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PARA TRANSIT SYSTEM IN MEDIUM SIZED CITIES PROBLEM OR PANACEA

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ABSTRACT

Para-transit system is indispensable transport system in medium sized cities of India due to various reasons. Size, pattern, structure, socio-economic conditions and network characteristics of these cities and service flexibility of PTS make it a vital transport system. The popularity of the system is evident from the fact that in some medium sized cities the PTS serves nearly 80 percent to 90 percent of the total passenger trips catered by public transport. It lacks infrastructure support for its operations and parking. Minimal check is being executed on the behavior of its drivers for their indiscipline, violations, disobedience to traffic rules and regulations. Poor maintenance of vehicles spreads pollution in these cities. Planning and administrative measures are suggested to improve the performance and operation of the PTS to serve the city safely, efficiently and in an environmentally sound manner.

1. INTRODUCTION

Transport mix is one of the important characteristics of Indian cities, under the given size, structure and socio-economic characteristics. The uniqueness of road networks, demographic, physical and societal requirements determine the selection of a particular transport system. Based on various research studies the National Transport Policy Committee in 1980 identified three different sets of urban transport systems prevailing in Indian cities (Government of India, 1980).

- A system with strong emphasis on mass public transportation with some para transit alternatives.
- A system with strong emphasis on PTS, usually with one dominant type, and little by way of mass public transportation.
- A system that is composed of a broad mix of mass public transport and PTS, with no one being dominant.

In all the above compositions the PTS plays its role as a leader or a follower. But it is informal in its planning and operations, which makes it a problem area for the medium sized cities. Lack of proper infrastructure, no operational controls, informal drivers' training, etc. are creating unsafe, inefficient and environmentally degrading conditions in medium sized cities. Suitable planning and administrative measures have to be evolved to improve its role in the transport system.

2. THE PTS AND MEDIUM SIZED CITIES

Broadly, the PTS is defined as the system one that comes in between MTS and private transport system. In other words, it may be defined as the system that is in between a conventional bus and private car. Various other terms, such as intermediate public transport (IPT) system, informal transit system (ITS), etc. are also used parallel to the PTS. In developing countries para transit modes, such as Jeepneys of Manila, Betjaks of Indonesia, Trishaws of Kuala Lumpur, etc. play a useful role in urban travel. In the Indian context number of modes can be counted under the PTS such as mini-bus, dodge, shared taxi, van pool, car pool, taxicab, maxi cab, matador van, phut-phut, tempos, auto-rickshaw, trekker, cycle rickshaw, man-pulled rickshaw, tonga, etc. The PTS characterizes more personalized kind of system that carries fewer passengers and is highly flexible in routing and operations. It does not have fixed halting points and time scheduling is regulated by internal competition, number of passengers, etc. The owners or operators of these vehicles have their own unions who themselves decide about the routes, fares, freight, halts, frequency of service, timings and so on. They are supposed to observe the traffic rules, vehicular regulations and are accountable to the public and

government for inconveniences, accidents, etc. (Baboo, 1986).

Medium sized city is a widely used concept these days, though no official definition for the same is devised as yet. However, various researchers and institutions are using population range 0.5-1.0 million to define medium sized cities. For the present purpose the same definition has been used to define medium sized cities.

2.1 Methodology

To appreciate the vitality and problems of the PTS in medium sized cities a case study of Amritsar is taken up. The study is based on various research findings regarding traffic characteristics and role of PTS in medium sized cities. Role of PTS is empirically tested and is based on analysis of primary data collected for traffic volume, speed and parking characteristics during peak hours. Wherever required comparisons are done with norms and standards evolved by the Indian Road Congress to identify the problem areas in operations of the PTS. Energy efficiency and pollution load of different modes are estimated from the norms prescribed for the same with respect to speed and traffic volume data. Passengers and drivers are interviewed for their socio-economic characteristics and preferences for different modes for various purposes. Preferences of passengers and drivers are recorded to suggest measures for improvement in the PTS operations and organization.

3. AMRITSAR CITY AND TRANSPORT SYSTEM

Amritsar city is an important medieval city in the north of India, which houses about 1 million people in 135 Km^2 area as per 2001 census. Decentralization of activities, zigzagging road network in the core and semi-ring and radial road pattern makes it an appropriate case to study the transportation features in a medium sized cities. It suffers from unplanned and haphazard growth and mixed land use. Consequently, different traffic characteristics can be experienced in different parts of the city (see Fig. 1 and Table 1).

