

A Review on the Significance of Integrated Transportation and Land Use Planning Model for the Planning of Urban Areas

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ABSTRACT

Planning for transportation infrastructure takes significant role in development of urban areas. Proper planning is needed for eliminating the problems like overcrowding, housing shortage, congestion etc. So there is a need of integrating transportation and land use. Transportation planning and the land use planning have to be done together. Integrating transportation with land use helps to decrease travel length and need to travel. Mixed land use development is more suitable for the urban areas. This paper critically reviews the importance of Integrated Transportation and Land Use planning (ITLUP) model in the planning of urban areas and applying this model as a solution for most of the problems facing in urban areas by analysing the best practices. The review also focuses on the relationship between land use and transportation by examining the parameters of ITLUP model.

Keywords: Transportation planning, land use, ITLUP model, urban areas

1 Introduction

The transportation planning has to be done along with land use. Land use and transportation depends on each other and it is a two way relationship. When the land use changes it affects the whole transport networks and facilities and when the transportation network changes the whole land use pattern changes. A small defect in the planning process will make the whole city decay. So to overcome this situation both land use and transportation has to be planned together. Linking both is a major task but once done it will be a solution for so many problems faced by the cities. People always prefer the places with easy accessibility. The accessibility depends on the transport system. This transport system determines the activities, which will again changes the land use.

2 ITLUP Model

The main use of integrating land use and transportation is that it helps to prevent urban sprawl and also guides in peri- urban development. Easy accessibility reduces the travel cost and also improves air quality. By integrating land use with transportation large markets and choices can be achieved which leads to the development of the country. A proper transport facility increases safety.



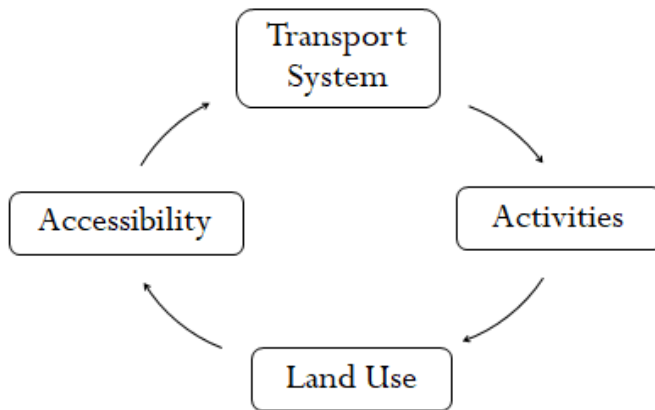


Figure 1: Principle of ITLUP Model

3 Relationship between land use and transportation planning

When the transport supply is improved then the accessibility increases. When the accessibility towards an area increases then the land value of that area increase, which will be responsible for the whole land use changes. This will generate traffic and increases traffic conflict which leads to deterioration in the level of services.

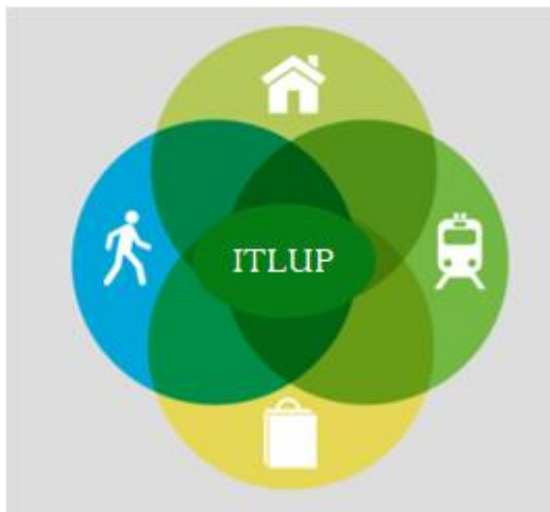


Figure 2: Concept of ITLUP Model

The three primary components which related transportation and land use area: economic activity (i.e., employment), demographic activity and transportation facilities (Shuhong Ma, Yan Zhang & Chaoxu Sun, 2019).

