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MODELING OF TRAVEL CHARACTERISTICS OF AN URBAN AREA (THRISSUR)

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***Abstract*-Transportation planning is mandatory for any region to design and prepare for future needs so as to ensure better mobility of people and goods. The increased urban development and traffic congestion have made it more necessary to effectively manage traffic in the cities. Thrissur is the fourth largest urban agglomeration in Kerala suffers severe traffic and transport related issues. NATPAC has conducted road inventory survey for approximately 129 km covering SH, MDR and city roads. Speed and delay survey was carried on 85.91 kms of road stretches in Thrissur city. Various other survey's like Road side interview survey ,Traffic volume survey , Link volume survey, Parking survey, and Pedestrian survey pedestrian surveys were conducted in appropriate locations . Secondary data has been collected from departments like KSRTC, RTO etc. With the help of the data, the trips are analysed based on various personal characteristics, socio-economic characteristics, trip characteristics and facilities available. Trip generation and Trip distribution models were developed using VISUM and various outputs of different stages were calibrated and validated.**

Keywords:Transportation planning, Trip generation, Trip distribution,VISUM

I. INTRODUCTION

Travel can be defined as any transporting activity from one location to another using any transportation mode. An individual usually travels with a reason to take part in an activity in a specific location .The most common daily travel for employees and students consists of travel to reach workplaces and campuses. Through the passage of time, the transportation is drastically increasing and to satisfy the people's travel demand various step are taken by the governing bodies. These travel demands can be spotted out by monitoring the people's travel activity. This travel activity includes travel time, travel characteristics, travel mode etc. The primary causes for rapid growth of travel demand in Indian cities are increasing urbanization, population growth and rising incomes. Travel activity of the people or public can be monitored by taking out to the people through survey. There are number of ways to take a survey like Roadside Survey, Online survey, Toll gate survey, Postal Survey, Phone call Survey .By opting any one of these surveys, we can easily find out Origin and Destination of the commuters , which is OD Survey. Through this survey in different location we can find out the Origin Destination, Transport mode, and many othedetailsofdifferentcommuters.

II. OBJECTIVES

- To develop a desire line based on the travel pattern of the selected city.
- To develop trip generation model for different trip purposes.
- To develop trip distribution model based on the existing travel pattern

III. SCOPE

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- The scope of the project confined to Thrissur Corporation area.

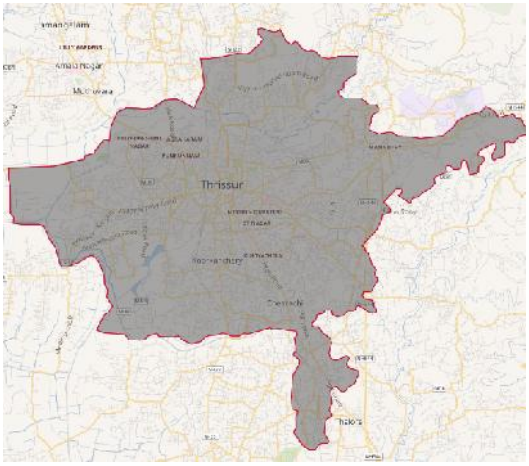

Fig. 1. Thrissur corporation map

IV. LITERATURE REVIEW

Carlos Sampaio, et al (2022), who described an increasing trend in private vehicle ownership. Despite the flexibility, convenience, and comfort-related advantages of individual transportation, it also represents some negative impacts. This paper proposes a methodology to map the individual transportation traffic-related externalities in an intercity corridor. For that purpose, PTV VISUM is used to develop a transport model[1].

Katarzyna Solecka et al(2014), are the authors who described on the overall methodology of designing and assessment of transportation solutions that result in the integration of an urban public transportation system. The proposed approach is based on the application of heuristic – expert design of an integrated urban public transportation system, its simulation with the use of a computer-based macro-simulation system VISUM and its multidimensional – multiple parameter comparison with the existing solution[2].

