Necessity of Feeder Service for BRTS-Ahmedabad

[1]Nikita A. Pujara, [2]Vijay J. Chitaria
[1]P.G. Student, [2]Professor,
[1]Civil Engineering Department,
[1]L.D. College of Engineering, Ahmedabad,India.

Abstract: Accessibility plays a key role for increasing the ridership of the existing mass transportation system and it will become more crucial in the absence of any formal mode available for feeder. Usually mass transportation system spans over a considerably large area through an appropriate centreline or peripheral or anticipated higher ridership routes in a metro city. The service provided by the mass transportation system can be augmented and can be extended to larger catchment area with help of an efficient feeder service. The BRT in Ahmedabad city is major arterial network used for both short and long distances. In order to make more number of people avail the facility, feeder service is the best option left. In this study, a substantial large catchment area of 2-3 small BRT service sections, each of approximately 1-2 km length will be surveyed for the identification and assessment of feeder services. The various existing feeder modes and their sufficiency will be evaluated. Current scenario of the public buses and para transportation system will be analysed. Based on its service quality and accessibility, requirement of the feeder service will be assessed and suitable feeder service needed and their optimal routes will be suggested.

***Index Terms*-feeder service, BRTS, accessibility, mass transportation system, transportation planning.**

I. INTRODUCTION

The population of India in urban area has been increased more than 220 million in 1951 to 2001 and is expected to grow to around 540 million by the year 2021. In percentage, it has increased 17 percent in 1951 to 29 percent in 2001 and it is estimated to increase up to around 37 percent by the year 2021. With this scenario, number and size of the cities also increased. These make heavy demand for urban transportation system. But insufficient public transport encourages people to switch their mode of transportation from public transportation to private transportation.

In Ahmedabad city, same context can be established for the public transport. As changes observed in population growth, increase in city size, development growth and activity node, development of public transport corridor of BRTS- Bus Rapid Transportation System and upcoming development of metro rail corridor. The existing old public transport service of Ahmedabad municipal transport should be relooked in this scenario of development. There is need the arise for increasing the capacity of the bus network in terms of frequency as well as the accessibility. The research is carried out for the west zone of Ahmedabad city. Route integration of the public transportation system will lean to increase in accessibility. In this research work the base routes of BRT system as trunk service and other service will be provided as feeder to the trunks. The research will design the integrated network for the public transport service and validates the design by comparing the accessibility improvements provided by the proposed design.

India has started to implement mass transportation systems like BRTS-Bus Rapid Transportation System and MRTS-Mass Rapid Transportation System to make city traffic congestion free. But these systems cannot be provided everywhere due to limitations like right of way. Many studies have been carried out for the travel time, travel cost also on reduction in a number of transfers required for a trip. Studies conducted on the scenario of public transport accessibility levels in Ahmedabad, which shows the lack of accessibility in some pockets of the city. To overcome the accessibility issues, this research work is carried out and provides a feeder network to the city.

The reason behind to develop the feeder service network is, to utilize the existing resources effectively and it will improve the issues regarding public transport system by connectivity and accessibility, which will further improve performance of the existing or upcoming transportation modes.

Integration of public transportation services includes the purposes of facilating seamless, multiple-operator journeys. The organization of services required a balanced system of operational features in terms of routes, frequencies, timetable, fares and ticketing etc. As the passengers desire “non-stop-non-transfer” journey, but the transport network is composed of different modes of travel (like trains, buses, taxi, autos etc.)So commuter has to transfer between modes, with a feeling of “time loss” and “discomfort”.

Integrated Feeder service with BRT system will give more efficiency in terms of the seamless flow of the commuters, increase in accessibility and reduction in travel time which will lead to increase number of commuters for utilizing public transportation system. And hence decrease the traffic congestion in the city.