4 Parameters of ITLUP model

Four step travel demand model is an important parameter of this model. They are trip generation, trip distribution, model split and trip assignment. This parameter helps to know the use and nature of transport facilities in that area, which helps in the planning process. The traffic flow will depend on the road types and the land used. Existing land use and the transportation system has to be clearly noticed before planning. Other parameters that have to be considered are the changes occurred in the land use and the possible changes in future.

5 Best Practices

This section deals with the best explanation of procedures and methods that has done in two extremely different places. The explanations shown gives an idea about the reason for using this model as a best one and shows how they have reached the solution for the problems they have faced. Also, how to use ITLUP Model can be studied by looking into these best practices.

5.1 Hong Kong

Hong Kong has planned the city using ITLUP Model as a precaution for eliminating the possible problems which urban areas may face.

5.1.1 About the city

Hong Kong is a metropolitan area and special administrative region of the People's Republic of China having an area of 1104 sq km. The population of Hong Kong is more than 7 Million and having a density of 6,777/km². With high density population the planning for the city was very difficult and the city faces overcrowd and traffic congestion. But because of the scarcity of land, the implementation of ITLUP Model was difficult.



Figure 3: Location of Hong Kong (www.google.com/maps)

5.1.2 Planning for integration

Hong Kong prepares a long term plan which is up to 2030 and a medium term plan which is upto 2020. In this plan the Land-use and the Mass Transit Railway (MTR) are integrated with mostly residential and some non-residential construction around the transit nodes and planning for road networks was also included in the plan. Based on the HK2020 Plan, the development is planned in three axes. They are the following:

1. Central Development Axis: Community type housing and educational institutions
2. Southern Development Axis: Tourism related facilities and logistics.
3. Northern Development Axis: Non-intensive commercial development that capitalizes on the strategic advantage of its boundary location.

HK2020 plan also provides a Metro Development Core for high rise residential and high density commercial and business activities.

