

# The Rationale for Making Indian Urban Development Compact and Transit-Oriented

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## Abstract

*The Indian metropolitan cities have witnessed tremendous growth trends with compounded infrastructure and management problems in the post economic-reforms era of late twentieth century. Transit Oriented Development (TOD) combined with compactness is a multi-dimensional approach advocating close knit, high density, mixed use, accessible and public transit adjacent development. In a developing country like India, where several high budget public transit projects are being planned across many cities, TOD can serve as a toolkit for integrating land use and transportation, to conserve land, and plan compact, highly accessible settlements wherein all daily requirements can be accessed with ease by walking, cycling or use of public transport.*

*This paper attempts to understand the central principles of TOD through an analytical look at certain settlements in Europe promoting use of public transit. This is followed by a discussion on the unsustainable urban growth trends witnessed in India in the last two decades and the rationale for adopting an approach of TOD in the context of planning proposals of various public transit systems in Indian cities.*

**[Keywords:** compact, high density, mixed-use, accessible, public transit]

## 1. Introduction

The era of privatization and globalization in India has altered the pattern of compact, transit oriented city development. Since 1991, there has been a huge boom in auto-industry of India. The promotion of private auto-oriented development coupled with increase in real estate investment has led to large scale housing projects coming up haphazardly along the city fringe areas. Huge parcels of fertile agricultural land continue to be utilized for large scale housing projects causing serious ecological imbalance. These projects lack basic infrastructure facilities including a connection to city public transport system. It is extremely vital to curb this unsustainable growth of urban areas. The availability of

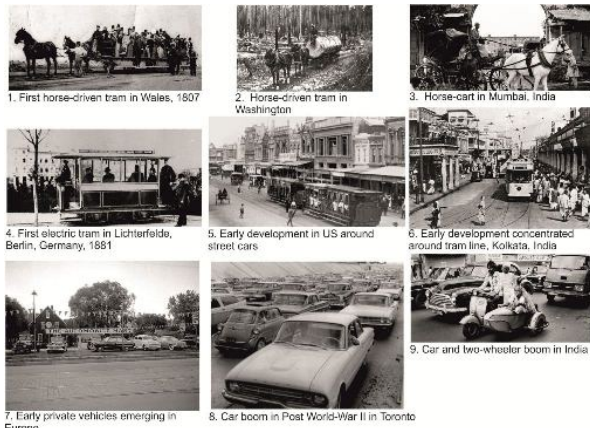
land as a resource is limited and therefore its cautious use is extremely important.

Several large scale transit projects are being planned in many metropolitan cities. The city development plans and comprehensive mobility plans of many cities make a mention of Transit-Oriented Development as a "tool for integrating transport and land use." However, in the name of TOD, intensive development is planned along the transit corridors to partly recover the huge investments done in transit development.

This paper therefore attempts to understand the real principles of TOD through analysis of available literature and a brief study of certain settlements in Europe promoting use of public transit. This analysis would then form the basis for developing a rationale for making Indian urban development compact and transit-oriented.

## 2. Relationship between transit and land use

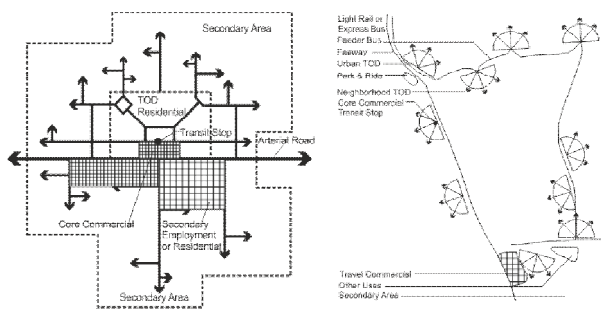
The Post World War II planning principles of strict zoning and over segregation of land uses altered the process of urban development which had traditionally been transit adjacent. Cities have been partially shaped by their transportation modes- whether walking, animal-drawn carts, streetcars or automobiles. Most of the urban design principles which we speak today have already existed before the advent of the automobile. Thus, the challenge faced today is to alter the pattern of urban development which currently encourages the use of private automobile instead of public transport. [1]



**Figure 1: Evolution of transit modes:**  
Sources: 1. (BBC Mobile News India) 2. (Oberghell), 3. (BBC Mobile News India), 4. (First electric tram, Siemens, 1881) 5. (authority), 6. (Nithin), 8. (<http://basementrug.com>) 9. (BBC Mobile News India)

