

An Investigation for Analysis and Methods of Traffic Data Collection, Trip Generation and Trip Distribution for Indore City

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ABSTRACT

Transportation engineers while planning urban traffic faces uncertain and surprised events. Factors affecting forecasting traffic for future are traffic uncertainties, vehicle types, purpose type and their complications associated. Inaccurate traffic planning tends to bad transportation. This review is made to search for existing techniques of trip generation and trip distribution. Data collection techniques for future study and research scope investigation are also major inspiration to conduct this review.

Keywords : Traffic study, Traffic survey, Traffic Analysis, Trip Generation, Trip Distribution.

I. INTRODUCTION

The public transport system in the city is essentially road based and includes organized and unorganized public transport system. Before the establishment of AICTSL, inter-city buses were run by the Madhya Pradesh State Road Transport Corporation (MPSRTC). However the financial status of the organization went into doldrums when almost half of the fleet was nonfunctional with huge amounts of money required towards maintaining it. Towards its last few months, MPSRTC recorded a huge debt and suffered losses. Since there was no specialized and effective regulatory agency to monitor the public transport system a special purpose vehicle in the form of public limited company Atal Indore City Transport Services Ltd. (AICTSL) was set up on December 01, 2005 to operate and manage the public transport system in Indore with private sector participation. Indore is the first city to introduce bus system on PPP model and set an example of an efficient public transport system for the rest of the country.

The aforesaid company identified 18 high travel demand routes and started operation with 37 ultra-modern low floor buses. Real time vehicle tracking and fully computerized ticket vending system were installed in these buses. O&M and other regulatory measures are being exercised by the company. Till 2009, there were 6 private operators running the bus service under the

contract to AICTSL. The operators own the bus fleet and pay for the upkeep of the buses themselves.

The intermediate public transport system in Indore is operated with 700 private minibuses plying on around 80 routes (as per joint committee report) and 16900 auto rickshaws (Source: RTO 20014-2015 report). In addition, 600 Tata Magic, 550-900 Maruti Vans (source: RTO 2004- 2015, AICTSL), 400 metro taxis (Source: AICTSL), 200 star cab (Source: RTO) are also plying as an IPT. There are a few horse driven carts (Tonga) which are found in the core area of the city. Recently the city administration has scraped the polluting vehicles like three wheeler, minibuses and other vehicles and replaced them with Tata Magic, Maruti Vans and CNG auto rickshaws. The minibuses are currently being replaced by Tata Magic and Maruti Vans. Currently only 196 minibuses are left and rest have already been replaced. The capacity of minibuses ranges from 6 to 30 passengers. Small mini buses carry 6-12 passengers and bigger sized mini buses carry 12-30 passengers. Maruti Van and Tata Magic operate on specific route permits (temporary or annual permits) allotted by RTO, whereas autos and taxis are permitted to operate anywhere within the city. In addition to the city permits, RTO also issues rural permits to run between the neighbouring villages along the outskirts of the city. Only 20% of the Maruti Van operators have route permits, while 80% have city permits which enable them to ply on maximum demand routes which

may or may not be assigned to other operators on route permits. The Tata Magic city permit routes are controlled by associations and Union. The fare structure for minibuses is 25% lower than the fare of AICTSL buses; however the fare structure of Maruti vans is same as that of AICTSL buses.

II. METHODS AND MATERIAL

A. Objective of Study

The main objective is to study and investigate for methods, techniques and procedure to forecast and plan future traffic scenario. Major sub issues to study and investigate are:

- Average Daily Traffic (ADT)
- Traffic Composition
- Peak Hour Traffic and Passenger Characteristics
- Trip Generation
- Trip distribution

B. Literature Review

Bayes Ahmed (2012), Urban transportation planning uses forecasting as an important tool. Several forecasting models are applied to predict future traffic scenario and are used as a basic technique to find new road capacity, transit services and required land use patterns. Future travel demand applied number of mathematical models which can simulate human traveling patterns and trends. Steps involved model with several questions for traveler's decisions. Decisions like human traveling actions, factors affecting travel and alternative traveling modes are required to set and record. Next is to generate trips simulation, it is four step process i.e. trip generation, trip distribution, modal split and traffic assignments. Author in this research article attempts these steps for transportation simulation in Dhaka City, Bangladesh. The 76 wards of city are divided into 10 zones as a traffic analysis zone to forecast travel demand.

Shivendra Goel et al. (2012), This paper points the involvement of society to transport demand. To find volume of trips between various zones is critical for transportation study. It is based on trends and linear programming mathematical models to future traffic generation. This research article performed modeling for generation of trip and its distribution for Delhi urban

area using genetic algorithm. All zones of city are considered and model for trip is generated for all zones which can be applied effectively to future scenario. The paper explains easy use of linear programming based model for traffic simulation and forecasting.

S. A. Veenstra et al. (2010), A fresh trip distribution model named limited destination model for not homogeneously distributed destinations. Model is performed and prepared conducting survey for shopping trips in the Dutch city of Almelo. New model presented in this paper performed effective than traditional gravity model. In this paper distribution is performed with function of distance. Study shows that most trips are noticed to nearby super market and most trips are made with cars. It was proved in this paper that trip modeling with new method improves traffic flow prediction.