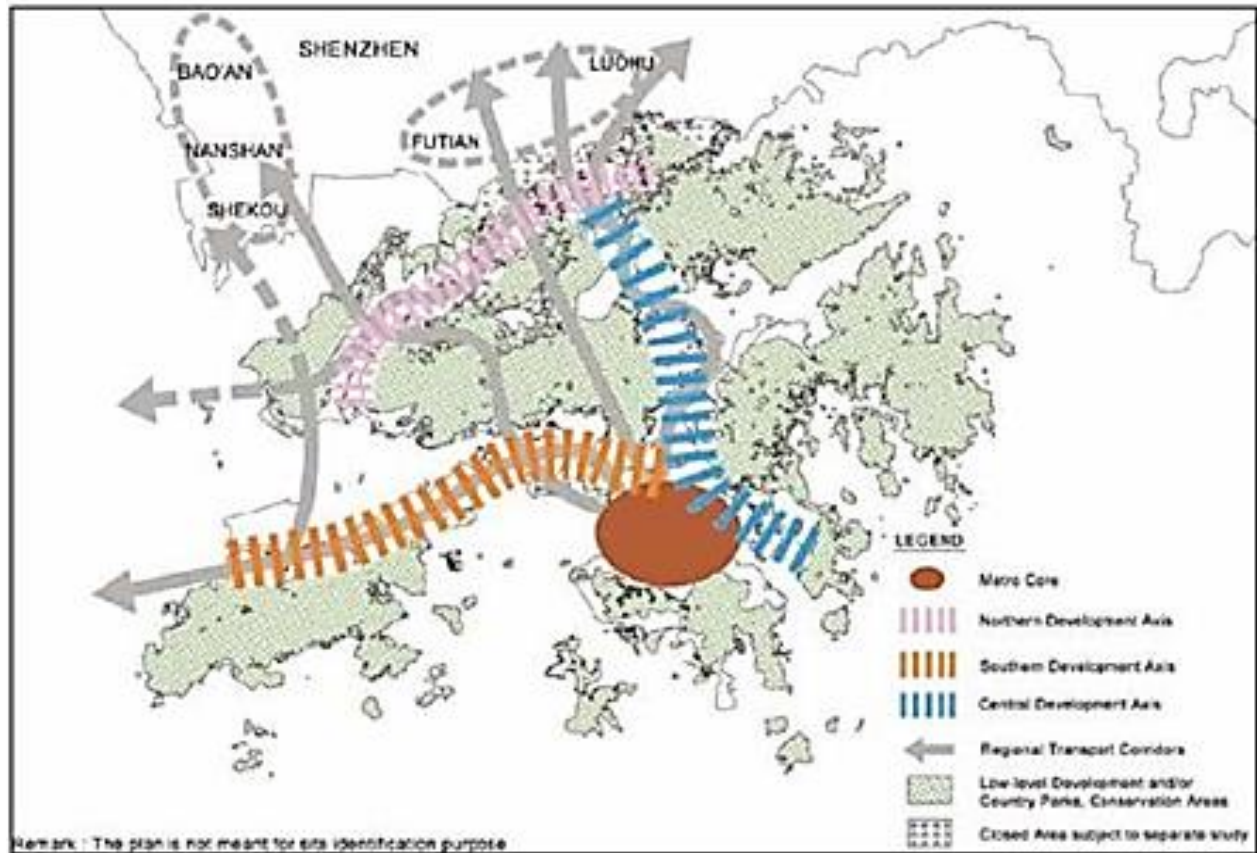


Figure 4: Development Axis in Hong Kong (Development of Toolkit under “Sustainable Urban Transport Project”, India, 2013)

The three axes were provided along the Regional Transport Corridor. The origin of this transport corridors are from the city core. Most of the transport corridors are extended to the main cities other than core city thus provides connection between the core city and the main cities (Figure 4).

5.1.3 Implementation of ITLUP Model

5.1.3.1 Accessibility

Hong Kong improves the accessibility by decreasing the travel length. Travel length has been decreased by integrating the land use with the transport networks and special consideration has been given for pedestrians. The commercial and educational areas are provided within the walkable distance. Thus economic growth can also be achieved. The development axis was made considering the easy accessibility. Also the growth areas have been noted by giving priority to accessibility (Figure 5). When the accessibility increases the need for travel can be decreased which helps to decrease the traffic congestion. Traffic congestion is a major problem faced by the urban areas. This problem can be eliminated by giving proper accessibility like Hong Kong.