**3. Transit-Oriented Development: Theory**

The term Transit-Oriented Development (TOD) is believed to have been coined by Peter Calthorpe. He has articulated the urban design related principles of TOD in his book, “The Next American Metropolis” written with associate Shelley Poticha in 1993. He defined Transit-Oriented Development as “A mixed-use community within an average 2,000 feet walking distance of a transit stop and core commercial area. Transit-oriented developments mix residential, retail, office, open space, and public uses in a walkable environment, making it convenient for residents and employees to travel by transit, bicycle, foot or car.” [2]. He proposed the following TOD Model:



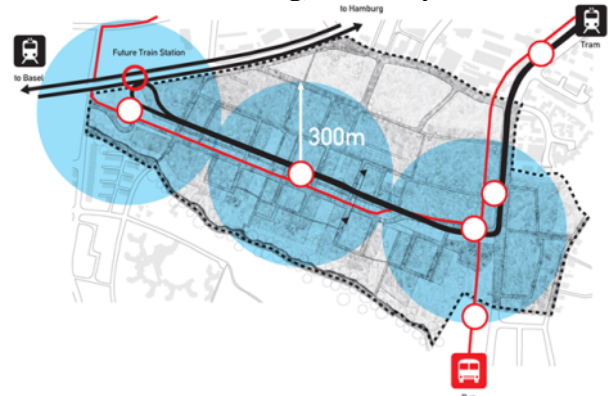
**Figure 2: TOD Model- Peter Calthorpe**  
Source: Retraced by author. Ref: Calthorpe, 1993

**3.1 Transit-Oriented Development: Principles**

TOD principles given by Salvensen, Bernick and Cervero, Scott Lefaver, Porter, Boarnet and Crane, Maryland Department of Transportation, California Department of Transportation and Oregon Department

of Transportation lay stress on five aspects, compact and high density, encourage public transit, mix-use, ease of accessibility to community facilities and pedestrian and bicycle friendly design. [3]

**4. Examples of TOD in Europe:**  
**4.1 Vauban-Freiburg, Germany**

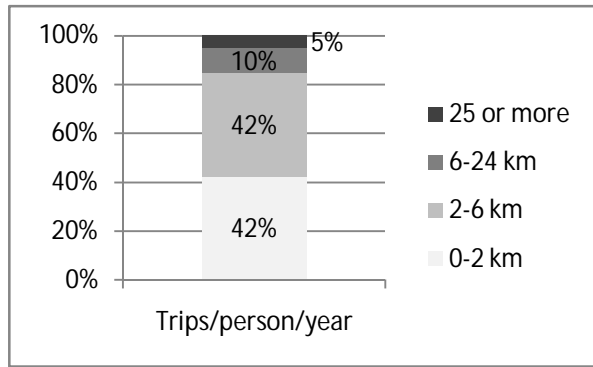


**Figure 3: Plan of Vauban Neighborhood Area, Germany**  
Source: Hesse

Vauban is a 38 hectare car-free housing with 5000 residents, located 3 km away from the city centre of Freiburg. The housing area is very well connected to the city centre by a bus and a tram service. Facilities like school, shops and work places are located around the bus and tram stops. Buying a car parking space in Vauban may cost its resident as high as 17,500 € with additional monthly maintenance costs. This price is sometimes higher than the cost of car itself. (4). As a consequence, 46% of the Vauban residents have voluntarily decided not to own a car. 65% of the residents walk or cycle and 19% residents use public transport to travel to their workplaces and access other daily facilities. People not owning a car and members of car-sharing association receive Deutsche Bahn (German Railway) passes to travel at reduced rates around black forest region of Vauban and in Germany.



