

Transit Oriented Development

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Abstract

Contemporary cities are facing grave challenges pertaining to environmental sustainability. The pace of occurrence of planned development is not matching with the pace of increase in environmental threats due to haphazard growth. Transport is one of the key sectors which has grown substantially in last few decades. The growth of this sector was meant to be for the improvement in quality of life of people rather gradually it has started deteriorating the same and this is primarily due to uncoordinated haphazard growth of the city. Urban transportation mostly causes issues with air pollution, traffic, energy use, noise pollution, severance, and land requirements. Urban area is largely occupied by motorised traffic flows and transportation infrastructure, which creates barrier effects. Until they receive active backing, bicycles and pedestrians are the less powerful group.

Keywords: Transit, Development, travel, land use, traffic density

I. INTRODUCTION

The expansion of the city area is a process that occurs independently of population growth. People are everywhere relocating from inner cities to the suburbs; this trend has both causes and effects, with rising car ownership and the movement in transportation from public transportation to private vehicles acting in tandem. The quantity of floor space per person is increasing in addition to land area, and this can be considered as both a cause and an effect of urban expansion. Separation of land uses is accompanying these occurrences, which makes mobility more necessary.

It is important to fully consider how land-use regulations and urban transit affect each other when examining the sustainability implications of these decisions. The final effect can differ significantly from the first reaction; the indirect and secondary effects could either strengthen or balance the original effect. Land use control can be viewed as the component dictating a city's fundamental level of energy use due to its ability to impact the average journey length. *The question that needs to be probed is, can we make use of the data generated as a consequence choices made by individuals be traced and mapped to suggest a efficient land use model for a metropolitan city to reduce the travel need. ?*

II. TRANSIT ORIENTED DEVELOPMENT

It is an innovative approach to deal with the issue of rapidly deteriorating urban environment. Although this ideally should be envisioned at the time of preparing Master Plan itself as if the land use planning and transport planning are not synchronized then we land up in the situation where both become ineffective and even after spending huge amount of finances, no change is observed in the travel pattern of people and the ownership of private vehicles keeps on increasing either at same pace or may even increase due to increasing travel demand.

Transport planning in our city till date, has been primarily based on the currently observed travel pattern and the forecasts based on this. Various transport models are used to estimate the trip

generation, distribution, mode choices and route assignments and based on these transport infrastructure is created but an individual in the city, who doesn't understand all these technicalities, does not have a difficult choice to make when it comes to choosing between an inefficient mass transit mode and a convenient private vehicle for transit. So in order to mobilize such individuals to use Mass transit modes instead of private vehicle it is necessary to create efficient, comfortable and affordable transit infrastructure within walkable distances of people (accessible) and this can be achieved through **Integration of Land Use with Transport**. For achieving this, a high density, compact, mixed use development may be desired with a transit node at walkable distance from any place in the area under question.

Now this may happen if master plan has provision for such kind of otherwise the city would grow at its own pace and with segregated land uses leading to a heavy dependence on private vehicles and causing various hazards. Then later a problem solving approach, like metro came up in Delhi only after entire city developed without any consideration to growing traffic, is adopted with revitalization of already developed area in the proximity of metro rail by making additional provisions/changes in master plan, which is a reactive approach but what is desired is vision and a proactive approach.

With all the scientific development available at our disposal, cities can be perceived to be transit based from green field stage. Then right from the beginning people can be sensitized and mobilized to use less energy consuming modes, like walking or using bicycles, taking them to a major transit node within a distance of half a kilometre and from there they can travel to the other nodes using a comfortable and efficient mass transit mode. Technologies like GIS, Remote Sensing and Data Analytics can be of great help while planning such infrastructure. Transport modelling can be done to estimate what can be done to make more people use mass transit mode.

Some of the Parameters that impact land use and transport include data pertaining to socio economic conditions of people, mode choices, factors affecting

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mode choices, density of population, factors affecting density of population and land use distribution, etc.

