

A Step Towards Integration of the Land Use and Transportation Planning in India

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Abstract—*The urbanization triggered by the industrialization and motorization as transformed the urbanscape and land use pattern of the cities round the globe. The system of transportation and the land use pattern are inevitably connected and interdependent. The system and elements of transportation has significant impact on the land use and structure of the urban fabric by shaping the nature and distribution of land use to improve the mobility, accessibility and site development potentials, at the same time the nature, distribution and intensity of land use also influence the system of transportation by influencing nature and demand of transportation facilities by affecting the travel and transportation characteristics in the city/region. The land use and transportation relationship has been observed, described and established by substantial evidences from studies and researches. This relationship has important policy implications by being a key factor in understanding the nature and evolution of urban form. But the current planning practice in India consider these two as nearly discrete entities, planned as distinct spatial and transportation plan generally by two different organizations/institutions with negligible or no attempts to integrate the objectives, and to come up with a holistic, comprehensive and integrated plan to assimilate the effect of transportation system changes on land use and at the same time the consequent backwash effects of land use changes on transportation system performance. This paper aims at understanding and reviewing the new trend and approaches of neighborhood and urban design taking into account the interrelation of land use and transportation in Indian context and scenario, and also to work out the strategies and recommendations for their integration in formulation and development of plans and regulation so as to reduce automobile dependency and dominance.*

1. INTRODUCTION

The existing systems of transportation and land use in an urban space highly influence the quality and standard of life, economy & productivity. They are an integral part of the urban fabric and urban landscape and are inexplicably interlinked and interdependent and it is impractical to dissociate impacts of land use on transport and vice versa because of the multitude of circumstantial changes of various other factors[1]. Road, transit and other transportation elements shape the development of land and new transportation infrastructure can help to improve the accessibility of site and mobility for the site users that raises the potential for development and redevelopment thereby generating an array

of movements and increase in travel demand as transportation is a “derived demand” resulting out of a person’s need to participate in activities.

The current planning practice however is uncoordinated and unsynchronized and very few planning agencies attempt to concatenate the effect of transportation system changes on land use and the consequent effects on transportation system performance, while there are substantial evidences from researches and studies that suggest these effects may be significant. This paper aims to understand and review the new trend and approaches of neighborhood and urban design like Neo-tradition design, New urbanism, Transit sensitive design, Pedestrian pods and Transit oriented development, etc. and how change in land use or activity and transportation regulation could affect travel behavior such as trip linking and mode choice, taking into account the interrelation of land use and transportation in Indian context and scenario.

We have also tried to discuss and work out the strategies like trip chaining, livable and walkable communities and access management, etc. to understand how transportation system can effectively be integrated with neighborhood design concept. Finally some recommendations have been made for the preparation of the coordinated and comprehensive common agreed plan for the integration of land use and transportation in plan formulation and development stage and also in preparation regulation so as to reduce automobile dependency and dominance and achieve a sustainable urban environment.

2. LAND USE AND TRANSPORTATION INTERACTION

The connection between transportation and land use is a elementary concept in transportation. Everything that happens to land use has transportation implication and every transportation accomplishment affects the development pattern of land use and economic activities. Due to increasing accessibility of new area make it attractive for new development. For example along the highway through

undeveloped land, a new interchange increases the accessibility of sites in the surrounding area thereby leading to the development of the surrounding area, correspondingly new developments in land such as commercial complex or a housing scheme, etc. lead to the creation of new array of trips thus increased travel demands and demand for the increase in volume of transportation infrastructure.

Transportation investment like Highway facilities can be an important factor in influencing economic growth by increasing access to new areas, which will make available access to raw materials, skilled labor markets and inexpensive businesses[2]. Land and economic impacts of transportation must be understood in their geographic context. The increased access to land provided by new or upgraded transportation facilities can either induce new development or change existing development patterns. The extent of the impact depends upon the geographic extent of the analysis. A small impact area can show the boost in economic activity but when a larger area is defined the impact will appear as a transfer in development within the region or local authority.