**Figure 4: Vauban-transit and land use integration**  
Source: Author (25-02-2012)

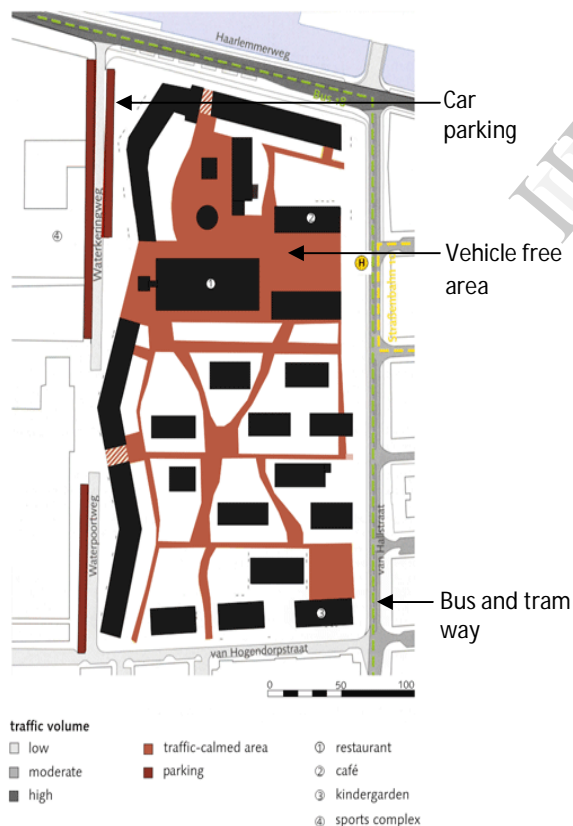


**Figure 5: Vauban-Trip distribution**

Source: Scheurer, 2001

**4.2 GWL Terrein-Amsterdam, Netherlands**

GWL Terrein is a small settlement located in the western district of Westerpark in Amsterdam, 3km away from historic city centre. The neighborhood was planned on a former water works site used by municipal water utility. It consists of 600 housing units accommodating a population of 1400 people.



**Figure 6: GWL Terrein Plan**

Source: ecologic-architecture.org

The ground level of neighborhood is raised from the adjacent road level, preventing the entry of cars and vehicles in the interior of the housing. Only 110 paid parking spaces are provided for 20% of the residents on the western edge of neighborhood. In this way the interior is made vehicle free, making it safe for children and residents to move freely. Facilities like school, recreational hall and 1400 sq.m of office space is a part of the neighborhood itself. GWL Terrein is well connected to the historical city centre and main railway station by a frequent bus and a tram service. As a result, 73% of the residents either walk or use a bicycle while 17% residents use public transport for travelling. [5]

**4.3 Promotion of walking, cycling and public transit in Europe**

Almost all the cities in Europe promote walking and cycling. Besides this, almost every European city has a well integrated transport system wherein the city tram and bus system is well connected to the regional transport system. This offers a choice to the commuters to select a suitable mode of public transit and also enables them to have quick interchanges between different modes of transport. The train stations, tram stops and bus stops act as community hubs.



**Figure 7: Promotion of walking, cycling and public transit in European cities**

Source: Author

**5. Unsustainable growth trends in India**

**5.1 Uncontrolled growth of private vehicles and lack of efficient public transit system**

Due to tremendous boom in auto industry, post the era of privatization and globalization, there has been an uncontrolled growth in the number of private 2-wheelers and cars.

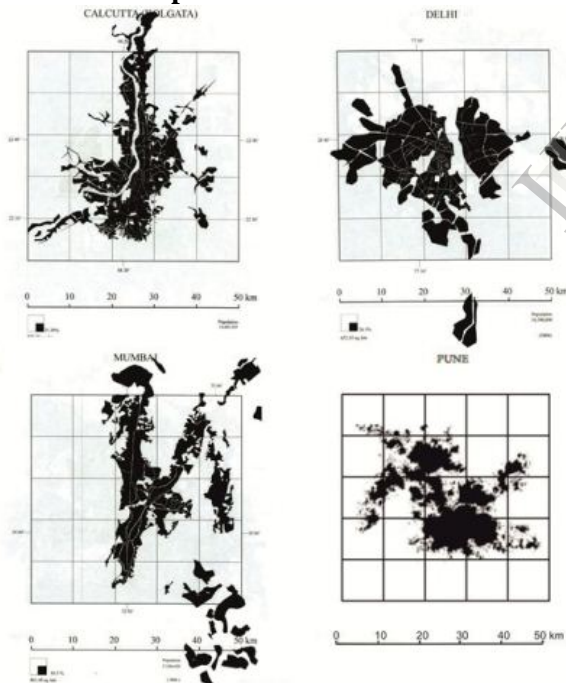
**Table 1: Growth of vehicles in India**

	1991 (Registered vehicles in millions)	2009 (Registered vehicles in millions)
Two-wheelers	14.2	82.4
Cars	3	15.3
Public buses	0.3	1.4

Source: Road Transport Year Book, 2007-09

Table 1 shows that the number of 2-wheelers in India had increased six fold from 14.2 million in 1991 to 82.4 million in 2009, with an average annual increase of 26.7%. Similarly, the number of cars had increased fivefold from 3 million in 1991 to 15.3 million in 2009, with an average annual increase of 22.8%. On the other hand, the number of public buses has grown by mere 11,600 in a span of 18 years, from 1.06 lakh in 1991 to 1.17 lakh in 2009 [6]. Thus, there were only 10 public buses per one lakh of population. While as per norms of Central Institute of Road Transport (CIRT), 40 buses are required for a population of one lakh. [7]

