Understanding The Reform Of Public Transit In India

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Abstract: Cities are the major sources of urban and economic development in developing countries and Transit Oriented Development (TOD) is broadly recognized as a policy to avoid congestion on major junctions, routes of an area by majorly focusing utilization of public transit, particularly making people walk and use non- motorized transport (NMT) specifically to make city environmentally sustainable. Be that as it may, TOD has to a great extent been a trendy expression in Indian strategy records for over 10 years, as the nation still anticipates its first completely executed TOD project. Thus, the main objective of this paper is to evaluate this strategy by understanding the feasibility this concept through two important TOD case studies of Delhi and Ahmadabad where the former has TOD in planning stage while the other in implemented. Thus, this paper will demonstrate the reforming of Indian city to a public transit oriented (PTO).

Keywords: Transit oriented development, evaluation, public transit oriented city, measuring criteria, etc

1. Introduction

Transit and transit-oriented developments (TODs) are achieving impetus all over the earth to increase transit sustainability. Much like western countries, Indian cities like Delhi, Ahmedabad, Mumbai, Pune, New Raipur, etc., are also focusing on the concept of TOD portrayed by compact planning by densifying inner areas where major activities are concentrated to make people walk and avoid use of their private vehicles. Since sustainable transportation is the aptitude to fulfill the desires of modern people to travel freely, communicate, access without being dependent on other resources so as to restore them for future generation. (Jain, 2018)

Indian cities have done considerable savings in construction of metro systems, with a small number of cities operating full-fledged metro. Likewise in Bengaluru, the invasion of community savings on transit and encouraging zoning enticement are attracting and a small portion of housing savings in transit-oriented developments (TODs). This paper compares TODs at Ahmedabad where TOD has been implemented and at Delhi where TOD resulted to planning stage only. The findings indicate the status of TODs at both the city level on the scale of the measuring criteria developed to understand the present scenario.(Joshi, 2017)

2. Scale For Calculating TOD

Copious authors have estimated a lot many several of method for evaluating the success of TOD in any area. Thus, interpretations of six main criteria with their indicators have been figured through the process of study of vast literature review which could be worn for measuring TOD in Indian studies. (Jain, 2018)

i. Institutional Support
ii. Quality of Cityscape
iii. Health, Safety and Environment
iv. Economic Development
v. Travel Behavior
vi. Socio- Cultural Impact

3. Criteria And Indicators For Analysis

CRITERION	INDICATORS
INSTITUTIONAL SUPPORT	• Is there any legal framework, implementation body, public subsidies available for TOD and active public-private partnership to encourage TOD?

QUALITY OF CITYSCAPE	• Vibrancy – population, residential and commercial density (service and retails establishments per sq. km) • Diversity of landuses • Quantity of mixed use $LU_d(i) = \frac{-\sum_i Q_{lu_i} \times \ln(Q_{lu_i})}{\ln(n)}$ $Q_{lu_i} = \frac{S_{lu_i}}{S_i}$ lu_i = land use class (1,2,.....,n) within the analysis area i Q_{lu_i}=Share of specific land use within the analysis area i S_{lu_i}= Total area of the specific land use within the analysis area i S_i = Total area of analysis i structures- Mixed- ness of residential $MI(i) = \frac{\sum_{ni} S_c}{\sum_{ni}(S_c+S_r)} \quad \forall i$ Where, *MI* is the 'Mixed-ness Index' for area of analysis *i*, *Sc* shows sum of the total area under non- residential urban land uses *Sr* represents the sum of the total area under residential land use within *i*,. The value of MI ca range from 0 to 1 and balanced mixed- ness of land use is 0.5 implying equal share of residential land use with other land uses. (Singh, 2014)
HEALTH AND ENVIRONMENT	• Spaces dedicated to pedestrians- quantity of accessible path • Intersection density • Livability- quality of air, health (Secondary sources can be used to identify this indicator, to find out the readiness of the station for TOD.)
ECONOMIC DEVELOPMENT	• Employment density • Number of business establishments
TRAVEL BEHAVIOR	• Passenger loads- in and off peak hours • Service frequency of transit system in peak hours • No. of transits connecting to transit stations and their distance (utilisation)- connections to different routes • No. of intersections- interchange to other mode • No. of parking- for cars and cycles (Providing parking of cars and cycles helps riders to park and ride for longer commutes.)
SOCIO-CULTURAL IMPACT	• Safety and security (Hardest thing to identify thus, number of people present at the stations through number of shops and eating joints) • Literacy rate (Number of persons literate per square kilometer.) • Residential diversity- ethnic diversity (This indicator is calculated on the basis of diverse cultures present in the neighbourhood.)