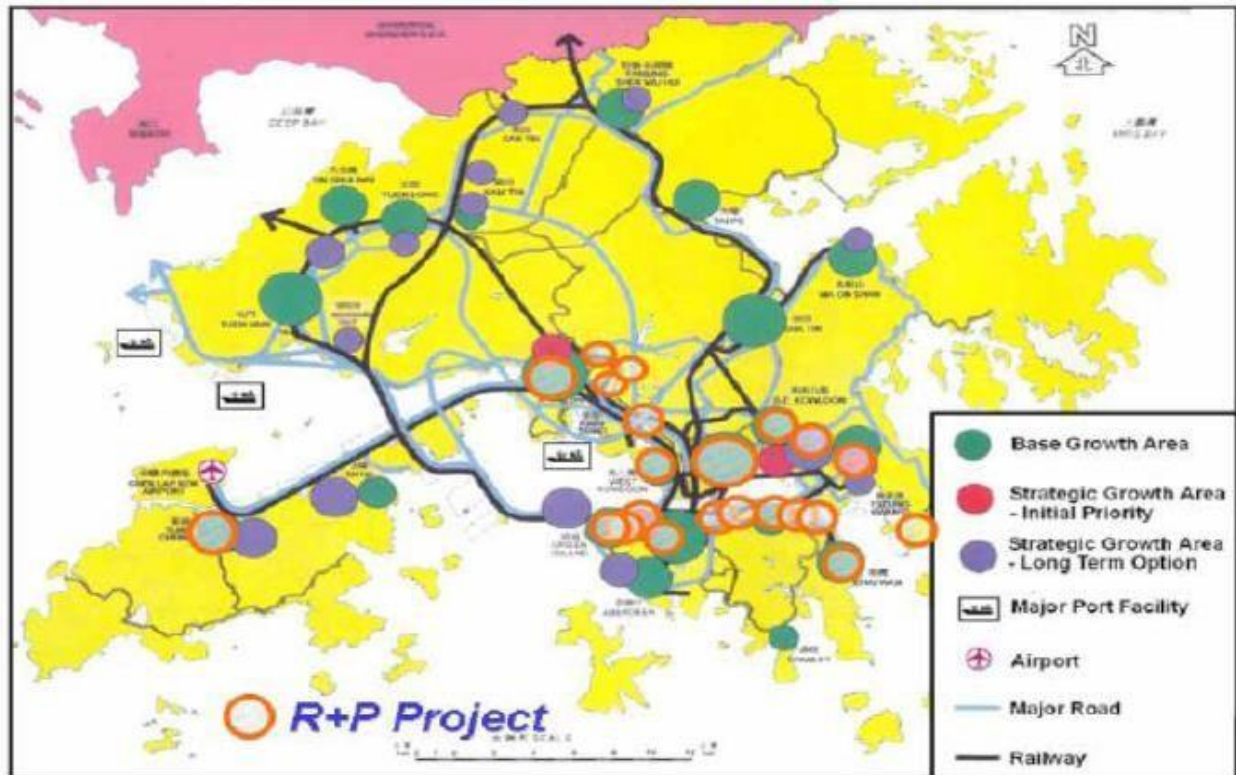


Figure 5: Integrating Transportation and land use (Development of Toolkit under “Sustainable Urban Transport Project”, India, 2013)

5.1.3.2 Housing along with transit

Housing mainly focuses on the road networks and transits for easy accessibility. The residential area not only focuses the city centre so that the city can be developed as a whole.

5.1.3.3 Integrated Transit Facilities

Hong Kong provides multimodal public transport which includes Mass Transit Railway, airways, Airport Express, Trains, ferries and busses. The trams are generally taken only by tourists for experience the quaint charm of Hong Kong. Integrated pedestrian systems decrease the use of vehicles. Provision of railway facility plays a major role in the public transport service (Figure 6).