**5.2 Urban Sprawl of cities:**



**Figure 8: City foot prints**

Source: Bosselmann [8]

Figure 10 shows the footprint area for four cities of Kolkata, Delhi, Mumbai and Pune. The sprawl in the city suburbs is clearly evident from the figure. The city extends spread beyond the 50km by 50km grid. The boom in real estate industry and availability of comparatively cheap land in the city fringe areas has led to sprawling suburbs in many cities. This physical growth of cities is unsustainable as it results in sparse,

low density development in the city fringe areas. Also, in most cases, fertile agricultural land is utilized for housing purpose leading to serious ecological imbalance. There is a lack of an integrated approach towards transit and land use planning. Most of these suburban areas lack even the basic infrastructure facilities including a lack of connection to a public transit system.

**5.3 Lack of integration between transit and land use:**

The UDPFI Guidelines are considered as standard guidelines for planning a particular development. The guidelines specify the minimum number of schools, commercial space, recreational space, shopping, etc for a particular size of settlement but they do not make any mention of accessibility to these infrastructure facilities. As a result, though a particular settlement has all the necessary facilities, they may not be easily accessible by walking, cycling or by the use of public transit.

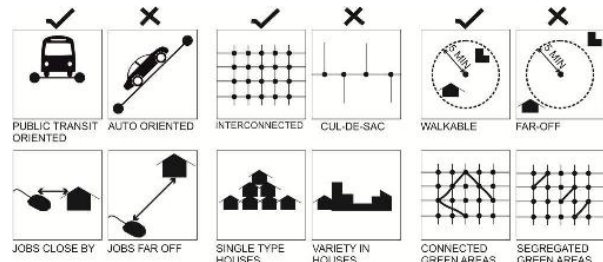
**5.4 Lack of consideration for pedestrians and cyclists**

Walking and cycling are non-polluting and sustainable modes of transport. A 2008 study of 30 cities showed that 16% -57% of all trips, involve no vehicles at all [9]. In spite of this, most of the Indian cities lack good footpaths for pedestrians, dedicated bicycle lanes and bicycle parking facility.

**6. Solutions and Conclusion:**

The above discussion clearly indicates that there is an urgent need for adopting an integrated planning approach for planning Indian cities. Currently, there are 53 cities in India having population of more than 1 million [10]. The city development plans and comprehensive mobility plans of many cities make a mention of Transit-Oriented Development as a ‘tool for integrating transport and land use,’ but do not propose any mechanism to achieve this. Some feasible solutions to achieve compact, transit-oriented development are suggested as below:

**6.1. Transit-Oriented Development Do's and Don'ts**

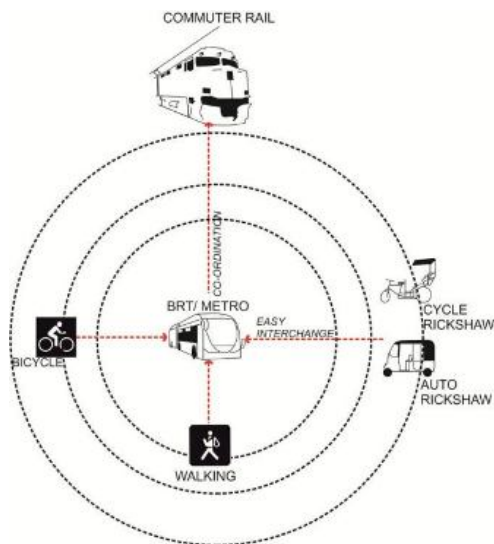


**Figure 9: TOD Do's and Don'ts**

Source: Author

- a) Plan new development that is public transit oriented and not auto oriented. Ensure that any upcoming development is well connected to the city public transport.
- b) An interconnected road pattern is efficient as compared to a cul-de sac road pattern as the former provides various alternative routes for travelling, better connection and helps to keep the trips as short as possible.
- c) Locate various facilities of daily requirement within a 5 minute walking distance.
- d) Locate good jobs in close proximity with residential areas. This helps to reduce the daily work trips done by using private vehicles.
- e) Locate a variety of housing types around a public transit corridor to offer a choice to the potential buyer as per his capacity.
- f) Plan green areas to be accessible and in the forefront. Do not consider green areas as left over spaces. [11]

