SUMMARY:

Public transport fare has always been a subject of debate; whether public transport shall be made free of cost, or fare structure shall meet operational expenses or public transport shall depend on subsidies. This study aims to analyze the current fare structure of public transport system in Pune region and testify the techniques to rationalize the same with the aim of optimum fare structure meeting equitable access to poor and incentives for middle and higher middle classes so as to opt for public transport instead of private vehicles. It also focuses on various alternatives to make the system financially sustainable.

Most of the systems see fare as a major source of revenue generation however there are many techniques to generate non fare revenue in order to subsidise fare. In comparison with various public transport companies in India, Pune has been the highest among Bangalore and Ahmedabad and many other cities. The current fare structure highly disappoints the possibility of modal shift from private vehicles to public transport since the extra cost incurred in case of transfers leads to more expenses than that for private vehicles especially for short trip lengths.

Overall, the existing fare structure needs urgent attention so as to cope up with current user's financial capabilities and attract more passengers resulting in modal shift especially when the city is in progress of implementing high quality Bus Rapid Transit (BRT) System.

A rationalized fare structure which complements rationalized operations and BRT will result in increased bus patronage as a result of modal shift and better accessibility.

Key Words: Public transport; fare; route rationalisation; Pune

PURPOSE OF THE STUDY:

Public Transport Company needs to operate with two conflicting goals of providing outstanding public transport services for citizens and at the same time managing financial viability [EMBARQ: Bus Karo: A Guidebook on Bus Planning & Operations, 2009]. Though it is necessary to manage financial viability, fare shall not be seen as the only mechanism to compensate financial losses. Any public transport fare which fails to give cheaper solution than expenditure on private vehicle will discourage use of public transport. It is the responsibility of government to provide subsidies against financial losses provided that if the losses are due to inefficiencies of the system, majors to eradicate inefficiencies shall be taken care of. Fare has always been seen as a source to generate more revenue however there exists many sources to generate non fare revenue. Neglecting non fare revenue sources, many public
transport companies try to generate more revenue with fare hike. Fare hike which is inequitable may decrease the use of public transport for short distances. Study aims at analysing the current public transport fare structure of Pune. Objective of this study is to derive new options for fare structure that ensures fewer burdens on short trip users and comparatively more but reasonable revision in fare for long trips and at the same time meeting financial requirements of public transport company. It also aims to find alternative sources to generate non fare revenue towards financial sustainability.

**MATERIALS AND/OR METHODS:**

1. **Introduction:**

Pune Metropolitan Region (total of 1340sqm) consists of city of Pune Municipal Corporation (PMC), Pimpri Chinchwad Municipal Corporation (PCMC), Cantonment boards and surrounding villages. Pune Mahanagar Parivahan Mahamandal Limited (PMPML) is public transport company that provides public transport services to entire region with a total network of approximately 1000 km and 330 routes serving the region and its surrounding villages. Though company serves wide network of service, extremely long routes and unnecessary overlapping of routes result in uneven load factors for many routes. Frequent breakdowns because of poor maintenance and old age fleet result in further degradation of service. Such scenario results in irregular frequency of buses with around 69% of buses having frequency less than 1 bus every 30 min. Long waiting times and high demand routes with crowded buses cause passenger inconvenience while on the other hand uneven loads for most of the routes result in financial losses and under utilization of public transport services. PMPML has total fleet of 1560 out of which on an average 1320 buses are in operations with daily 1100000 passenger trips. On an average, 880 passengers travel per bus with daily km/bus as 225 with average load of 32. At present current cost/km for operations is Rs 42 while revenue /km constitute to be Rs 30. This corresponds to average financial losses of 7-8% for financial year of 2011-12. PMPML currently earns Rs 84.6 lakh per day from ticket revenues. With pass sales and other revenues, total revenues come to Rs 106.0 lakh per day. With costs of around Rs 112.2 per day, PMPML faces an operating deficit of Rs 6.05 lakh per day. At present, fare is the major source of revenue for PMPML. Non fare revenue of PMPML constitute of only 3%. Neglecting non fare revenue sources imposes burden on passengers as the only financial source remains is through fare hike. Hence, in order to move towards minimizing deficit, It is highly required that company shall first look at the options to minimize operating costs. A key may be found in rationalizing route structure.