II. LITERATURE REVIEW

Debapriya Tripathy, Dr. Pradeepta Kumar Samanta(2017)[1] "Bus Rapid Transportation System (BRTS) in India: An Overview" Bus Rapid Transportation System (BRTS) is a mass transportation system which delivers cost effective, very fast, comfort, and reliable mode of movement for the users. As BRTS run in their exclusively dedicated lanes, there are very less chances of accidents or congestion. Also application of green technologies, tere are very less pollution of air and noise. BRTS should have proper provisions for right of ways, easy boarding and alighting facilities for the traveller. Furthermore with the use of artificial intelligence BRTS provides better facilities than any other public transport systems. The world's first BRTS was implemented in Curitiba, Brazil and the name of Rede Integrada de Transporte in 1974. This service became inspiration to many services around the world. About 35 million passengers use BRTS every day, as of November 2016. Most of the Latin American countries have excelled in their approach towards BRTS. Currently as the longest BRT route in the world with 210 km connecting the Indonesian capital Jakarta in Trans Jakarta. But due to poor planning and management the operation of such systems fails. Government of India has also planning on creating SMART cities. With this regard, BRTS will definitely ensure to achieve a good smart city in terms of public or mass transportation system. With increasing population and growing demand for speedy intercity and intra-city transportation services, BRTS will play a major role. This paper reviews on two successful cases of Trans Milenio in Bogota, Colombia and Ahmadabad BRTS, India. It also tries to carry out new approaches in terms of cost, time and quality of BRTS in future.

Saadia Tabassuma, Shinji Tanakab, Fumihiko Nakamurac(2016)[2] "Feeder Network Design for Mass Transportation System in Developing Countries" suggest that accessibility of a mass or public transportation system plays an important role in enhancing the ridership of the main system. The egress and access trips to and from the major transportation system become vital in absence of any formal mode available for feeder. This paper carries out the evaluation of the existing feeder modes that can be available for Bus Rapid Transportation System. Currently public buses or para transportation are analysed based on the service quality and service area coverage attributes. The service attributes are used as impedance for feeder design. The study gives the proposal of strategies for feeder design using a gravity model.

Jay Shah(2016) "Public Transport Accessibility Levels for Ahmedabad, India"[3] Potential of bus rapid transportation system for million plus Indian cities: a case study of janmarg brts, Ahmadabad, India" A sustainable transportation system must provide accessibility and mobility to all urban residents in an environment friendly and safe mode of transportation. With the rapid growth in the number of motor vehicles has resulted in severe traffic congestion, air and noise pollution in many cities of the country. Bus rapid transportation (BRT) is a term applied to a variety of public or mass transport systems using buses to provide more efficient and faster service than an ordinary bus service. The main aim of these systems is to approach the service quality of rail transportation while still enjoying the flexibility and cost savings of bus transportation system so the city can be made self sustainable. Ahmadabad became the first city in South Asia to receive award for sustainable transportation system. It has bagged for successful implementation of Bus Rapid Transportation (BRT) system. This Paper evaluates the impact of BRT System on Ahmadabad's transport sector and the changes that can be brought about by introduction of BRT System in other cities. Moving people quickly, at a low cost, with reduced greenhouse gases and air pollutants helps cities grappling with rapid growth, congestion and environmental concerns.

Jinjoo Bok 1,* and Youngsang Kwon (2016)[4] Public transport plays a significant role in the sustainability of urban areas. The mass mobility and feature of urban lives can be enhanced by establishing public transportation networks that are accessible to pedestrians within a convenient walking distance. Ease of access to public transport is characterized by the ease with which inhabitants can reach means of transportation such as buses or metros. By measuring the degree of accessibility to public transport networks using a common data format, a relative study can be done between diverse cities or metropolitan areas with diversify public transportation systems. The General Transportation Feed Specification (GTFS) by Google Developers allows this by presenting a general format based on text files and sharing the data set voluntarily shaped and contributed by the public transportation agencies of many participating cities around the world. This paper suggests a technique to assess and evaluate public transportation accessibility in different urban areas using the GTFS feed and demographic data. To exhibit the value of the new method, six examples of metropolitan areas and also their public transportation accessibility are presented and compared.