Fig. 1 Physical growth of Amritsar City

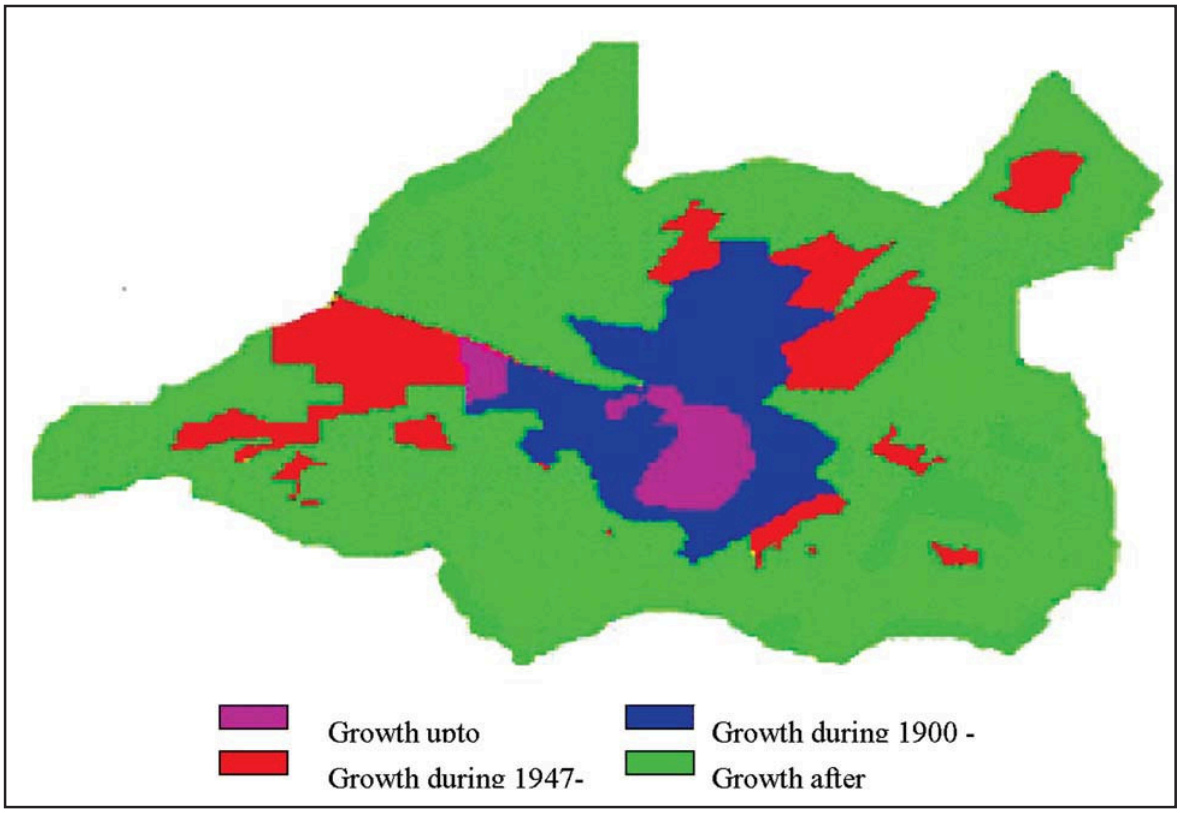

Table 1 Salient features of Amritsar city and mode of travel

Area	Land Use Features	Circulation and Traffic Characteristics	Mode of Travel (Public Transport)
CORE:Growth upto 1900; Medieval Period Development	• C.B.D. • Shops along road • Mixed land use • Tiny industrial units • Religious institutions • Offices • Vegetable markets • Theatres • Residential • High population and structural density • Encroachments	• Narrow zigzag lanes • High traffic intensity • Unauthorized parking • Crawling speed • Heterogeneous traffic • Over-utilization of road	• Cycle rickshaw (Dominant) • Tonga • Scooter rickshaw
INNER PERIPHERY: Growth between 1900-1947; Development Before Independence	• Mixture of planned and unplanned development • Medium intensity land use • Industry & Commerce along main roads • Main terminals (Bus, Rail, Truck) • Higher order educational & medical institutions • Office complexes • District centre • District courts • Grain market • Parks, Theatres, Play-Grounds, Religious institutions • Encroachments • Medium population and structural density	• Wide straight roads • High to medium traffic intensity • Unorganized parking • Medium speed • Heterogeneous traffic • Over-utilization of stretches of roads	• Cycle rickshaw (Dominant) • Auto rickshaw • Mini bus/Dodge • Conventional bus • Tonga
OUTER PERIPHERY: Growth between 1947-1976; Development before Establishment of Municipal Corporation	• Scanty Development • High intensity industrial development along main road • Higher order educational and medical facilities • Low density • Encroachments	• Wide straight main roads • Moderate traffic intensity • Unorganized parking lots • Heterogeneous traffic • Medium speed	• Auto rickshaw (Dominant) • Mini bus/Dodge • Conventional bus • Cycle rickshaw • Tonga
PERIPHERY: Growth after 1976; Development after Establishment of Municipal Corporation)	• Sporadic unplanned development along roads • Industrial development along the main roads • Very low population/ structural density	• Wide main roads • Low traffic intensity • High/ medium speed • Heterogeneous traffic	• Mini bus/Dodge (Dominant) • Conventional bus • Cycle rickshaw • Auto rickshaw