2. **Methodology for proposed fare structure:**

Cost of living and expenditure on transport in various major cities have been studied to compare fare of public transport in Pune with other cities. Except for Mumbai, all other cities show that citizens paying approximately 20% of the total expenditures towards transport whereas average trip length ranges from 5 to 6 km [www.numbeo.com,2012] In comparison with all the major cities in India like Bangalore, Chennai, Mumbai and Delhi, Pune has the highest base fare and also high charges per km (see graph1). Also in case of other cities, low base fare
provides opportunity to opt public transport for short trips. If the trend of fare hike by Re1 per stage continues in case of Pune, it shows highly inequitable fare as compared with other cities. BMTC in Bangalore is a good example of low fare as compared with Pune and high quality of bus service with periodic route rationalization. BMTC generates high non fare revenue with the use of commercial exploitation of land, advertisement rights, techniques to reduce fuel losses and periodic route rationalization.

It is essential to study and generate ‘fair’ fare structure in order to achieve financial viability without compromising the basic goal of satisfying users i.e. passengers. There has been trend to increase 1 re/km every year irrespective of socio economic changes. If the usual practices of flat fare hike by Re 1 per stage continuous it will create imbalanced financial burden on different users. It can be clearly stated that though Re 1 has been added to all stages, it results in different percent of increase for different users especially more percent increase on short trip users (See graph 3). It results in 10-14% of fare increase for trips less than 10 km and on the other hand only 3-5% for trips more than 20 km.

The entire denomination study has been conducted to generate base data for the analysis. With use of E ticket passenger data, average number of passengers per stage has been calculated. It shows that with existing fare structure there is tremendous imbalanced burden on short trip passengers. Pune has base fare of Rs 5 and 60 ps/km results in general formula of Fare= 5 + (0.6* trip distance in km). Average trip length of public transport users in Pune is 7.8km and average fare comes to be Rs10.5. In 2011, public transport in Pune comprises of daily 11 lakh passenger trips out of which 8 lakh passengers using tickets and 3 lakh pass users [Vansha Infotech, 2011]. Out of these 8 lakh passengers, maximum number of passengers i.e. 77% of total ticket users travel one way trip distance for less than 12 km (See graph 2). These 77% of passengers contribute to 50% of total passenger km. Revenue generation by these passengers comes out to be 65% of total revenue generation by ticket sell. Hence the 50% of passenger km of short trips contributes to 65% of total ticket revenue highlights the financial burden as well as imbalance in current fare formula. Remaining 35% of revenue gets generated from remaining 23% of passengers travelling distances greater than 12km.
Past trends of fare hike show constant hike by Re 1 to per stage whereas each stage comprises of approximately 2 km. In 2010-11, the base fare of Rs 3 had been increased to Rs 5 to cope up with fuel hikes of Rs 7.5 [Times of India, 2010] which corresponds to increase by 66% of base fare (see Graph 3) For passengers travelling long distances, the increase was much smaller, around 8 per cent. The same 1 Re per stage fare increase for 2012 creates the same disparity between short- and long-distance trips. For public transport captive users, many from the Economically Weaker Section, the fare increase meant additional burden on already strained household budgets. For those who had the means to access other modes, the fare increase cause passengers to switch from PMPML buses to rickshaws and private motorized modes. The cost of operating a two-wheeler—around Rs 1.5 per km1—is lower than the effective fare per km of public transport for trips up to 4 km. The fare increase was particularly painful for passengers who need to take more than one bus to reach their destination and thus pay the high base fare of Rs 5 twice. Demand for public transport is highly susceptible to loosing short trip passengers if it doesn’t address such issues. It is not only harmful to the modal share in a city but also to public transport operator from financial perspective.