Lidia Montero et al (2022), Modelling travel behavior trip purpose-based has been conducted.Technical details on sources and model development at each step are described.Model estimation, validation and prediction rely on RStudio (2020) and VISUM model for the study area, PTV-AG (2020). Final demand models are being integrated within the VISUM platform to support scenario evaluation by urban planners[3].

Marianna Jacyna et al (2017), Preparation of bicycle traffic model for the selected area should begin from the identification of the real transport network dedicated for bicycles and the rest of network, where bicycles can be used. Links of transport network, due to the functions that they perform for bicycle traffic, can be divided into: bicycle paths, pedestrian-bicycle paths, contraflows, one-way streets with bicycle traffic allowed in the opposite direction, streets with bicycle traffic allowed, walkways with bicycle traffic allowed[4].

Szymon Fierek et al (2012) The paper presents the planning process of an integrated urban transportation system (IUTS) for a medium sized metropolitan area. The proposed approach has a universal character and can be applied by city planners, traffic engineers and municipal authorities in strategic planning of urban transportation systems and designing advanced transportation solutions. It focuses on the integration of both public and private transportation within the metropolitan area[5].

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V. METHODOLOGY

Thrissur (formerly Trichur) is a district of Kerala situated in the central part of that state. Spanning an area of about 3,032 km2 (1,171 sq mi), Thrissur district is home to over 9% of Kerala's population. Thrissur district is bordered by the districts of Palakkad and Malappuram to the north, and the districts of Ernakulam and Idukki to the south and Coimbatore to the east. The Arabian Sea lies to the west and Western Ghats stretches towards the east. It is part of the historical Malabar Coast, which has been trading internationally since ancient times. The main language spoken is Malayalam.Kerala, a state in Southern India, has a network of 11 National Highways, 72 State Highways and many district roads. Kerala has 331,904 kilometres (206,236 mi) of roads, which accounts for 5.6% of India's total. Thrissur consist of total road length of 2055.766 km, which is about 0.6 percentage of total road length of the confined state.

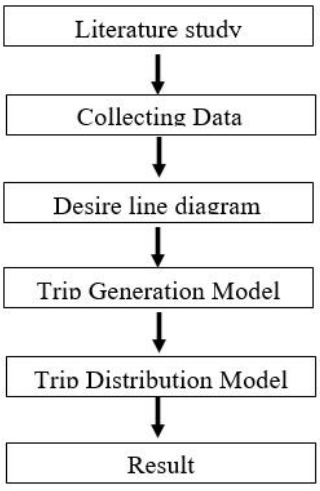
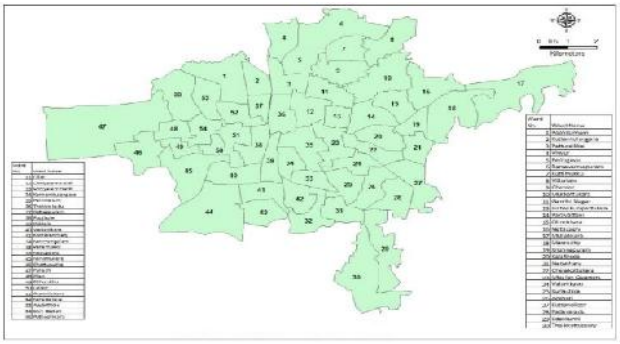


Fig. 2. Wards in Thrissur Corporation



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SI.NO	LAND USE	AREA(km²)	SHARE (%)
1	Residential	2,156.60	68.9
2	Agriculture land	275.1	8.79
3	Industrial	74.5	2.37
4	Commercial	56.6	1.8
5	Public and semi public	238.3	7.61
6	Parks and open space	59.5	1.9
7	Roads and Railways	255.1	8.15
8	Marshyland, swamps	15.1	0.48
	TOTAL	**3,130.81**	**100**

Table.1. Land use pattern of Thrissur City

The main impact of urbanization processes has been the expansion and constant change in urban land use. Physical, social, political and economic factors have played a decisive role in shaping the land use pattern of Thrissur City. The land use distribution of erstwhile Thrissur Corporation showed that almost 70% of the area was under residential uses followed by 9% area used for agricultural purposes.

