaged a significant optimistic influence in eradicating problems. According to Petkar, A. S., & Hamand, S. S. (2013) India is one of the fastest growing economies of the world and is also the second most populous nation, furthermore it has a rapidly growing urban population owing to which the cities are facing severe problems and challenges related to mobility, congestion and leading to pollution. Even though, a variety of criteria and indicators were listed by various authors that measure the uses of TOD techniques. Nonetheless, every country has its own challenges and problems for applicability and effective implementation of TOD. This paper attempts to recognize the challenges pertaining adoption and implementation at the urban body level. The study mainly adopts primary means of data collection. It reviews policies and case studies and captures the stakeholder's perception to identify concerns from the secondary study.

Applicability of TOD can act as an ideal tool in Indian context in this present scenario. So, an attempt to review, the application of TOD in India is done by understanding the policies developed for various cities at different level. Since, land use and transportation development in any study area exists in the form of a new alternative transit system, so that public transit ridership could be improved and finally proposing a reoriented and redeveloped area. Therefore, the understanding of the policies of various cities and towns is done through the scale of criteria and indicators developed through the study of vast literature.

## II. TRANSIT ORIENTED DEVELOPMENT

Basically, Transit Oriented Development (TOD) is a concept majorly focusing on the reconnecting transport system and land use planning with a rule of integrated planning. This tool is an ideal strategy to increase the use of public transport, walking activity and finally, reducing the urban sprawl and making more sustainable comfortable places. Even Calthrope (1993), added further that TOD majorly emphasize on the design and arrangement based on pedestrian-oriented movement and even strengthening the use of public transportation.

TOD is defined as a development within a specified geographical area around a transit station with a variety of land uses and a multiplicity of landowners by Salvensen (1996) whereas Bernick and Cervero (1997) defined it as a compact, mixed-use community centered around a transit station that, by design, invites residents, workers, and shoppers to drive their cars less and ride mass transit more. And finally, Lund et al,

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(2004) discussed TOD as an intention to increase transit ridership, increase walking and biking, and decrease the share of automobile trips. The design and mixed-use features of TOD may reduce both work and non-work automobile trips. Further, to review the studies authors had two intentions – first to check whether TOD is applicable to their area i.e., TOD- ness of that area and if the area is ready to be applied the TOD, then what should be the policies amendments to make that application successful.

## I. STRATEGIC PLANNING AND ASSESSMENT PROCESS FOR TOD WITH CRITERIA AND INDICATORS

According to the above review of existing literature, a few criteria and indicators are identified to measure the applicability of TOD in any area (Table 3). All those criteria have their own rulers of dimension for inspecting which have been discussed in other paper.

Table 3. List of ideal criteria with their indicators

CRITERION	INDICATORS
<b>INSTITUTIONAL SUPPORT</b>	<ul style="list-style-type: none"> <li>• Is the TOD government recognized?</li> <li>• Support of the local for a precinct zoned for TOD.</li> <li>• Availability of public subsidies.</li> <li>• Support of state agencies for TOD.</li> <li>• An active encouragement of TOD through public-private partnership</li> <li>• Existence of a implementation body.</li> </ul>
<b>QUALITY OF CITYSCAPE</b>	<ul style="list-style-type: none"> <li>• Vibrancy - population and commercial density</li> <li>• Attractiveness- street pattern</li> <li>• Diversity of land uses- location efficiency, efficient land use pattern</li> <li>• Quantity of mixed use structures</li> </ul>
<b>HEALTH, SAFETY AND ENVIRONMENT</b>	<ul style="list-style-type: none"> <li>• Safety and perception</li> <li>• Spaces dedicated to pedestrians</li> <li>• Accessibility by non- motorised transport mode</li> <li>• Walkability and cyclability- use of alternative transit modes</li> <li>• Livability- quality of air, health</li> <li>• Quality of mixed use development</li> </ul>
<b>ECONOMIC DEVELOPMENT</b>	<ul style="list-style-type: none"> <li>• Employment and business density</li> <li>• Estimated increase in property value</li> <li>• Estimated amount of private investment</li> <li>• No. of retail establishments</li> <li>• Estimated amount of private investment by type of land use</li> <li>• Financial return</li> </ul>
<b>TRAVEL BEHAVIOR</b>	<ul style="list-style-type: none"> <li>• Transit ridership- comfortable ride</li> <li>• No. of transits connecting to transit stations and their distance (utilisation)</li> <li>• No. of parking- for commuters, residents and shared parking</li> <li>• Mode of connections to transit station (Non- motorized and walkable environment)</li> <li>• No. of intersections</li> </ul>

### SOCIO-CULTURAL IMPACT

- Public participation- measured by resident and merchant surveys
- Safety and security
- Ownership
- Residential diversity
- Opportunities for advancement

Above mentioned, list of criteria is used as a tool to understand the policies developed for different cities and towns of India as TOD is a concept which needs to be renewed and renovated according to the requirement of that region. So, understand the policies of Indian cities, firstly it is required to study India which is discussed below.