It is clear from table 1 that PTMs play a dominant role in all parts of the city. Same can be supported by the fact that growth rate of PTMs is more than four times to that of MTS in the city. It is estimated that among the public transport systems PTMs serve as much as 94 percent of the passenger trips. Less number and low frequency of conventional buses on different routes are the reasons for lesser service. The traffic volume study indicates that PTMs cater to 5 to 8 times more travel demand than that of conventional bus system on major routes of the city. On the minor routes only PTMs are operating. In an estimate made by District Transport Office Amritsar in 1981, it was estimated that about 33,000 passengers were served by scooter rickshaw every day on different routes of the city. Whereas, an estimate of Nigam Transport Amritsar in 1986-1987 revealed that local bus facility served about 18,000 passengers per day on different routes of the city. Thus PTS dominates the transit scene in the city by catering most of the travel demand from the past. PTMs in Amritsar consist of mini-bus, dodge, taxi, scooter-rickshaw, cycle rickshaw and tonga. In case of the walled city, the narrow zigzagging lanes restrict the operation of PTS to cycle rickshaw and auto rickshaw only. Thus smaller sized settlements having decentralized distribution of activities and narrow zigzagging road network are perfect attributes for PTS operation. Slow moving PTMs are more popular on narrow zigzagging roads due to their better maneuverability.

3.1 Model Split and Travel Behavior

Fast moving PTMs are more popularly used for work purposes in Amritsar city. About 76 percent, 48 percent and 53 percent of the total trips are catered by auto rickshaws, mini buses and dodges respectively for work purposes. Cycle rickshaw is commonly used for education trips (23 percent of the total trips). Easy access, high frequency, low fare structure, less journey time, etc. are the determining factors responsible for the popularity of these modes for different purposes. The ring and radial pattern of road network improves accessibility to the extent that passengers can reach the PTMs within 5-10 minutes by walk. High frequency of fast moving PTMs i.e. 5-6 auto rickshaws per minute during peak hours on all the important radial routes betters their availability. Cycle rickshaw is so frequently available that even the remotest part of the city is served. Even the fare structure is as low as 50 paise per kilometer for auto rickshaw. Cycle rickshaw is more popular for shorter trip lengths due to comparatively high journey time. Comforts, high flexibility, privacy, gender, safety, economic status of passenger, etc. are the reasons for preferences to cycle rickshaw for social and health trips. About 28 percent old age travelers and 58 percent female use cycle rickshaw for their trips. Fast PTMs, such as auto rickshaw, mini bus and dodge are preferred modes of passengers earning Rs. 1,000-5,000 per month. About 78 percent of their travel demand is met by these modes. Passengers earning less than Rs.1,200 per month use tonga. Cycle rickshaw is more frequently used (25-50 percent) by passengers earning more than Rs.1,000 per month. Auto rickshaw is the most commonly used mode in the city for each income group as about 27 to 74 percent of the travel demand is met by this mode.

3.2 Drivers' Preferences for PTMs

The study reveals that as many as 60 percent of the PTS drivers are illiterate. Only 20 percent drivers have attained education up to tenth standard. Thus low level of literacy and easy employment in PTM operations tempt the drivers to adopt this profession. PTM availability on rent, higher profitability and loan facility by banks have furthered their interest to remain in this profession. On average an auto rickshaw driver earns Rs.200 per day, whereas a cycle rickshaw driver earns about Rs.100 per day. The PTS is largely governed by informal because drivers do not take any formal training to operate the vehicles. Malpractices of planning and controlling agencies result in poor or no execution of regulations and controls. Few drivers together can form a union through which they decide their routing, fare structure and security. In Amritsar there are as many as 200 unregistered auto rickshaw unions. Virtually, each new auto rickshaw parking stand gives birth to a new union. Normally they watch their individual interests but for common issues they stand together. Auto rickshaw unions are stronger than cycle rickshaw unions. Thus informal operations and control make the PTS an easy way out to earn and serve.