3. THE LAND USE TRANSPORTATION CYCLE

How we use our land directly impacts on the transportation facilities, modal split and vice versa. The land use transportation interrelationship is demonstrated by describing what will occur when the road network is improved. Land along the road becomes more accessible and gains high potential of development and attracts the developers[3]. As land along the road is developed traffic volume and number of trip generation increases, resulting into more congestion and a deterioration of road capacity restricting efficient movement of passengers and freight. And due to the reduced efficiency of the road roadway capacity has to be increased by road widening and construction of new roads, etc. attracting additional development in the nearby area and then new cycle of land use and transportation starts.

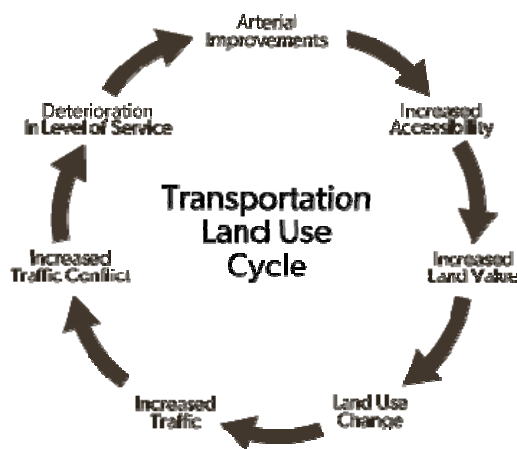


Fig. 1: Land use transportation cycle

(source: <http://www.gbrct.org/projects/land-use/>)

The land use-transportation cycle continues until it is physically or economically impossible to further expand highway capacity. Access Management, together with good land use control, can preserve highway capacity and effectively slow down or stop the development cycle.

4. STRATEGIES TO INTEGRATING LAND USE WITH TRANSPORTATION

Improved integration of land use and transportation planning can reduce the need for highway expansion and maintain the quality of our communities. Three cost-effective strategies useful for integrating land use with transportation.

- Nodal development
- Liveable walkable communities
- Access management

Nodal development is a deliberation of land uses around an existing intersection that serves as a central point for the community. This concentrates development to encourage walking or bicycle use so that land between nodes can be used for low density, low traffic land uses.

Liveable Walkable Communities are municipalities that provide facilities to promote walking, bicycling, services, and activities that promote a healthier everyday life. Communities that adopt street design standards to include sidewalks split from the road way and to accommodate bicyclists create safer and more pleasant environment for everyone.

Access Management is the ability to control the number and location of access points to a property. Access Management is implementing a set of planning strategies to ensure the safe and efficient flow of traffic, while maintaining the character of a community. Access Management strategies include spacing and design of driveways, median openings, and interchanges; placement of abutting parking facilities and use of instructional signage. It enables a community to maintain safety and quality of life for their residents and visitors.

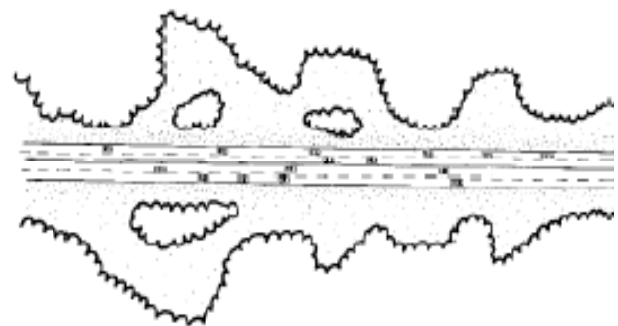


Fig. 2: Road through undeveloped land

Managing access can increase public safety by reducing accidents, travel time and congestion, while maintaining existing roadway capacity. Access Management strategies can lower road improvement costs, improve air quality, and preserve or enhance property values along a highway corridor. Additionally, there is growing evidence that Access Management is a cost effective planning strategy to limit a sprawl pattern of development.