## III. TOD IN INDIA

Urbanization in India is developing at a very large scale due to which major cities are accommodating a major population leading to extension of municipal limits ending to upsurge use private transit systems for travelling one place to another. India is struggling with the quickest developing nations in the world and with the development more and more towns are converting into cities comprising half of the population (Rawal,2014).

Urbanization is seen all over the world but majorly in Asia which has led to horizontal growth of the cities thus generating problems of urban sprawl leading to concentration of more economic opportunities and thus, increase in trip with higher usage of private vehicles, leading pollution and increased demand of infrastructure (Petkar, A. S., &Hamand, S. S.,2013). To tackle these concerns, many cities have reinforced their public transport by developing Mass Rapid Transit Systems (MRTS) such as metro rails and Bus Rapid Transit System (BRTS). It is however, it is essential use of these systems efficiently by amalgamating the land use with the transport infrastructure to make the cities livable, healthy and smart.

Hence, planning for the accessibility is the need of the hour with planning of increased density as well as improved connectivity which can be done with the help of TOD. A sustainable strategy is mandatory to sustain the fiscal growth and the problems arising due to the growth.

## IV. TYPES OF TRANSIT ORIENTED DEVELOPMENT IN INDIA

Based on vast literature, TOD policies are planned for the major cities and towns are classified under three sections mentioned below (Sinha. M., Ministry of Urban Development Government of India, 2016).

1. Area Level TOD
2. City Level TOD
3. Station Level TOD

Thus, the table below shows the critical analysis of the policies declared by the government of different cities and towns on the measuring scale of the criteria and indicators identified above, separately on the classification of the TOD level done above. Firstly, the table below classifies the assessment of TODs in India at area level.



Table 2. Assessment of TODs in India at Area Level

CRITERION	INSTITUTIONAL SUPPORT	QUALITY OF CITYSCAPE	HEALTH, SAFETY AND ENVIRONMENT	ECONOMIC DEVELOPMENT	TRAVEL BEHAVIOR	SOCIO-CULTURAL IMPACT
<b>DELHI</b>	<ul style="list-style-type: none"> <li>• DDA Act, 1957</li> <li>• Delhi has its master plan and has an entire section dealing with the provision of TOD (UTTIPCEC 2012).</li> </ul>	<ul style="list-style-type: none"> <li>• 3 zones- Intense, Standard and TOD Transition Zone</li> <li>• 11297 Persons/Sq. Km</li> <li>• - 30% residential</li> <li>- 10% commercial</li> <li>- 10% social</li> <li>- 50% as/zonal land use plan.</li> <li>• min. area 1 Ha</li> <li>• Ground Coverage 40%</li> <li>• FAR 4   No height restriction</li> </ul>	<ul style="list-style-type: none"> <li>• 30% minimum mandatory residential, -50% 32-40sqm -50% 62sqm to ensure affordability for LIG/ MIG group.</li> <li>• Provision for rental housing for students, couples, migrants etc.</li> <li>• Extra and mandatory 15% EWS FAR is provided.</li> </ul>	<ul style="list-style-type: none"> <li>• No identified financial model</li> <li>Expected Resources: Sale of FSI EDC Charges Betterment Charges</li> </ul>	<ul style="list-style-type: none"> <li>• 1.3 ECS/ 100sqm built-up</li> <li>• Unbundled from property</li> <li>• 50% of parking should be shared parking.</li> </ul>	<ul style="list-style-type: none"> <li>• No front setback with active frontage</li> <li>• Side &amp; rear Setbacks to be handed over to local bodies as constructed roads for the public use.</li> <li>• 250m c/c spacing for vehicular street network. 150m c/c spacing for pedestrian network.</li> <li>• Need of LAP has been discussed in various meeting but no work has been done on it yet. 500m.</li> <li>• Pedshed area will be marked on ZDP according to existing road network.</li> </ul>
<b>BENGALURU</b>	<ul style="list-style-type: none"> <li>• BDA Act, 1976</li> <li>• Bengaluru has tried to add in its Station Area Plan (SAP).</li> <li>• New master plan is under revision and not yet in the public domain.</li> </ul>	<ul style="list-style-type: none"> <li>• Population- 8.43 Million</li> <li>• Density- 134 Persons/ Hectare</li> <li>• As per Karnataka Urban Development Department FAR 4.</li> <li>• Within 150m radius from metro terminals</li> </ul>	<ul style="list-style-type: none"> <li>• Do not have any separate all-inclusive policy on TOD.</li> <li>• Pedestrian and cycling tracks are to be increased within 500m of the metro stations to increase pedestrian connectivity.</li> </ul>	<ul style="list-style-type: none"> <li>• Policies in terms of land value capture is similar to Ahmedabad.</li> </ul>	<ul style="list-style-type: none"> <li>• Public transport, feeder services, walkability and accessibility around the metro are yet to be developed.</li> </ul>	<ul style="list-style-type: none"> <li>• Lack of pedestrian and lack of ventilation and light</li> <li>• Incentives in the form of affordable housing is found around the Indiranagar metro.</li> </ul>
<b>MADHYA PRADESH (BHOPAL)</b>	<ul style="list-style-type: none"> <li>• BRTS+ Proposed MRTS</li> <li>• UMTA/ MPUCD</li> <li>• UADD</li> <li>• BDA</li> <li>• BMC</li> <li>• BCLL</li> </ul>	<ul style="list-style-type: none"> <li>• Population- 1.79 Million</li> <li>• Density- 2616 Persons/ Sq. Km</li> <li>• 30% FAR- Residential</li> <li>• 10% FAR- Commercial</li> <li>• 10% FAR- Community facilities</li> <li>• 50% FAR- Mixed Uses</li> </ul>	<ul style="list-style-type: none"> <li>• Intermodal integration within 200m from each other.</li> <li>• Coordination of local feeder transit service.</li> </ul>	<ul style="list-style-type: none"> <li>• Significant center of economic and community activity &amp; offices of the city as well as a moderate mix of retail.</li> </ul>	<ul style="list-style-type: none"> <li>• Prioritization of public transport and Non-motorized private modes.</li> <li>• Adequate amenities for pedestrians, cyclists, NMT and public transport users.</li> </ul>	<ul style="list-style-type: none"> <li>• Consideration of the old parts of the city with significant historical, cultural and architectural characteristics.</li> </ul>