\[\text{Assuming 4 stroke 2 wheeler gives average mileage of Rs 45/ltr and current petrol costs Rs 70/ltr}\]
It has been analyzed from the study that since PMPML primarily depends on fare revenue, the mechanisms to reduce operating costs shall be adopted which may eliminate the need to increase fare. Results give two proposals based on two conditions as follows:

**Proposal 1:** PMPML adopts techniques to reduce operating costs and rationalises fare

**Proposal 2:** If PMPML fails manage with reduction in operating costs because of administratative or political reasons and subsidies and then undergoes fare increase in rationalise manner.

**RESULTS OR EXPECTED RESULTS:**

1. **Proposal 1:**
   In order to achieve financial sustainability public transport company shall try to minimize financial deficit of 8% by mechanisms to reduce operating costs. Route rationalization is one of such.

1.1 **Route Rationalisation:**

Route rationalization seeks to make the PMPML system easier for passengers to use through merging of redundant routes and the simplification of the overall routing structure. From PMPML’s perspective, rationalization can bring significant financial savings through two mechanisms:

- Reducing the number bus-km operated for the same level of passenger demand
- Reducing the fleet size requirement, allowing the scrapping of old buses and the elimination of corresponding maintenance costs

Detailed study of this has been carried out by an NGO Institute for Transportation and Development Policy (ITDP) which depicts that route rationalization has potential to reduce the number of routes and total operated km [Institute for Transportation and Development policy, 2011]. The rationalization will yield additional benefits for PMPML by reducing the fleet size requirement. Route rationalization gives scope for scrapping off old fleet since there will be surplus fleet of 174 out of 1320 buses in operations daily. PMPML will have more flexibility to scrap buses that have reached the end of their useful lifetime (e.g. 11 years), which currently account for 14 per cent

<table>
<thead>
<tr>
<th>Slabs from</th>
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<th>Penalty per km</th>
<th>Formula</th>
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<tbody>
<tr>
<td>slab1</td>
<td>0-16</td>
<td>0</td>
<td>(=3+0.95(km-2)+0)</td>
</tr>
<tr>
<td>slab2</td>
<td>16-20</td>
<td>0.9*0.95=0.86</td>
<td>(=3+0.95(km-2)+P1)</td>
</tr>
<tr>
<td>slab3</td>
<td>20-36</td>
<td>0.4*0.95=0.38</td>
<td>(=3+0.95(km-2)+P1+P2)</td>
</tr>
<tr>
<td>slab4</td>
<td>36 onwards</td>
<td>0.2*0.95=0.39</td>
<td>(=3+0.95(km-2)+P2+P3)</td>
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</tbody>
</table>

**Table 1: Proposal 1**
of the PMPML’s fleet. Bus maintenance currently accounts for 7% of PMPML’s overall expenditure. This fraction is expected to decrease as the older buses are removed from the fleet. The total cost savings of Rs 11 lakh per day after the rationalization exercise are significantly higher than the Rs 6.05 lakh of deficit. This enables PMPML to continue the same fare or even rationalize it further while achieving same revenue to reduce burden on short trip users by following mechanism.

1.2 Parking Management:
Parking management needs to be enforced by municipal corporations. City of Pune has prime streets filled with on street parking leaving no space for pedestrians and cyclists. At present, private vehicle users in entire Pune region are enjoying free parking. On street and off street parking has great potential to generate huge funds by enforcing heavy parking fees. If charging were implemented for some 12,000 on-street parking spaces, the city could generate Rs 8 lakh per day.2 In a city of Pune, FC road itself is occupied with 3845 vehicles for 12 hours. Other major streets like Kumthekar road, Shastri Road, Tilak road are daily occupied with average 2000 parked vehicles. [Comprehensive Mobility Plan, Pune]. In a city of Budapest, Hungary parking fees have been imposed for on street parking and collected funds get diverted to buy new buses with special mentions on bus as’ Thanks for paying parking fees!’ Parking management is easy to implement and shall offer quick results. However it requires administrative and political will with enforcement. Such parking fees can always be used as transport fund for investing in public transport infrastructure.