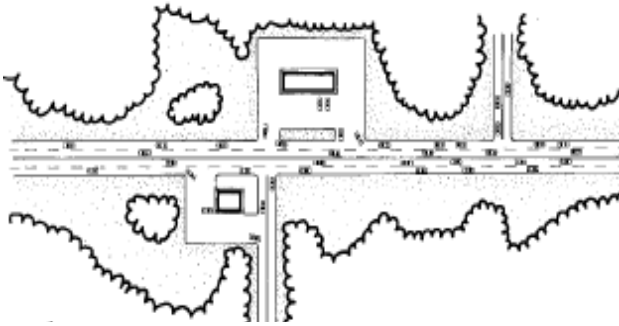


Fig. 3: Incremental development leads to increased conflict points along the roadway

Access Management strategies can be applied to all roadways including: major and minor arterials, collectors, and local streets. These strategies are particularly useful for rural areas or areas not yet completely developed. Rural areas with large tracts of land are particularly vulnerable to incremental development resulting in linear or strip development and the associated roadway capacity reduction. The appropriate strategies vary with the roadway function, the character of the abutting land, and the long-term planning policies.

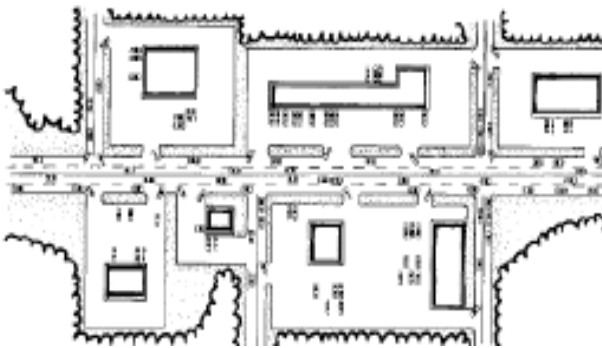


Fig. 4: Without integrating land use and transportation planning, congestion and sprawl-like development may occur.

5. NEW APPROACHES TO DEVELOPMENT

New approaches to development that emphasize transit, bicycles and pedestrian oriented designs are being considered in many communities. Some of the concepts discussed here are neo-traditional design, cluster development and transfer or sale of development rights.

6. NEO-TRADITIONAL DESIGN

“Neo-traditional design”, “new urbanism”, “transit sensitive design” and “transit oriented development” are terms used to describe a different approach to neighborhood development. Such projects are emerging across the United States showing how transportation systems can effectively be integrated with neighborhood design principles. The goal of these concepts is to reduce automobile dependency and automobile dominance. The principles are not necessarily anti-automobile, but pro-transit, pro-pedestrian and pro-bicycle travel.

In these designs land use is arranged to facilitate success of transit services and promote places where people can walk or bicycle safely. In addition, these areas attempt to achieve a high degree of interconnectivity between local streets, often by the use of grid street patterns. Advocates of this type of development want streets that are narrower than most existing street standards. In addition, such designs may include extensive traffic calming measures. Traffic calming can change travel patterns, predominantly the balance of travel between local and major streets.

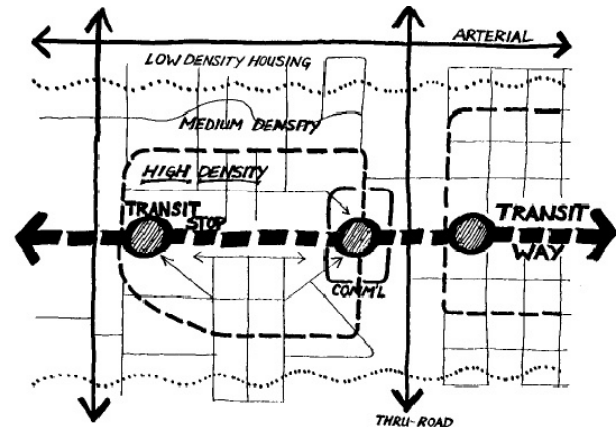


Fig. 5: Neo-Traditional Design

7. CLUSTER DEVELOPMENT

A cluster development allows assets densities over an entire development but dictates suburban sizes for individual lots. For example, a large 40 acre parcel might be developed so that one-acre home sites are built on ten acres, while the other 30 acres are left as open space, which can be held in common by all property owners, held privately, or dedicated to public use. Consequently,

