



TRAVEL DEMAND ANALYSIS IN THE IMPLEMENTATION OF FLYOVER AT MORAMPUDI JUNCTION

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Abstract : The main objective of this study is to present an overview of requirement of 'Proposed flyover at 'Morampudi junction' by using travel distribution modelling for transportation planning. Mainly there are four stages model that is trip generation, trip distribution, modal split and trip assignment. After the first stage of transportation planning i.e., trip generation, it is necessary to determine the direction of flow. The number of trips generated in various zones of the area under study must be proportioned to the various zones to which these trips are attracted. These generated trips from each zone are then distributed to all other zones based on the choice of destination i.e., Trip Distribution. The basic purpose of transportation planning and management is to match transportation supply with travel demand, which represents 'need'. A thorough understanding of existing travel pattern is necessary for identifying and analyzing existing traffic related problems. Detailed data on current travel pattern and traffic volumes are needed also for developing travel forecasting/prediction models. The prediction of future travel demand is an essential task of the long-range transportation planning process for determining strategies for accommodating future needs.

Index Terms - Network Plan, Travel Demand, QGIS.

I. INTRODUCTION

The proposed road network, formulated through a meticulous analysis of travel demand, stands as a comprehensive solution to the evolving transportation needs of the region. This proposal is grounded in the recognition that a well-designed road network is not merely a conduit for vehicular movement but a foundational element that shapes the very fabric of urban and regional landscapes. By embracing a holistic approach that integrates diverse modes of transport, caters to changing demographics, fosters sustainable mobility, and considers the ecological impact, the proposed road network is poised to become a cornerstone of efficient and people-centric urban planning. This study aims to identify the suitability of the flyover that has been proposed and identify whether it accommodates proper vehicular movement, provide free flow of traffic and also accommodate future need which further leads to the development. The significance of addressing travel demand and optimizing transportation infrastructure can result in congestion mitigation, economic efficiency, environmental sustainability, enhanced mobility and accessibility, quality of life, urban and regional planning, resilience and disaster preparedness, public health, energy efficiency, long term sustainability.

II. LITERATURE REVIEW

A COMPREHENSIVE REVIEW OF TRIP GENERATION MODELS BASED ON LAND USE CHARACTERISTICS

JAIDEEP MUKHERJEE, AUGUST 2022

The main objective of this paper was to provide a comprehensive review of the trip generation model associated with land use characteristics and advanced technologies in travel data collection. Further, various modelling approaches used in the literature were examined. Though socio-demographic, built environment, and land use characteristics had an influence on the trip generation rates, it was found that land use characteristics were better predictors of trip generation rates.

LAND USE INFERENCE FROM MOBILITY MOBILE PHONE DATA AND HOUSEHOLD TRAVEL SURVEYS

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The mobility data derived from mobile phones may provide hints regarding land-use. Activity zones, be residential or productive, feed the global mobility once acting as origin and/or destination of trips. This research presents an approach to characterize the predominant activity of the sectors of a case of study, the metropolitan area of Malaga (Spain), using mobility patterns. The methodology is tested and compared with the socio-economical information provided by the Official General Statistics and Economic Information in order to quantify the reliability of the approach.

MODELLING INDUCED TRAVEL DEMAND IN A DEVELOPING COUNTRY: EVIDENCE FROM DHAKA, BANGLADESH MOHAMMAD LUTFUR RAHMAN, DOUGLAS BAKER, M. SHAFIQ-UR RAHMAN 01 JAN 2020-TRANSPORTATION RESEARCH PROCEDIA (ELSEVIER)-VOL. 48, PP 3439-3456

The paper titled “Modelling induced travel demand in a developing country: evidence from Dhaka, Bangladesh” evaluates induced travel demand with the construction of transport infrastructure, using flyovers as a case study. The paper mentions that relatively little is known about the induced travel demand effects of flyover infrastructure in developing countries. The paper aims to answer the question of whether the construction of flyover induces travel kilometers or induced trips. The objectives of this research are to estimate average travel distance and trip frequencies based on socio-economic and travel characteristics of flyover and non-flyover users; to measure induced travel kilometers and induced trips caused by construction of flyovers and to model induced travel kilometers and induced trips. The paper uses purposive sampling techniques, both an intercept survey and online questionnaire were conducted to collect the data from 1060 vehicle users who used flyover and non-flyover roads in Dhaka. The paper contributes to guide policies that include the effects of induced travel demand when constructing new roadway facilities, particularly in Dhaka and other cities in developing countries.