III. PEDESTRIAN INFRASTRUCTURE TO PROMOTE USE OF PUBLIC TRANSPORT

Theoretically the pedestrian infrastructure gets centre stage while planning a city, however reality is sometimes not similar.. The condition of the pedestrian infrastructure, which is present in the cities, itself tells about the priorities of the city life and narrates the story of inclusivity of the city. The sidewalks often are either absent and if present are often in such dilapidated condition / broken down that they are unusable. Lack of continuity in network of pedestrian infrastructure makes it in-effective. Often encroached and neglected, it practically becomes unusable for many users like differently able, senior citizens, children, etc and also may lead to problems for women. It has also been observed that at many places pedestrian infrastructure is heavily encroached rendering it useless. These kind of instances of malfunctioning pedestrian infrastructure not only have direct repercussions but also have indirect consequences like promotion of social evils in neglected areas, congested streets, unsafe streets (especially for women), tendency to encroach and bypassing law gets promoted, etc. This acts as a setback for the efforts towards promotion of social inclusion and an equitable and just society. However often pedestrian infrastructure is often not seen from this perspective. Its lack impacts last mile connectivity, often pushing women out of jobs due to safety concerns and also encourages carbon emissions as people are forced to use private modes of transport leading to traffic nightmares. Only the construction of pedestrian infrastructure may not be enough to ensure social inclusion, a robust strategy to ensure the design is inclusive, its maintenance and management must be devised and implemented along with its construction. The objective of this paper is to establish the need to device a matrix, and identify the parameters that have an impact on pedestrian infrastructure and also have a mathematical measure to assess the impact.

IV. COMPONENTS OF TRANSIT ORIENTED DEVELOPMENT

Two-hour commutes are increasingly commonplace in almost every urban area due to the growth in traffic congestion. Almost invariably, efforts to address the issue by building new highways have resulted in increased sprawl and, ultimately, increased congestion. It's important to consider the role that every neighbourhood and station area plays in the regional network of transit-oriented areas when designing a successful transit-oriented development (TOD). It also necessitates knowledge of the region's travel habits, main employment hubs, and real estate market.

3.1 COMPONENTS OF TRANSIT ORIENTED DEVELOPMENT (TOD)

Besides other components some of the essential components of Transit Oriented Development are as follows :

- Designs with preference to walkability
- A mixed use node (office, residential, retail, civic)
- High density, walkable district within 10-minute walk-in circle surrounding MRT station.
- Presence of IPT systems including e-rickshaw , cycle rickshaw , rtv's, etc.
- Designed to include the easy use of bicycles and scooters as daily support transport.
- Large ride-in bicycle parking areas within transit nodes.
- Reduced and managed parking inside 10-minute walk circle around train station

Some of the areas of concern surrounding the TOD are as below:

- lack of public transport infrastructure to support the policy .
- The existing dense development around the metro station that reduces the scope of development
- The services like sewage and water pipelines etc. which might be inadequate for the proposed plan

V. IMPORTANCE OF VARIOUS STAKEHOLDERS

Around every public transport station, a variety of stakeholders and their unique frameworks for making decisions come together in diverse ways. Depending on factors including land ownership, development levels, and current planning laws, to name a few. For instance, a station might be located in an established suburban area where tiny land parcels are owned by numerous individual landowners. In these kinds of settings, it will be difficult for real estate developers to put together land effectively, thus they would typically look for other land to develop. Apart from this problem, these locations provide a unique layer of complexity since current inhabitants would have different opinions about the ideal land use mix and density (often trying to protect the status quo of low densities and mono functional residential neighbourhoods).

Compare this situation to a "greenfields" site, where the majority of the land surrounding a public transport station is owned by a single private landowner. Both the public transport company and the local government will be keen to develop the area around the station. To enhance overall ridership, the public transport agency may wish to make sure that the land can accommodate public transport customers (this may vary depending on the type and price of the public transport option). The growth of increased densities, the construction of high-quality public areas, and the construction of reasonably priced housing may be preferred by the local government. Private developers may postpone development by making wild guesses about the land's future value. When development eventually occurs, developers looking to maximise profits may design the project primarily to serve affluent populations, unwilling to make

concessions on parking availability or to prioritise retail in locations where public transportation serves impoverished communities, and failing to create the necessary mix of land uses to maximise the use of public transportation (Belzer et al, 2004).

This reflects on how interests of various stakeholders come together depending on individual transit node surrounding conditions

VI. CONCLUSION

Merger of Land Use and Transport Planning can save a lot of environmental damage caused due to large number of private vehicles and also save a lot of land which would be available for future development and provide us with a solution which is environmentally, economically and physically sustainable.

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