

# Transit Oriented Development: Smart Growth as a Solution for Sprawl in Surat City

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**Abstract**— Urban sprawl and poor land use planning contribute substantially to traffic congestion, air pollution, and greenhouse gas emission. Public transport helps reduce sprawl by attracting development around transit stations and this development support public transport by encouraging ridership. The coordination between land use planning and transport system planning is crucial to a sustainable future. Transit Oriented Development is one of the tools promoting this integration. This paper includes the problems due to sprawl in Surat City and TOD is one of the solutions of sprawl in Surat City.

**Index Terms**—Problem of sprawl, Concept of TOD, Case Study

## I. INTRODUCTION

Surat City observed growth rate of 55.29 % in 2011 with the rise of population from 24, 33, 785 in 2001 to 44, 66,826 in 2011. Surat becomes mega city; hence job opportunities and wide scope are available for people, which like a magnet attract the people. So a person from rural area comes to urban area for employment and for other purposes which cause city to sprawl. Hence, Urban sprawl and poor land use planning contribute traffic congestion, air pollution and greenhouse gas emission. Also the outskirts of the city have to potential to accommodate the migrants, but it requires good accessibility and congestion free network. Public transport helps reduce sprawl by attracting development around transit stations. So the Integration between land use planning and transport system planning is crucial to a sustainable future and to reduce sprawl in city. Transit Oriented Development is one of the tools promoting this integration. Compact, mixed-use development in a walk- able environment near transit stations typically is referred to as “Transit- Oriented Development.”

This research paper highlights problem arises due to urban sprawl and its alternative solution to reduce the sprawl.

### Objective

To study the problem arises due to urban sprawl in Surat and propose Transit Oriented Development to reduce those problems.

### Sprawl in Surat City

Sprawl development is mainly characterized by dispersed, low-density and large scale Developments as well as automobile – oriented transportation (Littman, 2001).

Surat City observed continuously increase in area of 8.18 Sq.km in 1951 with rise of 326.51 Sq. km in 2011. So Surat city continuously faced sprawl which contribute traffic congestion, air pollution and greenhouse gas emission. Also the outskirts of the city have to potential to accommodate the migrants, but it requires good accessibility and congestion free network.

*Table I Area and Growth Rate of Surat City*

Year	1951	1961	1971	1981	1991	2001	2011
Area (Sq km)	8.18	8.18	33.85	55.56	111.16	112.27	326.51
Decadal growth	-	29.05	63.75	64.65	93.00	62.38	76.02

Source: [www.censusindia.com](http://www.censusindia.com)

Dispersion of urban land use over large areas leads to longer commutes thus increased car dependency causing traffic congestion, poor air quality and finally urban decay.

The Surat City has continuously growth in Vehicular population due to increase in population. The vehicles registered in Surat RTO area has raised from 8 lakh in 2003 to 20 lakh in 2013. In the absence of public transport system in the city, the rate of increase in auto rickshaws has been 116.94 % and increase in motor cars is 217.17 % per year. The percentage of personalized vehicles has increased from 70% to 88% within a span of twenty five years. So there is need of to encourage public transport and reduce usage of private car. So the study focus on the mixed land use planning using high rise high density concept by Transit Oriented Development to minimize the problems arises due to urban sprawl in Surat City.

### Concept of Transit Oriented Development

TOD was firstly introduced in 1990 by American Architect and Planner Peter Calthorpe. He defines TOD as a mixed use community within a 2000 feet walking distance of transit station and commercial core.

In India, the concept of TOD to plan and develop cities / regions has been used in various cities, few of which are National Capital Region, Hyderabad Metropolitan Development Authority and Ahmedabad Urban Development Authority. TOD has gained popularity as a means of redressing a number of urban problems including traffic congestion, affordable housing shortages, air pollution and constant sprawl. Transit Oriented Development is essentially any development, macro or micro that is focused around a transit node, and facilitates complete ease of access to the transit facility thereby inducing people to prefer to walk and use public transportation over personal modes of transport. This is an attempt to compact the cities and reducing dependency on the new urban developments in the periphery which highly encourage the shift from non- motorized to motorized modes of travel.