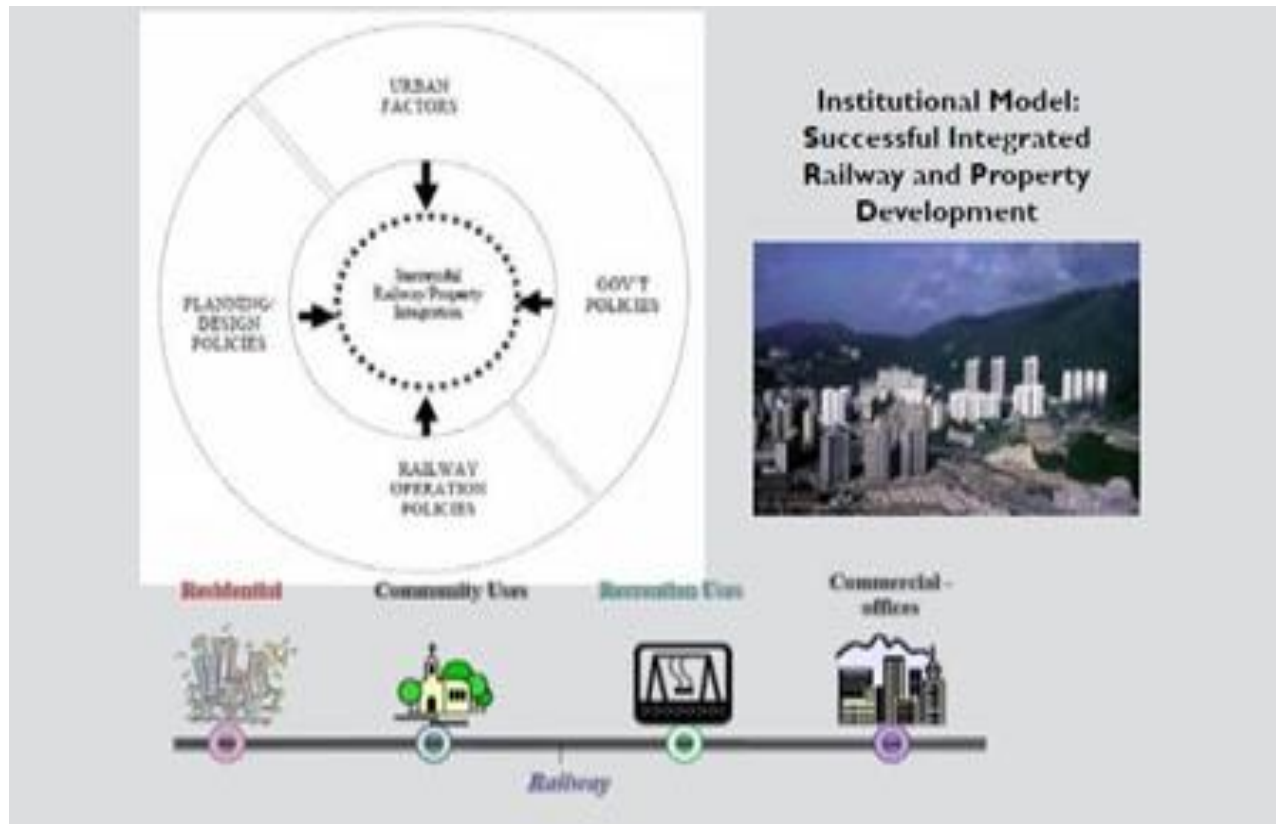


Figure 6: Integrated Transit Facilities (Development of Toolkit under “Sustainable Urban Transport Project”, India, 2013)

5.1.3.4 Analysis

In Hong Kong, the integration was done based on the development axis. Each axis was allotted for each sector and then the accessibility between the axes has been provided. Based on these axes the growth area was identified. Hong Kong gives priority to the public transport facilities. The residential area has been provided along the transit network.

5.2 Bangalore

Bangalore experiences a sudden population increase which leads to the adoption of ITLUP Model. They are successfully implementing the model as a solution for the problems like congestion, housing shortage etc.

5.2.1 About the city

Bangalore is the capital of Indian state, Karnataka. It has an area of 8.4M. The city has an area of 709 sq km with a population density of 4378 persons/sq km. The economic growth of the city increases the population and the land value which leads requirement of sudden planning.



Figure 7: Bengalure (www.google.com/imgbp)

5.2.2 ITLUP Model Planning

The planning authorities give more importance to the transport system so that it can be accessible to maximum population of the city. Traffic congestion was a major problem faced by the planning authorities so they concentrated more on providing efficient transport facilities. The mainly used transport services in Bangalore Metropolitan Region are metro and buses. A Light Rail Transit/ Monorail, Commuter Rail System and Bus Rapid Transit System are also planned for Bangalore Metropolitan Region. BMR gives facilities like pedestrian ways, circulation of traffic, approach roads and parking facilities and also gives importance for the safety of commuters.

The integration of the public transit facilities was done ‘to minimize the need to change and when change is essential to make it as convenient as possible and with minimum time loss’ (KUIDFC, 2007). The public transit network is planned as radial corridors operate on ‘direct origin to destination routes’ (KUIDFC, 2007) circular routes act as interchanges for the radial routes, and collector corridors operate in areas some distance from mass transit nodes.

The city has planned two major inter-modal interchange terminals the first to accommodate interchange

between the Bangalore Metropolitan Transport Corporation bus service, Karnataka State Road Transport Corporation regional bus service, Bangalore Metro Rail Corporation and a city centre complex and the second to connect the BMTC, KSRTC, railways, BMRC and the Airport Rail Link. In addition to these, 47 major interchanges have been proposed at required intersections of mass-transit corridors.

