ASSESSING THE PERFORMANCE OF PUBLIC TRANSPORT OPERATION IN DEHRADUN, UTTARAKHAND, INDIA

Singh Pooja*, Chani P.S.¹ and Parida M.²

1. Department of Architecture and Planning, IIT Roorkee, Dehradun, Uttarakhand (INDIA)
2. Department of Civil Engineering, IIT Roorkee, Dehradun, Uttarakhand (INDIA)

ABSTRACT

The unchecked growth of population had put forth a tremendous demand for infrastructure and mismatch between demand and supply of transport infrastructure resulted in delays, fuel loss, air and noise pollution and accidents and loss of productive time and energy. All over the world public transport system has been playing an important role in meeting the transport demand of the cities. Recognizing the cost effective nature and the flexibility that the bus system provides, bus organizations in most of the cities of the world have brought in reforms to improve their productivity. So there is urgent need to assess the performance of PT (Public Transport). In this paper an attempt has been made to develop a benchmarking for public transport system against which the performance of transport sector and government policies would be evaluated. Benchmarking is an important mechanism for introducing the accountability in service delivery.

Key Word: Urbanisation, Public Transport (PT), Indicator of public transport facilities, Benchmarking, Level of Services (LoS)

INTRODUCTION

India is the second most populated country in the world with the population of one billion plus. According to the 2011 census, India has a population of 1210.2 million with approximately 31 per cent or 377.1 million people living in urban areas and it is expected that by 2031 about 40% population i.e. about 600 million people would be living in urban areas.¹ Public transports play a major role in the city to reduce congestion and delay. Transportation play a crucial role in economic and sustainable growth thus there is need for benchmarking of service level for proper and smooth flow one place to other. Today there are no means of monitoring the quality of infrastructure being developed. There is therefore, a need to shift the focus towards service delivery to better utilize the funds being made available for development of urban transport under the Five year plans. All over the world bus system has been playing an important role in meeting the transport demand of the cities. Recognizing the cost effective nature and the flexibility that the bus system provides, bus organizations in most of the cities of the world have brought in reforms to improve their productivity.²,³

AIMS AND OBJECTIVES

To study the existing level of public transport operation in Dehradun and find out the area where the improvement is needed to be done.

METHODOLOGY

Study area

Dehradun city in the shivalik foothills of Himalayan ranges is the capital of the new state of Uttarakhand, India. Dehradun urban area supported a population if lakh as per 2001 census. The growth rate of past few decades has been constant except for the high growth rate of 66% in last decade (1991-2001) on scale of large scale migration after Dehradun has declared as the interim state capital. The average house hold size is about 5 people. The growth of motor vehicle in Dehradun has been

*Author for correspondence
phenomenal. The registered vehicles have grown at 11% pa during past 12 years. It is observed from the that car, 2-W constitutes more than 14% and 75% of total vehicles. Growth of taxis and IPT mode at the rate of 25% and 28% respectively and public transport fleet at the rate of 7% pa.

**Public transport system in Dehradun city**

The existing intra city public transport system is being operated by private operator through bus and tempo. The private buses are running on 10 routes having a fleet of about 100 busses. About 10 main tempo routes are operating in the city with about 1300 tempos on the roads. Vikram (Transport service) is the main mode of public transport in the city and operated from the road side, utilising the road ROW as terminal and causing the delay of other vehicles plying on the road.

**Approach**

As a prerequisite to the study, relevant data required would be collected as per the guidelines of the SLB Handbook issued by MoUD (Ministry of Urban Development). The data could either be taken through previous studies, secondary sources or captured through specific primary surveys. This data would be the basis for the establishing the base year benchmarks of various parameters. The data collected from the primary and secondary sources will be collated, analyzed and accordingly the performance of parameters would be assessed.