1.3 Commercial exploitation of land:
Commercial exploitation of land is highly beneficial for ‘real estate boom’ cities like Pune where it provides a good competition for private developers to participate in developing transfer stations, terminals through Public Private Partnership. High FSI/ FAR (Floor Space Index/ Floor Area Ratio) can be awarded to terminal sites for developing commercial spaces within terminal premises. It’s a time consuming solution though has high potential to generate chunk of revenues.

1.4 Other non fare revenue sources:
Advertisement rights can generate moderate amount of revenues by using buses and bus infrastructure to generate non fare revenues. Other techniques such as congestion charging involve highly modern IT system, lot of investments and challenges in enforcement.

1.5 Proposed fare structure:
This proposal has been evolved considering public transport company effectively implements route rationalization. Other non fare revenue techniques are decisions

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2 Assuming a fee of Rs 10 per hour, 85 per cent occupancy, and 8 hours of operations per day.
by municipal corporations. Table 1 gives details of proposal 1 where the existing fare has been rationalized with base fare has been reduced to Rs 3 which can compete with cost of operations of two wheeler providing incentive for private vehicle users to shift to public transport. Four slabs give details of penalty as the travelled distance increases. No penalty for passengers travelling up to 16km reduces burden on short trip users as well as transferring passengers. Graph 4 shows that there has been no burden on short trip users but some reasonable burden on long trip users. Passengers who contribute to 50% of total passenger km will end up in paying reasonable fare with no penalty for transfers.

Pass revenue contributes to 15% of total fare revenue. Revised pass amounts depend on the proposed fare formula in relation to average distance travelled using pass. For revising pass amounts, the burden shall not increase more than 10% for regular pass users. Pass users of daily pass may be put reasonable more burden in order to have balanced pass amount revisions.

Thus rationalization should be considered as a serious mechanism for improving balance sheet and then means to rationalize fare shall be adopted.

2. **Proposal 2:**

If there will be occurrences of revenue shortfall in case PMPML fails to implement route rationalization because of political burdens as whole or in parts + seeking supplementary funding sources, fare increases may be required. The win here is to have fare revisions that are equitable and gradual. The current approach of introducing a flat fare hike for each stage is not the ideal solution because it imposes a differential burden on different passenger groups.

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<thead>
<tr>
<th>Slabs from</th>
<th>Slabs to</th>
<th>Penalty per km</th>
<th>Formula</th>
</tr>
</thead>
<tbody>
<tr>
<td>slab1</td>
<td>0-8</td>
<td>P0=0</td>
<td>=5+0.83*(km-2)</td>
</tr>
<tr>
<td>slab2</td>
<td>8-22</td>
<td>P1=0.9*0.83=0.75</td>
<td>=5+0.83*(km-2)+P1</td>
</tr>
<tr>
<td>slab3</td>
<td>22-36</td>
<td>P2=0.7*0.83=0.58</td>
<td>=5+0.83*(km-2)+P1+P2</td>
</tr>
<tr>
<td>slab4</td>
<td>36 onwards</td>
<td>P3=0.3*0.83=0.25</td>
<td>=5+0.83*(km-2)+P2+P3</td>
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**Table 2: Proposal 2**

If the company implements flat fare increase of Re 1, total fare revenue will increase 8.53 lakh per day, helping to close the financial deficit gap. Analysis of fare per km and trip length of all passengers enables to calculate expected revenues with flat fare hike of Re 1 per stage. The total revenue generated by this fare structure has been targeted to generate equitable fare formula putting no burden on short trip users.
Proposed fare formula is based on 4 slabs as per passenger km travelled. First slab covers short trip passengers travelling less than 8 km i.e. less than average trip length. This slab faces neither fare hike nor penalty for travel. Second slab ranges between 8 to 22km and third slab ends at 36km. Fourth and last slab starts for distances travelled more than 36 km. Each slab has telescopic penalty starting from 75ps for slab 2 (see table 1). With this fare structure, same revenue increase of Rs 8.5 lakh per day same as with flat fare hike can be achieved but putting no burden on short trip users.