EXTENDED FOUR-STEP TRAVEL DEMAND FORECASTING MODEL FOR URBAN PLANNING AKASH AGRAWAL¹, SANDEEP S. UDMALE¹, VIJAY K. SAMBHE¹•INSTITUTIONS (1) 01 JAN 2018

The introduction of the paper explains that the four-step travel demand forecasting model is an important tool for transportation and urban planning. It helps predict the use of existing transportation facilities and assists

planners in making decisions about implementing transportation services in metropolitan regions. These decisions are based on evaluating the outcomes of implementing alternative courses of action, such as new highways, in specific zones. The paper proposes an extension to the traditional four-step model to suggest regions that are in higher need of a highway transportation program based on the severity of traffic load.

SURVEY OF MACHINE LEARNING AND DEEP LEARNING TECHNIQUES FOR TRAVEL DEMAND FORECASTING NICOLAI SISON¹, LIN LI², MENG HAN³•INSTITUTIONS (3) 01 OCT 2021

This paper is a literature survey that aims to collect and organize significant documents related to modern-day travel industry demand forecasting. It incorporates classical techniques that stem from time series analysis and revenue management to state-of-the-art machine learning and deep learning models. The paper highlights the limited diversity in methods used to forecast today's travel industry demand and the need for more advanced and hybrid forecasting models. It also discusses the constantly-evolving dynamics influencing the accommodation sector and new innovative technologies reducing the cost of alternatives to airline travel, making future demand in these areas increasingly difficult to predict.

III. METHODOLOGY

Study Area

Morampudi Junction is one of the major junctions in the city of Rajahmundry. It is present on the National Highway – 16 (NH-16), Rajahmundry. It connects 4 towns which are Rajahmundry, Namavaram, Bommuru and Rajanagaram. Rapid urban growth is resulting in an increase in travel demand and private vehicle ownership in urban areas. In the present scenario, the existing infrastructure has failed to match the demand that leads to traffic congestion, pollution and accidents. So a new flyover has been proposed at the junction which is about 1.4km in length in order to overcome the issue of traffic congestion and also reduce the rate of accidents occurring at the junction.



Fig: STUDY AREA LOCATION (FLYOVER AT MORAMPUDI JUNCTION)