For assessing the performance of public transport operation in Dehradun city, the methodology adopted is as given by service level benchmarking for urban transport given by MOUD by government of India. Service level performance benchmarks have been identified for the following areas of intervention: 3,4

1. Public transport facilities
2. Pedestrian infrastructure facilities
3. Non Motorized Transport (NMT) facilities
4. Level of usage of Intelligent Transport System (ITS) facilities
5. Travel speed (motorized and mass transit) along major corridors
6. Availability of parking spaces
7. Road safety
8. Pollution levels
9. Integrated land use transport system
10. Financial sustainability of public transport

Typically, four Levels of Service (LoS) have been specified in Table 2, viz. ‘1’, ‘2’, ‘3’ and ‘4’ with ‘1’ being highest LoS and ‘4’ being lowest to measure each identified performance benchmark. Therefore, the goal is to attain the service level 1. The indicators identified within parameter public transport facility are as follows:

- Presence of organized public transport system in Urban area
- Extent of supply / availability of public transport
- Service coverage of public transport in the city (Bus route network density)
- Average waiting time for public transport users
- Level of comfort in public transport (crowding)
- Percentage fleet as per urban bus specifications

It indicate the city wide LoS provided by public transport system during peak hours (8-12 noon and 4-8 pm). Public transport system will only bus base system in Dehradun city. Public Transport system are characterised by fixed origin and destination, fixed routes and schedules, fixed stoppage time and fixed fares. Therefore it doesn’t include IPT, RTV, autorickshaw, 3W, 2W, tempos, shared taxis and other vehicles providing point to point service. The indicator to calculate the citywide level of services for public transport facilities is mentioned in Table 1.

**Field survey and data collection**

Data to be collected against public transport facility and its six indicators as mentioned in Table 3 from primary (field survey) and secondary survey (reports, records and various departments).

Primary survey was conducted for bus service facilities inventory in different location of Dehradun city. There are basically 10 major routes for intercity public transport operation in Dehradun city. Passenger data has been calculated for the different routes and headway data has been calculated for 6 different routes.
Table 1: Indicators to calculate city-wide level of service for public transport facilities

<table>
<thead>
<tr>
<th>LoS</th>
<th>Presence of organised public transport system in urban area (%)</th>
<th>Extent of supply/availability of public transport</th>
<th>Service coverage of public transport in the city</th>
<th>Average waiting time for public transport users (mins)</th>
<th>Level of comfort in public transport</th>
<th>% of fleet as per urban bus specification</th>
</tr>
</thead>
</table>
| 1   | > = 60                                                        | >=0.6                                         | >=1                                           | <=4                                               | <=1.5                             | 75-1000 \%
| 2   | 40-60                                                        | 0.4-0.6                                        | 0.7-1                                         | 4-6                                               | 1.5-2.0                           | 50-75                                    |
| 3   | 20-40                                                        | 0.2-0.4                                        | 0.3-0.7                                       | 6-10-                                             | 2.0-2.5                           | 25-50                                    |
| 4   | < 20                                                         | <0.2                                           | <0.3                                          | >10                                               | >2.5                              | <=25                                     |

Table 2: Overall level of services of public transport facilities city wide

<table>
<thead>
<tr>
<th>Overall LoS</th>
<th>Calculated LoS</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>&lt;12</td>
<td>The city has a good public transport system which is wide spread and easily available to the citizens. The system provided is comfortable.</td>
</tr>
<tr>
<td>2</td>
<td>12-16</td>
<td>The city has public transport system which may need considerable improvements in term of supply of busses/coaches and coverage as many parts of the city are not served by it. The frequency of the services available may need improvement. The systems provide is comfortable.</td>
</tr>
<tr>
<td>3</td>
<td>17-20</td>
<td>The city has a public transport system which may need considerable improvements in term of supply of busses/coaches and coverage as many parts of the city are not served by it. The frequency of the services available may need improvement. The system provided is not comfortable as there is considerable overloading.</td>
</tr>
<tr>
<td>4</td>
<td>21-24</td>
<td>The city has very poor/no organised public transport system.</td>
</tr>
</tbody>
</table>

Calculated LoS = (LoS 1+ LoS 2+ LoS 3+ LoS 4+ LoS 5+ LoS 6) and identify overall LoS as mentioned below in Table 2.