Apart from efficient transit system the city focuses on mixed land use development so that the need for travel can be reduced.

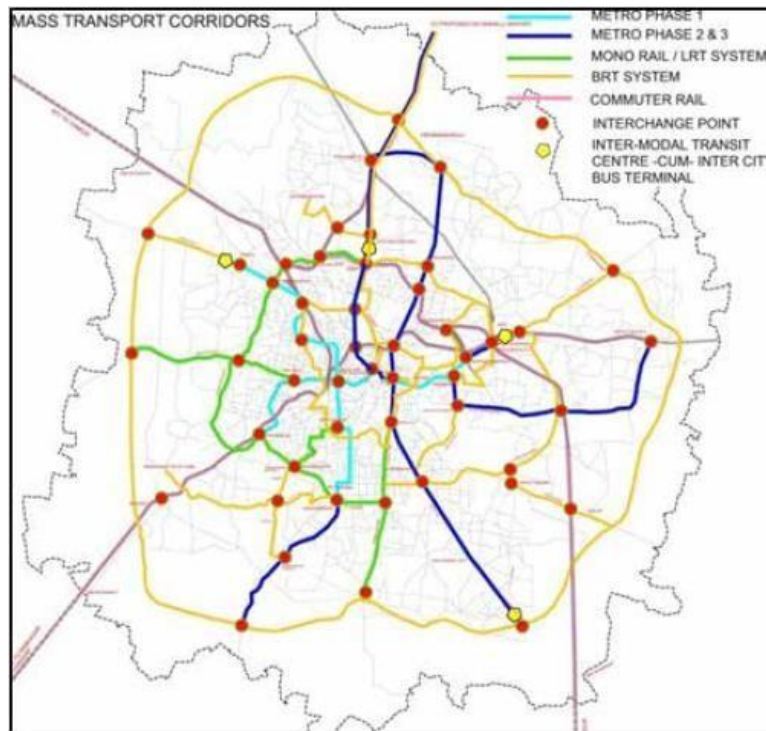


Figure 8: Mass Transit Network (*Development of Toolkit under “Sustainable Urban Transport Project”, India, 2013*)

The transport facilities connect the whole city to the centre. The residential area has been seen everywhere in the city (Figure 8). Mixed use development was done here so the travel demand and travel length can be decreased.

ITLUP Model Proposed facilities include:

- i. Terminals which consist of bus bays, platforms, seating & lighting, provides importance to public conveniences, safety and security and information systems.
- ii. Bus maintenance depot which consists of bus parking, services and utilities, maintenance bays, washing platform etc.
- iii. Passenger amenities which consists of daily needs shopping, amenity centres etc.
- iv. Park and ride

5.2.3 Analysis

Bangalore focuses more on easy accessibility. So for improving transport facilities, the authority has come up with so many plans for transportation infrastructure. They are giving efficient public transport service facilities to the people and also they prefer mixed land use development for decreasing travel demand.

6 Comparison of case studies

The cities can be planned in any manner but the planning should fulfill the needs of the residents. So while planning an urban area study the area well and then select the appropriate solution. In some cases the problem can be solved as a part but in some cases the problem should be rectified by changing the whole place. This section compares the two case studies and shows what they have done to rectify the problems.

Table 1: Comparison of case studies

HONG KONG	BANGALORE
City has been planned as a whole.	Improves the available facilities
Planning was made giving importance to the social infrastructures.	Special consideration has been given to transportation sector and the planning mainly concentrates on the public transport facilities.
Implemented ITLUP model aiming more economic growth.	Implemented as a solution for traffic congestion.

7 Conclusion

The land use types and transport facilities are linked together. So that the transportation facilities has to be provided based on the land use types or else it will leads to traffic congestion and also land use pattern has to be designed on the basis of transport networks. If there is no proper transportation facilities then that land will become decay and the land value decrease which leads to urban slum. Mixed land use is more preferable for urban areas which play a major role in integrating land use and transportation. When the need for travel decreases the traffic congestion can be decreased which leads to a sustainable environment.

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