Thus morphological, demographic, physical and socio-economic reasons make the PTS a vital transport system for medium sized cities like Amritsar. Their operational flexibility, informal planning and controls facilitate the drivers in serving the passengers' needs. Operational characteristics of different PTMs differentiate the nature and extent of role each mode plays. Fast PTMs provide primary service whereas slow PTMs supplement them in most of the cases. Due to absence of MTS the PTS becomes a vital system of transport for medium sized cities.

4. PROBLEMS AND ISSUES OF THE PTS

Though vital, the PTS poses some serious problems and issues that alarm the city authorities to take corrective actions to improve its performance. Some of the important problems are discussed below.

4.1 Absence of Planning for the PTS

Absence of route planning leads to self-planned PTS routes that results unjustified traffic assignment and distribution model. Volume of PTMs on profiteering routes increases enormously. It is not the case that this enormous increase corresponds to increased travel demand. But some of the auto rickshaws remain under occupied even during peak hours. Since no route permit is issued to any of the PTMs, therefore, most of the drivers concentrate on popular routes of the city with a view to get more passenger clientele during peak hours. Such whimsical growth in traffic volume and frequency leads to congestion on the main roads during peak hours. At intersections the conditions are still worse. In fact, these vehicles create traffic bottlenecks and thus cause delays at these points. Almost all the radial roads of Amritsar face these problems but conditions are critical on the central spine. PTS is so flexible and informal that it does not have fixed stoppages. The vehicles are halted at will of the driver or passenger. The abrupt stoppage hinders the free flow of traffic and become a cause of conflict/ rear end collision at times.

4.2 Imbalanced Land Use Pattern

Increased traffic volume and frequency of PTMs, especially fast moving, on some routes have made them popular roads of the city. Consequently, polarization of activities at few locations, transformation of land uses, unauthorized constructions, increased land values, additional pressure on the existing infrastructure, introduction of non-conforming activities, etc. have occurred along radial routes. Intensity of commercial activity has doubled at intersections of the central spine. Such unplanned transformation and development have adversely affected the areas around roads, cityscape and supporting infrastructure of the city.

4.3 Increased Heterogeneity of Traffic

High growth rate of PTMs and personalized modes have increased the heterogeneity of traffic on main roads of the city leading to various traffic hazards like confusion, accidents/collisions, slow travel speed. The study reveals that speeds on most roads of the city range from 30 to 40 km per hour. During peak hours it reduces to 20-30 km per hour depending on the popularity of road. Slow speeds, especially on congested corridors and walled city area of the city, have made fast moving PTS energy inefficient by almost 2 times. Heterogeneity of traffic and slow speeds are adversely affecting the air quality of Amritsar. Whereas, private automobiles cause 64 percent of CO and HC, the remaining is contributed by motorable PTMs. Interestingly central spine pollutes the city by about 48% of the total pollution generated by transport. The drivers of rickshaws are using adulterated fuel, which further increases the intensity of air pollution.

4.4 Encroachments

High frequency of PTMs, hence high urban mobility, tends to invite unauthorized and regularized encroachments (informal activities) along the roadsides or on footpaths of the main arteries. At least one lane of the road is absorbed by such encroachments leading to reduction in road width and road capacity. Over-utilization of the left over carriageway, traffic jams, crawling journey speed, extra fume diffusion, etc. are the consequent results.

4.5 No Parking Facilities

Non-availability of planned/ organized parking lots at the important junctions and along main routes

tempt PTS operators to park their vehicles along the kerbs of roads, which clubbed with encroachments further reduce the road width (upto 2 lanes at important junctions). The planned parking lots are either inadequate or are located at places where regular traffic is not attracted, therefore, drivers park their modes at convenient places that hinders continuous flow of traffic by reducing the road width, overcrowding the junctions/ stretches and disturbing the aesthetics of the road.