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<b>MUMBAI</b>	<ul style="list-style-type: none"> <li>Mumbai Metropolitan Regional Development Authority (MMRDA)</li> </ul>	<ul style="list-style-type: none"> <li>Population- 12.4 Million</li> <li>Density- 31700 Persons/ Sq. Km</li> <li>53%- On foot</li> <li>47%- Motorized trips</li> <li>78%- Public transport</li> <li>500m x 500m area of each station for higher FSI incentives</li> <li>Premium FSI- 2 to 8</li> <li>At least 20% to be non- residential</li> </ul>	<ul style="list-style-type: none"> <li>500 meters of the station bring a new urban form of higher built-up densities, large plot sizes with significant on-plot parking provisions.</li> <li>Providing safe and sustainable transportation systems.</li> </ul>		<ul style="list-style-type: none"> <li>High pedestrian footfall for a 10-12 min walking distance from the station</li> <li>Ensuring adequate accessibility for transportation</li> <li>Augmenting/ strengthening of public transport systems.</li> <li>Traffic and pedestrian safety management</li> </ul>	<ul style="list-style-type: none"> <li>Diverse range of affordable housing types; these include old MHADA colonies, police quarters, old four-storied walk-up apartment buildings, urban villages and newer slum clusters.</li> <li>At least 30% to be LIG</li> </ul>
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Evaluated from Master plan of Delhi 2021, Master Plans of Mumbai, Madhya Pradesh (Bhopal) and Bengaluru. Now, the table below classifies the assessment of TODs in India at city level.

Table 3. Assessment of TODs in India at City Level

CRITERION	INSTITUTIONAL SUPPORT	QUALITY OF CITYSCAPE	HEALTH, SAFETY AND ENVIRONMENT	ECONOMIC DEVELOPMENT	TRAVEL BEHAVIOR	SOCIO- CULTURAL IMPACT
NAYA RAIPUR	<ul style="list-style-type: none"> <li>CIDCO</li> <li>Sea woods</li> </ul>	<ul style="list-style-type: none"> <li>Total Area- 40 Acres</li> </ul>				
NAVI MUMBAI		<ul style="list-style-type: none"> <li>Mixed Use Core</li> <li>High Density Transit Corridor</li> <li>Development as per the contours.</li> </ul>	<ul style="list-style-type: none"> <li>Hierarchy of greens connecting amenities within walkable distance</li> </ul>		<ul style="list-style-type: none"> <li>Multimodal Transit</li> <li>Interconnected Street Pattern</li> <li>Walkability</li> </ul>	<ul style="list-style-type: none"> <li>Streetscape Design</li> <li>Compact Development</li> </ul>

Drawn from Reports of Naya Raipur and Navi Mumbai

Finally, the table below classifies the assessment of TODs in India at a smaller level i.e., at station level.