Amrita Sarkar et al. (2012), Fuzzy logic can be applied effectively as a mathematical approach to traffic and transportation modeling. The paper tried to explore importance of fuzzy logic in traffic problem solution. It can solve complex problems which cannot be solved using traditional techniques.

The process of fuzzy inference involves:

- i. Defining If-Then rules
- ii. Defining membership functions
- iii. Applying logical operations

Many traffic problems are complex and nonlinear. Solution of large traffic and transportation can be solved using fuzzy logic models.

Md Majbah Uddin et al. (2012), It is found that trips and vehicle attraction from centers are studied in western countries but not that much in Asian countries. This paper research is performed in Bangladesh, trip rate analysis method is approached to study and analyze trip attraction rate of shopping centers at Mirpur Road, Dhanmondi area of Dhaka. Six shopping centers are considered and number of vehicles and peoples visiting during peak hours. Parking space, Shopping area and number of stores are the factors on which trip attraction depends. The study is helpful to assess traffic impact due to new upcoming shopping centers and its impact on traffic volume.

Elyasuddin Jalal et al. (2015), Study is conducting at fastest growing city Kabul, capital of Afghanistan, Traffic congestion due to population increase and economic growth is problem for this city. The paper

research approaches Kabul city traffic planning, travel demand is analyzed and forecasted for the year 2025. Results of this paper pointed that private transportation demand is less in city. In short term no need of new road link is required and existing road network is required to raise to achieve traffic improvements. Large capacity public transportation facility are required to handle public transportation load and new road links will be required by year 2025.

Mir Iqbal Faheem (2012), Paper studied problems due to congestions in traffic. Congestions are uneconomic due to time delay, accidental and also reports pollution problems. Traffic impact analysis is used and explored as a planning tool for transportation network demand forecasting. Traffic impacts are studied to plan public facility and traffic infrastructure improvement. Paper reported that there is need of traffic impact analysis to reduce congestions. It can identify problems in advance and plays critical role to solve traffic problems.

Haitham M. Al-Deek (2001), Study is conducted at United States, Seaport international cargo and shipping are traffic generators. Truck trip generations and trip split models are studied to acquire information for future road projects. Regression analysis and back propagation neural networks approaches are used for freight trip generation. Models are used to found inbound and outbound traffic movements of trucks. It is concluded that BPN model is better and accurate than regression analysis. Applying BPN paper presents combined truck trip generation and truck rail split model for Jacksonville Port. The neural network model are found accurate for the study of similar problems.

Leena Samuel Panackel et al. (2013), Paper explains that long term transportation plans required travel demand forecasting models. Paper focuses to formulate trip production models applying regression technique to towns of Kerala. Three medium size towns are selected for research study and data is collected through household interviews. The quantitative and qualitative data analysis is performed using correlation and multi regression analysis. Results shows that regression model with independent variables provides better results and estimations for trip produced. The forecasting is conducted to achive fast travel demand forecasting.

Nadezda Zenina et al. (2013), The research paper aims trip generation models with mixed use transport

infrastructure. The aim is to improve the transport trip generation accuracy. Experimentation is performed for trip generation using linear regression equation and smart growth tool in this paper. Accuracy of generated trips per hour was maximized by the evaluation of “smart growth” criteria.

Navya S V. et al. (2013), There is continuous growth in travel demand in Thiruvananthapuram city. The reason is software sector employment, education sector and high volume commercial activities. There is rise in public travel pattern due to residential and business areas and hence produces high traffic stress. This paper develops home based trip generation model and factors affecting trip generation are studied. Mathematical model is developed for study area and it is found that rate of trip generation is mostly dependent on the employment status of the people.

Donald C. Shoup (2003), Bad techniques and policies are major problem for traffic engineers and planners. This paper studied parking and trip generation rates for parking demands and vehicle trips. The aim of the study is to avail and develop free parking facility for all vehicles involved in generated trips.

III. RESULTS AND DISCUSSION

Proposed Methodology

Literature study suggested following steps and methods to be followed for future traffic planning:

- Manual Survey for Classified Counts
- Origin-Destination (OD) Survey
- Terminal Area Survey
- Trip Generation
- Trip Distribution

Expected Outcomes

- Purpose Wise Trip Distribution with Future Trip for Year 2025
 - ✓ Business Trip Distribution for present year and year 2025 (Morning and Evening)
 - ✓ Industrial Trip Distribution for present year and year 2025 (Morning and Evening)
 - ✓ Education Trip Distribution for present year and year 2025 (Morning and Evening)

- ✓ Others Trip Distribution for present year and year 2025 (Morning and Evening)
- Percentage Contribution of Purpose for present year and 2025 (Morning and Evening)

IV. CONCLUSION

Urban areas in Indian cities are facing continuous high traffic growth and it is already known that it will grow with higher percentage in coming decades. There is urgent requirement of transport system study for future transport planning and forecasting specially at urban areas. There is an urgent need for significant improvements in the transport system including mass transport system keeping in view the long term requirements of the City. There is absence of scientific planning and implementation of scientific methods to forecast urban city traffic and transportation plans.

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