Fig.3. Land use pattern of Thrissur City

VI. TRIP GENERATION

The model has been developed for the entire study area. The internal trips originate and terminate within the study area, whereas the external trips include all other components viz. Internal - External, External - Internal and External – External. Trip generation is the process by which measures of urban activity are connected into zone to zone production and attraction. In this stage, the relationship between urban activity and travel and the production and attraction of each zone in the study area are predicted.

Table.2. Representation of Model split of vehicles

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Sl. No.	Mode	Internal - Internal	Internal - External	External - Internal	External - External	Total	Total vehicle trips (%)
1	Bus	973	3812	4548	1184	10517	5%
2	Mini Bus	62	878	1390	941	3271	2%
3	Car	3940	19405	22211	9895	55452	29%
4	Passenger Auto	1147	9188	8599	4811	23745	12%
5	Two wheeler	8115	42992	40990	7459	99556	52%
Total Vehicles		14236	76275	77738	24290	192541	100%
In percentage		7%	40%	40%	13%	100%	

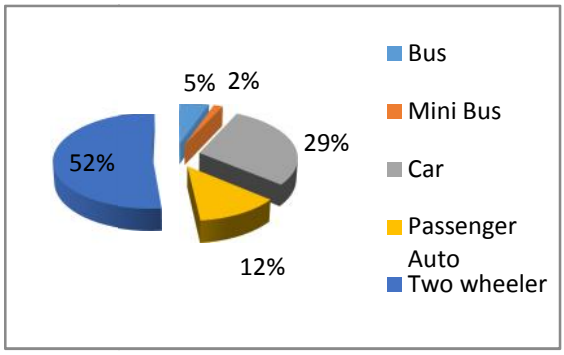

Fig.4. Representation of Model split of vehicles

Table.3. Representation of Model split of Passenger

Sl. No.	Mode	Internal - Internal	Internal - External	External - Internal	External - External	Total	Total vehicle trips (%)
1	Bus	40881	160124	191005	49725	441735	58%
2	Mini Bus	164	2672	3813	4817	11466	1%
3	Car	9649	46146	58244	26273	140311	18%
4	Passenger Auto	2513	17641	16521	7952	44628	6%
5	Two wheeler	10489	54997	54195	9617	129299	17%
Total Vehicles		63696	281580	323777	98383	767437	100%
In percentage		33%	146%	168%	51%	399%	

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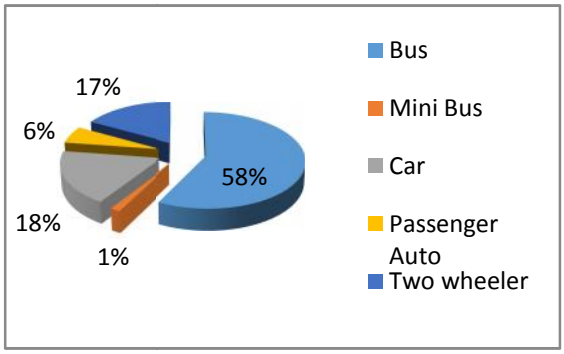