Geok K. Kuah1 and Jossef Perl (2010)[5] "Optimization of Feeder Bus Routes and Bus-Stop Spacing". Existing studies of transportaion network design deal individually with the problems of shaping the best possible route space and functioning headway, and that of formative the optimal stop spacing. This paper represents an investigative model for the design of an optimal feeder bus network for accessing an existing rail line, which avoids the chronological approach and combines these three basic variables. Our results with regard to bus-route spacing and headway are similar to those obtained previously, indicating that route spacing and functioning headway are not very sensitive to changes in the relevant system parameters. With view to bus-stop spacing, three diverse cases are considered, reflecting three different stop-spacing policies. In the first case, bus-stop spacing is specified as consistent over the whole area. In the second case, stop spacing is steady along any given route. In the third case, stop spacing may vary both between and along routes. Closed-form solutions are presented for the first two cases. The solution to the third case is shown to depend on an preliminary condition. Three numerical examples are presented, represented that the planned model provides reasonable solutions and reliable responses to changes in demand.

Ashish Verma and S. L. Dhingra (2005)[6] "Feeder Bus Routes Generation within Integrated Mass Transportation Planning Framework" This paper suggests a model for developing best possible feeder bus routes, within integrated mass transportation planning structure, for urban rail transportation stations. The model is a part of the methodology to develop an useful and efficient integrated urban mass transportation system for a city which has a potential demand for a new rail-based mass transportation system besides the street transportation system and existing rail-based system if any. In addition to the planned model the methodology comprises of rail transportation corridor identification and incorporated scheduling models, but they are not within the scope of this paper. The routes are generated in two levels; the first level generates the initial set of shortest paths potential feeder routes based on the maximum and minimum route length criteria. In the second level, an exploration is made around these corridors by generating K shortest paths for each station-to-terminal node pair potential feeder route and using genetic algorithm to select one route combination out of all feasible routing configurations. The feeder routes were developed for two different cases: Case 1 for selective search and Case 2 for open search, and the best results out of the two were adopted. Thane City, which is a part of Mumbai Metropolitan Region, India, is taken as the case study area. It was established that better results in terms of minimized objective purpose value were obtained for the open search case. The planned model is able to develop optimal feeder routes, within integrated mass transportation planning structure.

Steven Chien, Zhaowei Yang(1999)[7] "Optimal Feeder Bus Routes on Irregular Street Networks" The methodology presented here seeks to optimize bus routes feeding a major intermodal transportation transfer station while considering intersection delays and realistic street networks. A model is developed for finding the optimal bus route location and its operating headway in a heterogeneous service area. The criterion for optimality is the minimum total cost, including supplier and user costs. Irregular and discrete demand distributions, which realistically represent geographic variations in demand, are considered in the proposed model. The optimal headway is derived analytically for an irregularly shaped service area without demand elasticity, with non-uniformly distributed demand density, and with a many-to-one travel pattern. Computer programs are designed to analyze numerical examples, which show that the combinatory type routing problem can be globally optimized. The improved computational efficiency of the near-optimal algorithm is demonstrated through numerical comparisons to an optimal solution obtained by the exhaustive search (ES) algorithm. The CPU time spent by each algorithm is also compared to demonstrate that the near-optimal algorithm converges to an acceptable solution significantly faster than the Es algorithm.

III. CONCLUSION

After the study, the importance of a regular feeder system to improve the accessibility of mass transportation system. It can be concluded that use of conventional transportation system as feeder mode will not be pleasing at all; particularly in developing countries where conventional public transport is stagnant and offers quite poor service in terms of comfort and coverage. The review of commuters regarding these current feeders also unfolds the reason behind, no use of BRTS by private vehicle users, because it provides quite efficient, comfortable and safer travel. The standard of current feeders is almost impossible to compromise for private vehicle users and therefore cannot attract other income class groups than low income class (who have no other choice). It is additional concluded the well suggested approach of 'integrating paratransit as feeder to utilize the existing resources', is underwhelming in the local context. A feeder bus service will unquestionably proffer improved riding quality and create lesser environmental hazards.

IV. REFERENCES

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