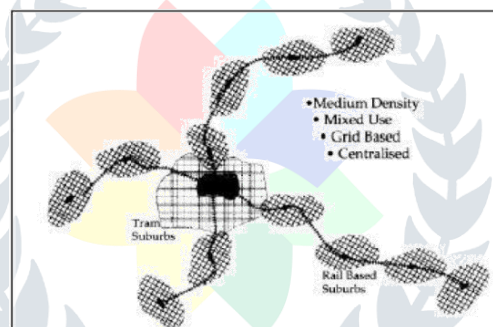
The primary goals of TOD are to:

1. Reduce/ Discourage private vehicle dependency and induce public transport use- through design, policy measures and enforcement.
2. Provide easy public transport access to the maximum number of people within walking distance- through densification and enhanced connectivity.

Typically, TOD occurs within 1/4 to 1/2 mile or within a 5 - to 10 - minute walk, of a transit station. TOD can create dense, walkable mixed- use areas around stations that generate economic development and more vibrant communities. TOD occurs within ¼ to ½ mile, or within 5 to 10 minute walk of a transit station.

TOD is characterized by:

- A mix of uses,
- Moderate to high density development
- Transportation choices, including walking, biking, and the use of transit
- Urban design and landscape features that integrates surrounding uses and streets
- Pedestrians oriented



**Figure I Concept of TOD**

Source: (Newman P.W.G and J.R Ken Worthy, "The land use- transport connection: an overview, land use policy 1996 13(1), pg. 1-22)

## Case Study

### Curitiba, Brazil

- **A model of Transit Oriented Planning:**

The Parana state of Brazil's capital city is known as Curitiba. Curitiba is the largest city and largest economy in southern Brazil and the 8th largest city in all of Brazil. The city has a population of 1.9 million people within an area of 430 sq. km. Curitiba's economy is based on industry, commerce, and services. Tourism is also a significant industry in Curitiba. Two million tourists visit the city per year. Curitiba has a long history of innovations in land use, transport and environmental management. The successful execution of its citywide transit system and integrated land use plan over the last four decades, has received further enhancements in 2009 and 2010 with new corridors and capability improvements on one of the existing bus ways.

Curitiba's urban growth strategy is a model for cities around the world. Available public transportation is prioritized when choosing housing and commercial building locations. The public transportation system is extraordinary in terms of its affordability for customers, the use of enclosed prepaid stations, and the combination of transfer terminals.

- **Curitiba paves way for sustainable communities:**

Curitiba has integrated public transportation planning into the overall city plan since the 1970s. In 1972, Curitiba shaped one of the world's first pedestrian malls in order to reduce vehicle traffic in a busy area. Today, public transportation is the main concern in Curitiba's long- term structural plan for urban development. High traffic areas such as shopping centres and high rise apartment buildings are easily located next to public transportation stations. This level of accessibility has compact automobile dependence. Curitiba's long term plan encourages dense land use by developing the city along existing bus routes.



**Figure II Conceptual linear TOD plan that became a reality**

- **Successful Urban Planning:**

Curitiba is regarded as an outstanding example of Transit Oriented Development (TOD, which implies that residential, business and recreational areas should be built in high density areas and close to public transport stations. In addition, rather than promoting segregated zoning of land uses, TOD proposes land use mix to decrease the travel distances. By coupling the growth of a pedestrian friendly community with an efficient low emission Bus Rapid Transit (BRT) system and lower car parking availability, Curitiba has effectively reduced the overall travel of its residents.

- **Expansion and growth of public transportation:**

Planning for Curitiba's next main project has already begun. New roads will be constructed near new residences and businesses, each with access to a new BRT route, the Green Line. For over 40 years, Curitiba has been able to successfully incorporate transportation and land-use planning. Such experience has also been a model for other large cities, mainly from emerging economies, which have decided to invest on BRT as the backbone of their public transport system. Curitiba has cooperated with private companies to develop buses which are accustomed to the needs of various types of transit routes.

## II. CONCLUSION

Integration of land use and transport planning system is necessary to sustain any cities which face urban sprawl which can increase the journey by private motorized transport which result in increased congestion, emissions of greenhouse and also negative impact on environment and social and economic impacts. For promoting this integration TOD is one of the most important tools.

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