The above tale concludes that **Local government** and **implementing body** plays major role with respect to other bodies and for this major changes has been proposed in FAR Norms by planning bodies .Where as **Sidewalks; cycle tracks** and even other enhancing elements have lots of importance in a success of TOD in an area and thus, plays a vital role in quality of cityscape. A good variety of trees to remove **air and noise pollution** is required, similarly installments **of cameras and scanners** with proper establishment of **police post and lightings** also plays major role to make environment more healthy and safe for the people to reside in. Similarly, **Diversity in employment** as well as **income groups** goes hand in hand for economic development in which increase in number of **transit modes** with best **connectivity** is required the most will improve the travel behavior and thus, creating a socio- cultural impact from the eyes of **mixed land use** with **affordability** is essential for better **neighborhood.**

After creating a scale to measure the impact of upcoming project of TOD or implemented TOD project, this paper attempts to understand the difference in TOD exercises made by both of the cases individually i.e. **for upcoming project of TOD,** two case studies from Delhi (Karkardoma and Trilokpuri) is taken and for comparing **upcoming project of TOD and implemented TOD project,** Delhi and Ahmedabad is compared on the above mentioned scale.

Comparison Of Tod Excercises In Delhi On The Criteria Evaluated (State Level)

CRITERION	KARKARDOMA	TRILOKPURI
INSTITUTIONAL SUPPORT	• DDA, DMRC, GNCTD, NDMC, PWD, UTTIPEC, etc.	• DDA, DMRC, GNCTD, NDMC, PWD, UTTIPEC, etc.
HEALTH AND ENVIRONMENT	• Spaces dedicated to pedestrians- quantity of accessible path **21 m** • Livability- quality of air, health- **181 (Unhealthy)- API** • Presence of information display system- **Sound and Convenient**	• Spaces dedicated to pedestrians- quantity of accessible path **25 m** • Livability- quality of air, health- **324 (Very Poor)- API** • Presence of information display system- **Sound and Convenient**
TRAVEL BEHAVIOR	• Passenger loads- in peak hours – 90% (too crowded) • Passenger loads- in off peak hours- 50% • Service frequency of transit system in peak hours – **3-4 mins.** • No. of transits connections – **Bus- 39A, 313, 473, 202**	• Passenger loads- in peak hours – 90% (too crowded) • Passenger loads- in off peak hours- 50% • Service frequency of transit system in peak hours – **4-5 mins.** • No. of transits connections– **Bus- 118E, 306, 248, 349, 349A**
SOCIO-CULTURAL IMPACT	• Safety and security • Literacy rate **HIG**	• Safety and security • Literacy rate **LIG**

4. TOD Concepts Adopted In The Ahmedabad City

The land-utilizes focal commerce locale incorporating workplaces, vend and different commerce regions, alongside private turns of events. CBD is reinforced by transport course to dole out solely and interfacing with BRTS along with MRT. It is expected that the zone might advance with boosting recovery focal zone by converting into a lively, blended, travel situated, pedestrianized CBD.

• **Density:** The uncommon zones, distinguished along the BRTS and the proposed MRTS will be subjected to higher FSI of 4.0 inside TOZ.

•**Diversity:** The land-use dissemination inside the upshot zone is adaptable comprehensively set apart blending the bazaar to choose (BRT, 2014).

•**Parking the executives and NMT:** A piece of the current CBD region corresponding to the stream front advancement is proposed to be a person on foot just zone. Stopping standards are proposed to be changed.