**6.2. Planning an integrated transport system:**



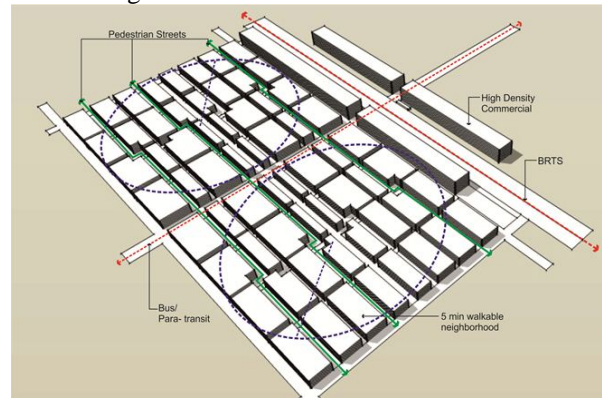
**Figure 10: Integrated transit system**  
Source: Author

From the examples of European cities, it is clear that the success of transit-oriented development depends upon the efficiency of transport system. The point of argument is not whether bus based or rail based rapid transit system is efficient but how well different modes of transit are integrated with each other. [Refer Fig 11]

**6.3. Have compact dense development to conserve land**

It is important to plan any upcoming settlement around a public transit corridor with easy access to the

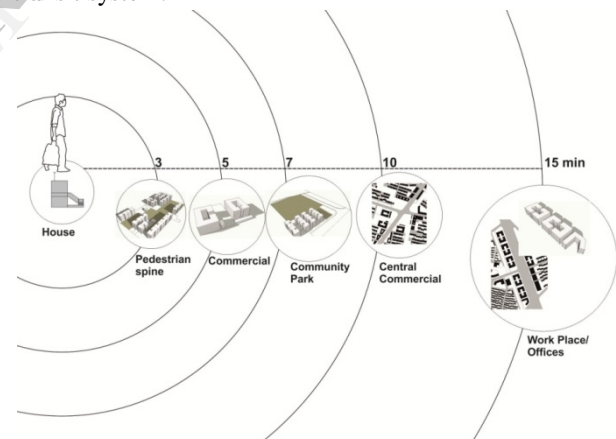
transit stop. Such settlements must be compact, high density, mixed-use and mixed-income settlements as shown in figure below.



**Figure 11: Compact, high density, mixed-use TOD**  
Source: Author

**6.4. Have ease of accessibility to all facilities of daily requirement**

All the facilities of daily requirement should be within walking distance as far as possible. In certain cases when the facilities cannot be accessed by walking or cycling, they should be well connected by a public transit system.



**Figure 12: Accessibility to facilities of daily requirement**  
Source: Author

**7. Conclusion:**

It is vital to take immediate steps to control the unsustainable growth trends in India. TOD can serve as a toolkit for integrating land use and transportation, to conserve land, and plan compact, highly accessible settlements wherein all daily requirements can be accessed with ease by walking, cycling or use of public transport. Though, TOD may not provide solutions to all the urban problems, it is surely an important approach as it concentrates on transit which is the backbone for any society to progress. TOD needs to be

seen as a new paradigm of sustainable development in India.

## References:

1. Dittmar, Hank, Belzer, Dena and Autler, Gerald. An Introduction to Transit-Oriented Development. [book auth.] Hank Dittmar and Gloria Ohland. *The New Transit Town*. Washington DC : Island Press, 2003, pp. 1-7.
2. Calthorpe, Peter. *The Next American Metropolis*. New York : Princeton Architectural Press, 1993.
3. *TOD and Joint development in the United States: Literature Review*. Chisholm, Guen. 2002, Research Results Digest, pp. 5-6.
4. Melia, Steve. *On the road to Sustainability-Transport and care-free living in Freiburg*. Bristol : Faculty of Built Environmen, 2006.
5. Scheurer, Jan. *Car-free housing in European Cities-a survey of sustainable residential projects*. Perth : s.n., 2001.
6. Wing, Transport Research. *Road Transport Year Book (2007-2009) Vol 1*. New Delhi : Ministry of Road Transport and Highways, Government of India, 2011.
7. PCMC, CRISIL. *Comprehensive Mobility Plan for Pimpri-Chinchwad Municipal Corpotation*. Pimpri-Chinchwad : s.n., 2008. p. 4.
8. Bosselmann, Peter. *Urban Transformation: Understanding City Form and Design*. s.l. : Island Press, 2008.
9. *On two legs and a payer*. R Gupta, R Menon, A Mishra, A Pallavi. April 30, s.l. : Down to Earth, 2009, Vol. 17, p. 23.
10. Commissioner, Office of Registrar General & Census. *Provisional Population Totals, Census of India, 2011*. New Delhi : Office of Registrar General & Census Commissioner, 2011.
11. Condon, Peter. *Seven Rules for Sustainable Communities: Design strategies for post carbon world*. Washington DC : Island Press, 2010.