4.6 Illiteracy and No Administrative Control

Illiteracy of PTM drivers and poor administrative controls result in poor driving skills and violation of traffic regulations and controls, signs and signals, air and noise pollution control measures, etc. Though no such study has been carried out for Amritsar but a study conducted by RITES in 1998 reveals that auto rickshaws had an accident rate of 6.3 accidents per 1000 vehicles in Delhi as compared to 5.8 for taxi, 3.7 for cars and 0.96 for two wheelers. Involvement of cycle rickshaw in fatal accidents has been less particularly on account of low speeds in their areas of operation (RITES, 1998).

Hence neglect to plan for the PTS, lack of government control and informal operations are main factors responsible for various traffic problems in the city. Illiteracy of drivers and irresponsible behavior towards traffic regulations and controls lead to whimsical movements that create unsafe traffic conditions on different roads. Lack of knowledge and lust for higher profits tempt the drivers to use adulterated fuel that is injurious to health and environment.

5. SUGGESTIONS

Size, structure, road network pattern and socio-economic conditions of passengers and negligible role of bus transport are governing factors in the popularity of PTS in medium sized cities. Also, PTMs can support shorter trips but for longer trips MTS is the only economical option. As per David Ac Maunder commuters rely on public transport system for journeys in excess of about 10 Km (Roy, 1997). Though it is difficult to say but their characteristic features reveal that PTS is capable of serving a city of 2 million conveniently. An organized approach to PTS will make it a sustainable option for medium sized cities. Following suggestions are made to make the PTS more organized and better operated.

5.1 Planning for Routes and Operations

MTS is a better option to avoid unprecedented growth of PTMs and private modes. But PTS should not be neglected while proposing a transport system for medium sized cities. Since they are the most viable and vital modes to cater the urban travel needs of these cities, therefore, proper planning about their routing and operation should be done after conducting scientific studies. Instead of making them accountable for safety and inconvenience they should be considered for their merits as well. Trip assignment modeling should be applied to planning and operation of PTS so that rabid growth of PTMs, especially auto rickshaw, is checked. Wherever bus transport facility exists efforts should be made to integrate the two systems physically as well as operationally. Planning and management should be done in a manner that both support each other instead of competing one another.

5.2 Controlled Land Use

As discussed earlier, better transport facility tempts to intensify and transform the land uses along main/ popular routes. The converse is also true because high magnitude of economic activities induce more PTMs to ply on such routes. Land use – transport interaction modeling should be attempted and proposed land use zoning regulations and building bye laws should be strictly enforced. Haphazard transformation and intensification of land uses should be strictly prohibited. Such an effort shall remove the bottlenecks by avoiding encroachments due to informal sector and unauthorized parkers.

5.3 Formalization of the PTS

With a view to improve the operational and organizational skills of the PTS it is essential that it should not be set free in decision making process regarding its routing, frequency and fare fixation. Competent local authority should formalize its

operational matters so that it helps in improving safety, efficiency and environment of the city. Government should perform the role of a coordinator in the total process so that some rationality prevails in the transport system. Every effort should be made to make each PTM driver a skilled/ organized driver by passing him through the required/ prescribed procedure as mentioned in Motor Vehicle Act. Drivers' training camps should be organized where they should be taught about the traffic regulations and controls. Effort should be made to register each driver, whether motorized or non-motorized. Fares should be fixed with mutual agreement between the government and the PTM operators. Since most of PTM drivers are illiterate, therefore, they should be educated about their responsibilities towards important aspects of traffic & transportation. They should be educated about the ill-effects of adulterated fuel on health as well as environment. Such efforts will improve their operational and responsible behavior towards traffic.

5.4 Planned Parking Lots

Proper provisions should be made to provide required infrastructure for different PTMs. Proper parking lots, with provisions of shelter to counter the adverse weather, should be planned at appropriate locations. While designing the parking lots near intersections care should be taken to locate them at an appropriate distance from the junction. Generally, 100 meter clear space is recommended at the junctions. Efforts should be made to remove encroachments, if any, on/ along the PTM parking lots so that they can be optimally utilized.

6. CONCLUSIONS

Hence the PTS is a vital transport system for the medium sized cities. Small size of settlements, decentralized distribution of economic activities, small trip lengths, etc. do not support economic and efficient operation of MTS. As an alternative PTS is a panacea for the travel needs of medium sized cities. Although the problems caused by PTMs are serious by nature and magnitude but by taking planning, organizational, operational and educational measures principles of safety, efficiency and environmental conduciveness can be achieved. Thus the PTS should be considered as a panacea and not a problem under the existing and anticipated traffic and transportation scenario of medium sized cities.

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