*Graph 4* compares the flat Re 1 increase with the Proposed Fare Revision. There is no change for passengers travelling up to 8 km because a Re 1 increase would constitute a larger percentage increase than the 10 per cent target. At longer distances, the fare begins to increase by roughly 10 per cent.

In 2012 fare increase, PMPML also plans to raise the prices of passes. Pass sales constitute of 13-15 per cent of total revenues, out of which the majority is of monthly passes than that of daily passes. In past year 2010-11 the rates for passes were increased between 20% for some categories while no change for some other categories, more moderate increase of is suggested for the next increase. For example, for monthly pass of all routes in 2011-12, the increase was around 15% which has been proposed to be 4.5% for 2012-13 in the proposal. For revising pass amounts for regular pass users, the amount of pass can be increase by 10% but not more than that. 10% of total increment accounts to daily increase by negligible amount. New fare formula addresses equitable fare revision and at the same time achieving same revenue as expected from hike by Re 1 per stage.
DISCUSSION

It can be seen from the table 3 with proposal 1; there are high chances of generating good amounts of revenue with decrease in operating costs. Hence there is no need to raise the fare. In case PMPML fails to reduce operational costs, fare revision with proposal 2 may generate additional revenues so as to close the deficit gap.

<table>
<thead>
<tr>
<th></th>
<th>Ticket Revenue Rs (In lakh)</th>
<th>Revenue from passes Rs (In lakh)</th>
<th>Total Revenue Rs (In lakh)</th>
<th>Cost per day Rs (In lakh)</th>
<th>% increase in revenue</th>
<th>Profit Rs (In lakh)</th>
<th>Profit %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Existing</td>
<td>84.64</td>
<td>19.39</td>
<td>106.15</td>
<td>112.21</td>
<td>0.00</td>
<td>-6.06</td>
<td>-5.71</td>
</tr>
<tr>
<td>Flat fare hike or Re 1/stage</td>
<td>92.16</td>
<td>20.24</td>
<td>114.69</td>
<td>112.21</td>
<td>8.05</td>
<td>2.49</td>
<td>2.17</td>
</tr>
<tr>
<td>Proposal 1</td>
<td>84.52</td>
<td>20.88</td>
<td>107.55</td>
<td>100.41</td>
<td>1.32</td>
<td>7.14</td>
<td>6.64</td>
</tr>
<tr>
<td>Proposal 2</td>
<td>90.63</td>
<td>21.06</td>
<td>113.97</td>
<td>112.20</td>
<td>7.37</td>
<td>1.76</td>
<td>1.55</td>
</tr>
</tbody>
</table>

Table 3: Summary Inflow Outflow per day

CONCLUSION:

To achieve the conflicting goal of financial viability and quality of service with equitable fare public transport company shall adopt following mechanisms-

- Reduce operational costs by periodic route rationalisation
- Fleet management to ensure minimal expenditure on maintenance
- Subsidies from municipal corporations generated through transport funds
- Equitable fare for all by means of rationalisation
- Reasonable ticket fare for short trip users
- Attractive pass amounts for long trip users
- Cheaper option for transport for all
- High quality modern fleet to attract middle and higher income groups
- Techniques like parking management, congestion charging, commercial exploitation of land, advertisement rights to generate more revenue.
It shall be noted that fare hike in disproportionate manner is harmful for public transport company since it discourages usage and again cause reduction in fare revenues.

ACKNOWLEDGEMENTS:

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