Cluster development allows much of the land to be kept in a natural state for environmental or agricultural preservation. Cluster development is an emerging approach in rural areas and other very low-density development. This style of neighborhood design implies that length of residential streets

will differ from conventional designs, and the access system to major roads will also vary.

8. TRANSFER OR PURCHASE OF DEVELOPMENT RIGHTS

The transfer or purchase of development rights is a way for local jurisdictions to preserve rural and natural areas or the appearance of their communities. Property owners sell or transfer the right to develop their land, and in return they receive the assessed difference between the land's value for development and its value for open space or agriculture. This transfer often manifests itself in the form of a maintenance easement. Once the development rights are sold or transferred, the land cannot be developed. The proprietor receives the value of development and can remain on the land and use it for individual purposes. The land owner may also receive a significant break on taxes when the land is assessed at a lower value[5].

9. RECOMMENDATIONS

The land use and transportation should be integrated in urban planning while preparing master plan in every city at initial level so the holistic development of a city can be achieved and level of services can be maintained for longer duration.

Transportation demand management should be implemented as an alternative to road and parking facility capacity expansion. Transport demand management affects land use directly by reducing the need to increase road and parking facility capacity. This can be done by providing intensive to business and business and consumer to fever mare accessible and clustered development with improved transportation choice.

10. CONCLUSION

Transportation investments have a significant influence on surrounding land uses. Land use patterns also affect the utilization of transportation facilities. These interrelated effects will occur, Regardless of whether city officials consider land use in determining their transportation investments. Governments, developers, and citizens can work together to design integrated land use and transportation plans that will help achieve a shared vision for the future. Integrating land use and transportation more effectively can help shape priorities for transportation investments and ensure that new transportation projects and land use plans support and reinforce each other for generalizing land-use change and the role of transportation in the process. The purpose of this paper has been to present some alternative interpretations of the relationship between transportation and land use. These interpretations are based on previous empirical research that calls into question some of the basic tenets of traditional location theory. The ideas presented here should provide

direction for a better understanding of this complex relationship.

REFERENCES

- [1] FHA, "Land Use – Transportation Interaction" Chapter-2, An Overview: Land Use and Economic Development in Statewide Transportation Planning, Federal Highway Administration, U.S. Department of Transportation, May 1999, pp. 10-24. Retrieved from <http://www.fhwa.dot.gov/planning/processes/statewide/practices/lu.pdf>.
- [2] ICF Consulting, "Handbook on Integrating Land Use Considerations into Transportation Projects to Address Induced Growth" A Report prepared for American Association of State Highway and Transportation Officials (AASHTO), March 2005
- [3] SRPC, "How To... Link Land Use and Transportation Planning" "How To" Planning Series by Strafford Regional Planning Commission, Dover, New Hampshire, retrieved from <http://www.strafford.org/> on 12th January 2015.
- [4] Swamy, H. M. S and Bhakuni, N, "Towards Integrated Land Use Transport Plan" JOURNEYS, May 2014, pp. 25-36 retrieved from http://www.lta.gov.sg/Itaacademy/doc/J14May_p25-Swamy_Ahmedabad.pdf on 19th January 2015.
- [5] TGM, "The Transportation-Land Use Connection" Connecting Transportation and Land Use, Transportation and Growth Management, retrieved from <http://web.pdx.edu/~jdill/Connection.pdf> on 15th January 2015.