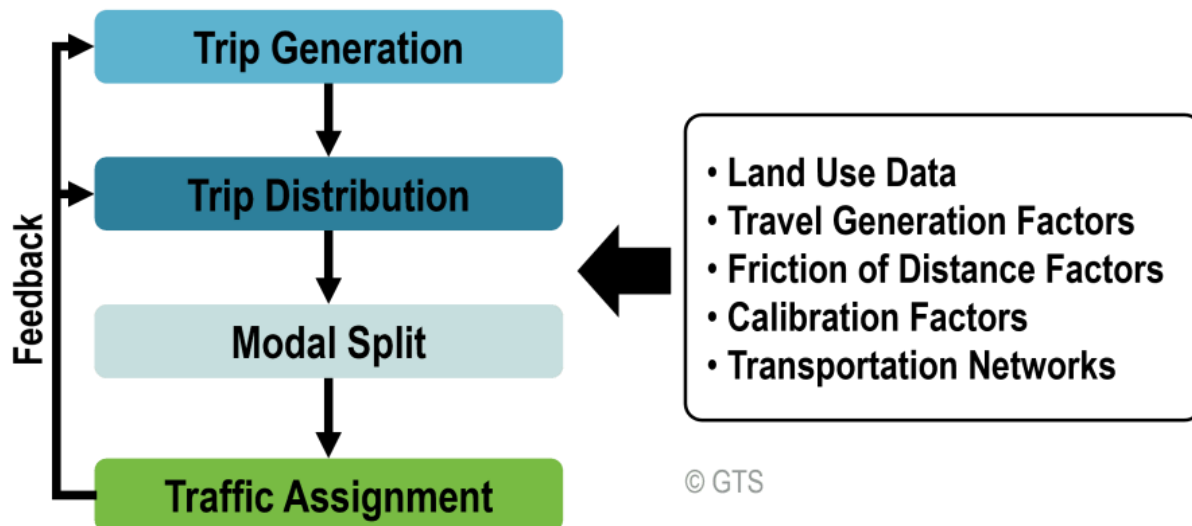


Fig: METHODOLOGY FOR TRAVEL DEMAND ANALYSIS

IV. RESULTS AND ANALYSIS

TRIP GENERATION

Trip generation refers to the first step in the transportation planning process, where the number of trips (journeys) generated by a specific area or land use is estimated. These trips can be related to various modes of transportation, including cars, buses, bicycles, walking, and more. Trip generation is a fundamental component of transportation planning.

Activity Pattern	Description	Frequency
(hwh)	Home to work and work to home	45.38%
(hw+h)	Home to work and work to home with additional stop	18.46%
(hwhwh)	Tour with sub-tour and back to home	17.69%
(hwh++h)	One primary tour with at least one secondary tour	5.38%
(hw+wh)	Tour with sub-tour and back to home with non-work activity	13.09%

Table 1 : RESULTS OF TRIP GENERATION

TRIP DISTRIBUTION

In terms of methodology, we use several basic methods for the trip distribution step, such as the gravity model, growth factor models, and intervening opportunities. However, the gravity model is the most common one, based on the rationales described in this chapter.

As mentioned, trip distribution is the second step of travel demand analysis, through which we appropriate trip productions to all other zones. The results would form a matrix which is known as O-D matrix presenting the number of intrazonal and interzonal trips in a single table.

ZONE	A	B	C	D	TOTAL
A	192	207	328	445	1172
B	56	347	217	362	982
C	42	248	142	421	853
D	98	168	449	335	1050
TOTAL	388	970	1136	1563	4057

A – NAMAVARAM, B – BOMMURU, C – RAJANAGARAM, D – RTC COMPLEX

Table 2 : RESULTS OF TRIP DISTRIBUTION

MODAL SPLIT

The choice of transport mode is probably one of the most important classic models in transport planning. This is because of the key role played by public transport in policy making. Public transport modes make use of road space more efficiently than private transport. So in this step we identify the average percentage of different modes of transport passing through the junction for over a week by conducting traffic survey.

Bikes	Car	Auto	Bus	Lorry	Total
56.41%	19.95%	0.24%	2.27%	21.40%	100%

Table 3 : RESULTS OF MODAL SPLIT

TRIP ASSIGNMENT

Model Validation

The developed travel demand model was validated by comparing the simulated volume and observed volume. The error in volume on most of the roads was obtained closer to 15%. The Relative Root Mean Square Error (RRMSE) obtained between the observed and simulated volumes of all the roads are 15%. This shows that the developed model is able to capture the actual system.

S.No	Name of the Road	Simulated PCU	Observed PCU	Error %
1.	Towards Rajanagaram	117879	140436	19.14
2.	Towards Namavaram	33698	38533	14.35
3.	Towards Bommuru	94017	106403	14.17
4.	Towards RTC Complex	122345	142472	16.45
5.	Towards Rajahmundry	283117	329412	16.35

Table 4 : RESULTS OF TRIP ASSIGNMENT

V. CONCLUSION

We observed the study area and we found out that,

- Most of the trips that are generated at the location belong to the activity pattern (hwh) which means home to work and work to home.
- People with vehicle ownership are more likely to make the pattern with tour with at least one additional stop for non work activity (hw+h).
- Most of the commuters prefer to use bikes as their mode of transport irrespective of type of trip.
- In case of travel demand analysis it is observed that the deviation between the observed and simulated PCU's is very small (around 15%) and hence the proposed flyover is able to predict travel demand for the work commuters correctly.

VI. REFERENCES

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