Table 4. Assessment of TODs in India at Station Level

CRITERION	INSTITUTIONAL SUPPORT	QUALITY OF CITYSCAPE	HEALTH, SAFETY AND ENVIRONMENT	ECONOMIC DEVELOPMENT	TRAVEL BEHAVIOR	SOCIO- CULTURAL IMPACT

<p>AHMEDA BAD</p>	<ul style="list-style-type: none"> <li>• AUDA</li> <li>• GTPUD A, 1976</li> <li>• Ahmedabad has outlined Transit Oriented Zone (TOZ) in its development plan and even in the making of its Local Area Plan (LAP)</li> </ul>	<ul style="list-style-type: none"> <li>• Total registered vehicles: 24,00,000</li> <li>• Total road accidents year 1888 in 2014 (250 Fatal)</li> <li>• 12000 Persons/Sq. Km</li> <li>• Uses allowed in a TOZ are: Residential-1&amp;2, Assembly-1,2 &amp;3, Religious, Business, Educational-1&amp;2, Institutional, Mercantile-1,2&amp;3, Storage, Transport, Hospitality, Sports and Leisure, Parks and Temporary Uses (according to market)</li> <li>• No Ground coverage restrictions</li> <li>• FAR 4</li> </ul>	<ul style="list-style-type: none"> <li>• No such strategies for affordability in Transit Oriented Zone.</li> <li>• Separate affordable housing zone and TPS has provision of affordable housing for urban poor.</li> </ul>	<ul style="list-style-type: none"> <li>• Implementation of TOZ can be funded by AMC and AUDA through various mechanisms identified in LAP, example- sale of FSI, sale of land identified through TP Schemes, Public Private Partnership for improvement of public open spaces, advertisement rights etc.</li> <li>• A special tax – “betterment charge” – on property within 250 m of transit corridor</li> </ul>	<ul style="list-style-type: none"> <li>• 10% relaxation for commercial parking.</li> </ul>	<ul style="list-style-type: none"> <li>• Setbacks to be used for pedestrian access</li> <li>• LAP includes overall mobility, pedestrian accessibility, public transport, public open spaces, amenities infrastructure and enhancement of overall neighborhood character.</li> <li>• East zone has been divided in 23 LAPs and West Zone has 26 LAPs.</li> <li>• 10 LAPs from West zones; completed by AMC &amp; AUDA.</li> <li>• Will be submitted to Government by November 2016.</li> </ul>
<p>KOCHI</p>	<ul style="list-style-type: none"> <li>• Greater Cochin Development Authority (GCDA)</li> </ul>	<ul style="list-style-type: none"> <li>• 70% of Indian data traffic.</li> <li>• Population is 1.67 million</li> <li>• Density- 2600 Persons/ Sq. Km.</li> <li>• FSI in TOD Area – 3</li> </ul>	<ul style="list-style-type: none"> <li>• Modeled from the Report of Station Area Planning of Ahmedabad and Kochi Metro Rail Project.</li> </ul>	<ul style="list-style-type: none"> <li>• Sale of Area Additional FAR along Metro.</li> <li>• Cess on Property Transactions and Place Making</li> <li>• “Accessibility Tax” as part of property tax</li> </ul>	<ul style="list-style-type: none"> <li>• NMT and Place Making</li> </ul>	

**V. CONCLUSION**

The potential for TOD’s success will lead to ceaseless degree of dependence on the response of developers, real estate, consumers, density and transit accessibility and sustainable development and transit-oriented development are two most popular concepts amongst the planners across world. Based on the study of various policies of Indian towns and cities, inferences are discussed below. Firstly, Delhi follows strict norms whereas Ahmedabad has more market friendly approach. Ahmedabad is having its separate zone for affordable housing, concept of mixed income group of TOD is missing from TOZ. On the other hand, Delhi is trying to provide affordable housing in TOD but with the strict percentage, it can restrict the market to participate. Possible threats of encroachments like, parking, vendors, etc. which could block the passage and could resist the entry important services, in case of emergency. Delhi Transit Oriented Development policy is summed up by saying ‘One size fit to all. And even Delhi TOD policy includes typologies at different levels called city center TOD, suburban TOD, commercial TOD, Residential TOD. Therefore, it can be said that relaxing parking norms in commercial to promote public transport. Though the

resources of finance (direct collection and LVC) have been identified but use of revenue (generated from TOD), in TOD policies/ regulations is not ensured in Delhi. TOD policy of Delhi is not able to work on LAPs, due to lack of capability of Municipal Corporation whereas Ahmedabad: smooth integration of city and local level interventions whereas TOD policy of Bengaluru does not address the ‘nitty-gritties’ of street designing and accessibility. Due increase of FSI lack of natural ventilation and natural light is found. Thus, it can be concluded that lack of detail description or flexibility is seen in rules and regulations for TOD application is found in all other areas except Delhi.



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