RESULTS AND DISCUSSION

For benchmarking the public transport operation in a city all level of services has to be calculated against each indicator

Presence of organised public transport system in urban area

Total no. of buses (A) = 3899
Total no of buses under the ownership of STU/SPV or under concession agreement = 337
% = B/A*100 = 8.64 %

LoS1 = 4
Percentage of organised public transport is 8.64 % i.e. less than 20. So the LoS1 lays under 4 (Table 1).

Extent of supply / availability of public transport

No. of busses available in city in a day (A) = 337
Total population of the city (B)/1000 = 578000/1000
Ratio A/B = 0.583
LoS2 = 2
The ratio is 0.583 that lies between 0.4-0.6 that comes in LoS2 -2 (Table 1)
Table 3: Data to be collected against parameter

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Indicator</th>
<th>Data to be collected</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public Transport facilities</td>
<td>Presence of organized public transport system in urban area (%)</td>
<td>Total number of buses in the city. Total number of buses under the ownership of STU/SPV or under concession agreement.</td>
</tr>
<tr>
<td></td>
<td>Extent of supply availability of public transport</td>
<td>No of buses/ train coaches available in a city on any day. Total population of the city</td>
</tr>
<tr>
<td></td>
<td>Service coverage of public transport in the city</td>
<td>Total length in road kms of the corridors on which public transport systems ply in the city. Area of the urban limits of the city.</td>
</tr>
<tr>
<td></td>
<td>Average waiting time for public transport users</td>
<td>Bus stops within the city. Route wise headway (in min) for buses.</td>
</tr>
<tr>
<td></td>
<td>Level of comfort in public transport</td>
<td>Key routes of public transport in the city. Seats available in a bus of each type on each identified route. Passenger count on bus at key identified routes.</td>
</tr>
<tr>
<td></td>
<td>% of fleet as per urban bus specifications</td>
<td>Total number of buses as per urban bus specifications in the city.</td>
</tr>
</tbody>
</table>

**Service coverage of public transport in the city**
Total length in road kms of the corridors on which public transport systems ply in the city (A) = 217.7
Area of urban limit of the city in km² (B) = 359
Ratio (A/B) = 0.606
LoS 3= 3
Service coverage ratio is 0.606 that lies between 0.3-0.7 i.e. LoS3- 3 (Table 1).

**Average waiting time for public transport users**
Headway data is collected in 6 different location in Dehradun.
Average headway-9.2 minutes i.e  LoS4= 3 (lies between 6-10)as per Table 1.

**Level of comfort in public transport**
Level of comfort described as ratio of average of passenger count and seat availability in bus at different location of the city. From the field survey the average ratio is 0.87 that come under level of service 1 so LoS5 is 1.
Passenger count in the bus (A) = 24.563
Seat available in the bus (B) = 28
Ratio (A/B) = 0.87

LoS5= 1

**Percentage fleet as per urban bus specification**
The percentage fleet as /urban bus specification is 19.57. According the Table 1 it is <= 25 i.e LoS6 comes under level of service 4.
Total no. of buses in the city (A) = 373
The number of buses as per urban bus Specification (B)= 73
Percentage=(B/A)*100 = 19.57
LoS6 = 4
Calculated LoS = LoS 1 + LoS 2 + LoS 3 + LoS 4+ LoS 5+ LoS 6 =4+2+3+3+1+4=17
The overall LoS is 17 which lies in the range of 17-20, thus for which from the indicator Table 2, we get the overall LoS is 3.

**CONCLUSION**
The parameters presence of organised public transport system in urban area and percentage fleet as per urban bus specification are having the LoS 4 thus these area are those which need the major improvement, whereas the service coverage of organised public transport in the
city and average waiting time for public Transport users are having the LoS 3. It also need to improve if we improve more than one indicator then we can get overall LoS for public transport for Dehradun to LoS of level 1 from level 3.

RECOMMENDATIONS
Although the LoS is 1 for comfort in public transport as it depend on the numbers of passenger /seat, but the factor i.e. the quality of buses needs improvement. As level of service is 3, so considerable improvement is needed in terms of supply of buses and the service coverage as most part of city is not served by it. And frequency of busses also needs to be increased.

REFERENCES