Fig.5. Representation of Model split of Passenger

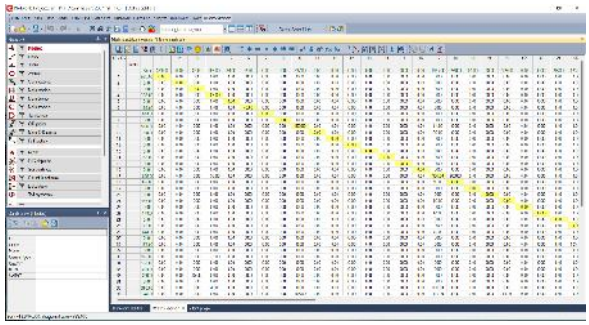

Fig.6.OD Matrix for Passenger Trips

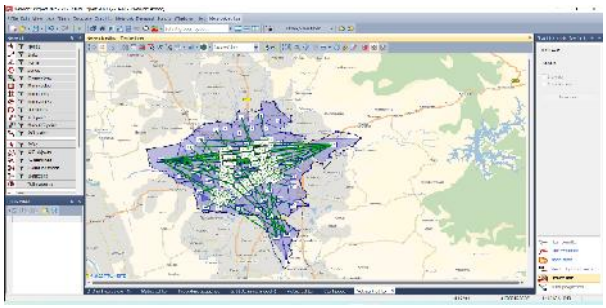

Fig.7. Desire line diagram

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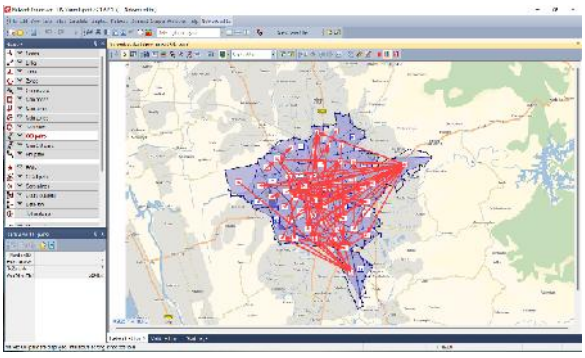

Fig. 8. Trip Generation from each wards

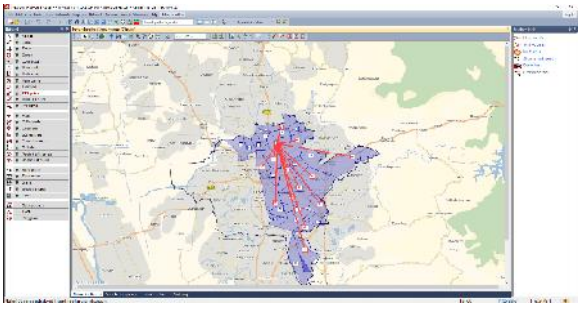

Fig.9. Trip Generation from ward 9

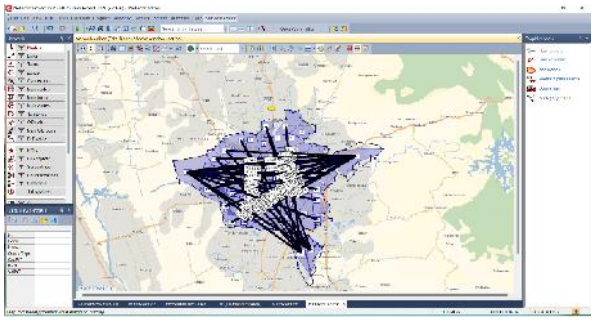

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Fig.10. Trip Generation from ward 19

VIII. TRIP DISTRIBUTION

Trip generation provides an idea of the level of trip making in a study area. What is needed is a better idea of the pattern of trip making, from where to where do trips take place, the models of transport chosen and as well as the routes chosen. The trip distribution models are used to predict the spatial pattern of trips or other flows between origins and destinations.

Fig.12. Trip distributed to each ward

IX. CONCLUSION

The acquired data have been assembled in tables for better representation. Origin Destination Matrix is formed and with the help of that table Desired line Diagrams have been drawn for Passenger and Goods trips respectively. Considering the Desired line diagram, Visum is used to construct Trip Generation Model which produces the number of trips from and to each wards. By Trip generation model we found the trip generated from each ward individually, most number of trips generated, least number of trips generated and total trip generated. Trips attracted from each ward and Trip produced by each ward is also founded out. From this we could spot out the busiest wards from the District. With the help of these parameters, Trip distribution model is represented, in which the purpose of the trips are also considered. By this model we found the purpose of trip in the busier wards and alternative are suggested for the trip purpose and improvements are suggested in the future to avoid traffic congestion.

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