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EVALUATING THE EXISTING PUBLIC TRANSPORTATION SYSTEM

A Case Study of Rmts of Rajkot city

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Abstract —

Bus route evaluating is one of the important elements of the transit planning system. It can provide valuable information based on which important operational decisions. The evaluation determines the operational status and existing problems, providing an objective basis for route selection, route exit, route construction, route planning and so on. One of the important aspects that affect the efficiency of bus transportation is the performance of the route. Therefore, it is recommended to develop a model to evaluate route performance. The performance of the route depends on several criteria. Some of these standards are qualitative (by time performance, bus station distance, fuel consumption, etc.), some are qualitative (road conditions, safety, comfort). Therefore, it is recommended to use multi-standard decision (MCDM) tools to evaluate routing. The MCDM tool that can handle qualitative and quantitative factors is the analytic hierarchy process (AHP). In this study, we study these factors to analyze the various factors of bus line performance, we know which is more important, which is the most important factor in public transport. Now consider this factor, derive the ranking of various bus routes

Keywords-*Performance evaluation, AHP, city bus*

I. INTRODUCTION

The transportation system of a city represents development of the city. But at the same time, highly developed cities are facing higher problems of transportation management and spending lots of money and effort for solving those problems. Public transportation plays an important role in the transportation system of the city. With the increasing level of urbanization, the issue of developing ancient strategy for urban transportation has been considered in numerous scientific and technical works.

Apart from the issues of congestion control and traffic management, the important rising problems include management of routes of public transport medium, schedules of the modes which considers the transfer time from one mode to other. The modes should efficiently serve commuters such that transportation need of maximum commuters should get satisfied, and it should make the commuter reach to his/her destination in least time possible. At the same time there should be least underflow in the mode, affordable to the operator. The data is time dependent, as travel time and demand of transportation varies with time.

The rapid growth of India's urban population, as in other developing countries, has generated an enormous need for efficient public transport services to carry high volumes of passengers through dense, congested urban areas. Since large cities are far more dependent on public transport than small cities, the need for public transport services has increased faster than overall population growth

There are many strategies that could make public transport more productive, however many of them are not being implemented to the degree they could be, and, furthermore new strategies must be developed to address current problems. In general, public transport productivity improvement strategies make public transport more efficient to operate and more attractive to customers.

Growing cities require movement of people. Such large scale movements, if carried by personalized means of transport create congestion on roads, excessive energy consumption, environmental pollution and parking problems. Moreover most of the urban residents cannot afford personalized transport and depend on public transport. This requires both an increase in quantity and quality of public transport and effective use of demand as well as supply-side management measures. The tasks of urban public transportation are to meet the increasing demands of all kinds of passengers and to earn corresponding social and economic profits in a prescribed period of time by providing high quality of service based on limited public traffic vehicles.

Among all the public transportation systems, buses are the most popular and most commonly used ones because of their inherent flexibility, adaptability to changing employment and residential patterns, and low capital costs. Therefore, many researchers focused on improving bus transportation systems by reducing the cost of operations, minimizing waiting times, improving the quality of service, etc.

II. DATA COLLECTION

The data collection required for the purpose of project analysis includes preliminary survey (OD survey at station) and detailed survey (OD survey at different locations along the survey route). Survey was conducted by the direct interview method. The public transport users were interviewed either at the origin or at the destination of the trip. The questionnaire designed specifically for this purpose consists of trips details like Purpose of trip, Origin - Destination of trips, Frequency, Trip length, and various socio-economic conditions. Socioeconomic and household characteristics such as gender, age, occupation, household size, household income, vehicle ownerships, play an important role in the travel characteristics.

III. PROCESSE OF AHP ANALYSIS

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A. Analytic Hierarchy Process (AHP) –

Decompose the decision-making problem into a hierarchy – Make pair wise comparisons and establish priorities among the elements in the hierarchy. – Synthesis judgments (to obtain the set of overall or weights for achieving your goal). – Evaluate and check the consistency of judgments. – Developing a pair wise comparison matrix for each criterion. – Normalizing the resulting matrix. – Averaging the values in each row to get the corresponding rating. – Calculating and checking the consistency ratio. – Calculate the weighted average rating for each decision alternative. Choose the one with the highest score.

B. Structure of The Hierarchy –

Decompose the decision-making problem into a hierarchy of criteria and alternatives. – Level 1 is the goal of the analysis. Level 2 is multi criteria that consist of several criterions; you can also add several other levels of sub-criteria. The last level is the alternative choices.

IV. DATA ANALYSIS

A. Qualitative Analysis for All Routes

Table 1

Route No.	Road condition	Comfort	Safety
51	Very good	Excellent	Very good
38	Very good	Good	Good
1	Excellent	Very good	Good
2	Good	Very good	fair

B. Calculation of Quantitative Analysis for All Routes

1) Bus Stop Spacing = (Total route length in km / no. of bus stop)*1000
2)On time performance: ((2*12)+(5*38)+(10*24)+(15*19)+(20*7)/(12+38+24+1 9+7)
3) Fuel cost: Idle fuel consumption = 1.5 lit/hr
Assume Fuel efficiency = 5 km/lit Now assume fuel cost = 60.83 Rs/lit
4) Average travel speed (km/hr) = total travel distance / Avg. travel time
5) Average passenger per trip = bus seating capacity + no. of standing passenger count at bus
6) Bus hour Utilization = (total travel time * Frequency) / (No. of bus at that route * working hour)

C. Calculation of Quantitative Analysis for All Routes

Route No./criteria	1	2	3	4	5	6
51	509	9.23	16.8	16.01	40	.34
38	530	8.8	17.01	16.10	38	.40
1	470	9.11	16.43	16.65	45	.44
2	488	8.67	17.4	15.91	48	.30

V. CONCLUSION

1. It also shows that the largest passengers have their own house and their own vehicles. This means that after the use of their own vehicles, the preferred use of public transport. This shows that public transport has great potential.
2. As on time performance is given as first priority that means public are more conscious towards the important of time.
3. As our consistency ratio value came very less it means our judgments is very much nearness to perfection.
4. The socioeconomic analysis of the study shows that more and more travelers travel on a daily basis and travel education is the greatest purpose.

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