•**Housing:** Low-pay lodging id proposed along the downtown area utilizing for restoring the city ghetto tenants. According to improvement "hubs of crossing point" with the current BRTS passageways stretching out open transit in the area, will prompt a advancement next to the fringe of the city.

Comparison Of Tod In Delhi And Ahemdabad On The Criteria Evaluated (National Level)

CRITERION	DELHI	AHEMDABAD

INSTITUTIONAL SUPPORT	• DDA, DMRC, GNCTD, NDMC, PWD, UTTIPEC, etc. • Necessitate of LAP has been discussed many a times still no effort has been done on it yet. **Due to involvement of many institutions, Delhi is unable to effort for LAPs**	• AUDA, AMC • Private Sector • 23 LAPs are found in East Zone and West Zone has 26 LAPs. **Even distribution of city and local level interventions**
QUALITY OF CITYSCAPE	• **Intense, Standard and TOD Transition Zone**- Zonal distribution of TOD • **11297 Persons Per Sq. Km** with **min. area of 1 Ha** , Ground Coverage- 40%, **FAR- 4 | No height restriction** **30% mandatory residential for increasing population density.**	• **Landuses are clearly mentioned in TOZ** • **There are no restrictions on Ground coverage, FAR- 4** • Up to 60m ROW : Max. Height 45m 60m & above ROW: Max. Height 70m **Increase in population density is not ensured.**
HEALTH AND ENVIRONMENT	• 30% minimum mandatory residential, **-50% 32-40sqm** **-50% 62sqm** to ensure **affordability for LIG/ MIG group**. • Provision **for rental housing for students**, couples, migrants etc. • Extra and mandatory **15% EWS** FAR is provided. **Delhi has worked for providing affordable housing in strict % for TOD**	• **Strategies for affordability in housing or anything is not seen in Transit Oriented Zone.** • Separate zones and provisions for affordable housing schemes are in TPS
ECONOMIC DEVELOPMENT	• Extra charges will be charged on FSI, irrespective of landuse/ terms and conditions • **No identified financial model** • Expected Resources: Sale of FSI , EDC Charges and Betterment Charges **FSI rates for commercial and residential are standardized having its own pros and cons**	• Additional FSI has to be purchased • LAP has mentioned the funding of implementation of TOZ by AMC and AUDA, example- **sale of FSI**, sale of land identified through TP Schemes etc. • **"betterment charge" – a unique tax on property within 250 m of transit corridor**
TRAVEL BEHAVIOR	• **1.33 ECS/ 100sqm** built-up • **Parking should be shared parking on the scale of 50%** • Pedshed of 500m area as per the accessible road network will be marked on ZDP **One size fits to all TOD typologies:**	• **10% relaxation for commercial parking.** • Pedestrian accessibility, public transport, mobility, public open spaces, amenities infrastructure and enhancement of overall neighborhood character is included in LAP **Relaxing parking norms in commercial: Promote PT**

SOCIO-CULTURAL IMPACT	• Local bodies are supposed to constructed roads on side and rear setbacks for the public use. • Active frontage is planned thus, no setback. • 150m c/c spacing is planned for pedestrian network in 250m c/c spacing for vehicular street. **Promising fear of encroachments which could obstruct the passageway and even could defy the access of essential services in case of emergency.**	• Setbacks to be used for pedestrian access

5. Inferences

Ahmadabad has **more welcoming approach** as compared to Delhi having **strict norms**. **Separate zone for affordable housing**, and not mixed with TOD planning in Ahmadabad. On other hand, Delhi is **trying to provide affordable housing in TOD** but **with the strict % norms** and thus, follows a concept of **"One size fits to all"**. **Lack of expertise** and **collaboration** within different bodies are seen in planning and implementation if TOD in Delhi. Ahmadabad's norms relating to Urban Design (setback, building heights, active frontages), permissibility of uses and parking in the TOD notified zone, are the same as across rest of the city (AUDA, 2015). Similarly, **lack of support** and **Involvement of political** department in instant decisions are seen in case of Delhi and thus resulting in lack of many infrastructural requirements especially **urbanisable land** and **reluctance in mode of travel.**

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