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Chapter V
CIVIC AMENITIES

5.1 Introduction

The pressures of utility market around the globe are open out. Utilities are often required to compete with domestic and foreign privatization forces for cost-effective operations and manage facilities adopting time-proven, quality-driven, and realistic business practices to better serve the public. In today’s competitive market, managing utility services has become a challenging to entrepreneurs for effective utilization of economic concepts to develop a practical cost management approach. An integrated Utility Management System with Geographical Information System (GIS) is essential to capture, store and analyze the demographic changes, spatial changes and aging infrastructure of the utility services. Utility GIS have become an excellent way to record what you have and where it's located. Thus, it helps to quickly identify maintenance problems and also the engineering of utilities.

The various utility services like urban transportation, multispecialty hospitals and medium wise primary schools were given below.

5.2 Urban Transport

Keeping traffic moving is the big challenge that all levels of management are facing globally. Private travelers, commercial road users, and the public sector are continually searching for a new and faster travel routes. The old adage, ‘information is power’ is the understandable solution to the traffic problem. Travelers wish for real-time information to help them to select the best route to take at any given time. They need to know traffic speeds, incidents and road conditions.

An India’s transportation structure represents improvement phase of India. But at the same time highly urbanized countries are facing higher difficulties of transportation management and spending lots capital and endeavor for solving individual’s problems. Increasing traffic congestion, the need to protect the situation and the problems of road security is the main reason for many cities worldwide to think of new plans in public transportation scheme.

Urban Bus: In view of the technological superiority and other advantages, urban bus may be introduced in metropolitan cities replacing the standard bus currently in use. The Central Government should finance 50 per cent of the cost of 2,000 urban buses, as an initial investment towards more efficient public transport.
Dedicated Bus-ways: As a major part of the transport demand will continue to be met by the bus system in cities, it is important to facilitate their movement through provision of dedicated bus-ways.

5.3 Pune Mahanagar Parivahan Mahamandal Limited (PMPML)

Pune Mahanagar Parivahan Mahamandal Ltd or PMPML is the public transport service provider for the city of Pune and Pune Metropolitan region, which includes areas surrounding Pune and Pimpri-Chinchwad.

At present, the PMPML has around 1600 buses on the roads on a given day. The number of routes has almost reached 300 due to the addition of a couple of new routes over the past few months, operating 63.4 million km of route and transports approximately 0.23 billion passengers per annum. Bus fares are charged on the basis of km travelled, and range from the minimum fare of Rs.1.4 for 2 km to Rs.14.85 for a journey of 60 km.

In February 2008, the Union urban development ministry cleared a proposal to provide funds for purchasing 650 public transport buses for Pune and Pimpri-Chinchwad. The funds have been issued under the Jawaharlal Nehru National Urban Renewal Mission (JNNURM). Of the total, 200 were supposed to be semi-low floor buses. The number of buses sanctioned for Pune is 500, while that for Pimpri-Chinchwad is 150.

5.3.1 PMPML Depots

Pune Mahanagar Parivahan Mahamandal Ltd or PMPML is having 10 depots in PMC and PCMC area. Currently these depots have 1609 working buses out of these 327 buses are Casual contract buses and 1282 are PMPML buses. PMC and PCMC areas are having 3380 bus stops throughout the city as well as 344 routes and 18522 trips per day. Depot wise distribution of PMPML buses are given in following table.
Table 5.1 PMPML Depot wise Distribution of Buses in PMC and PCMC area

<table>
<thead>
<tr>
<th>Sr. No</th>
<th>Name</th>
<th>Regular PMPML Buses</th>
<th>No. of Casual Contract Buses</th>
<th>Total No. of Buses</th>
<th>% of Buses</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Hadapsar</td>
<td>144</td>
<td>36</td>
<td>180</td>
<td>11.19</td>
</tr>
<tr>
<td>2</td>
<td>Katraj</td>
<td>155</td>
<td>51</td>
<td>206</td>
<td>12.80</td>
</tr>
<tr>
<td>3</td>
<td>Swargate</td>
<td>212</td>
<td>36</td>
<td>248</td>
<td>15.41</td>
</tr>
<tr>
<td>4</td>
<td>Marketyard</td>
<td>56</td>
<td>21</td>
<td>77</td>
<td>4.79</td>
</tr>
<tr>
<td>5</td>
<td>Kothrud</td>
<td>160</td>
<td>17</td>
<td>177</td>
<td>11.00</td>
</tr>
<tr>
<td>6</td>
<td>N T Wadi</td>
<td>197</td>
<td>41</td>
<td>238</td>
<td>14.79</td>
</tr>
<tr>
<td>7</td>
<td>Pune Station</td>
<td>88</td>
<td>37</td>
<td>125</td>
<td>7.77</td>
</tr>
<tr>
<td>8</td>
<td>Bhakti-Shakti (Nigdi)</td>
<td>81</td>
<td>49</td>
<td>130</td>
<td>8.08</td>
</tr>
<tr>
<td>9</td>
<td>Sadguru Nagar (Bhosari)</td>
<td>45</td>
<td>22</td>
<td>67</td>
<td>4.16</td>
</tr>
<tr>
<td>10</td>
<td>Nehrunagar</td>
<td>144</td>
<td>17</td>
<td>161</td>
<td>10.01</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td><strong>1282</strong></td>
<td><strong>327</strong></td>
<td><strong>1609</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

Source: PMPML Head Office, Swargate, Pune

From the study of utility services Swargate depot shows the highest buses in depot 15.41% (248) followed by N. T. Wadi 14.79% (238) and Katraj 12.80% (206) in Depots. Sadguru Nagar (Bhosari) depot was shows only 4.16% (67), Marketyard 4.79% (77) and Pune Station 7.77% (125) in depot. Kothrud 11% (177), Hadapsar 11.19% (180 buses), Nehrunagar 10.01% (161) and Bhakti-Shakti 8.08% (130) PMPML buses.
PMPML Bus Depots in PMC and PCMC area

Fig. 5.1
PMPML Bus Depots with Road Network in PMC and PCMC area

Legend
- PMPML Depots
- Main Roads
- Railway Line
- Major Rivers

Fig. 5.2
Depotwise Distribution of regular PMPML Buses in PMC and PCMC area

Legend
- Bus Depots
- No. of buses
  - High: 212
  - Low: 45

Fig. 5.3
Depotwise Distribution of PMPML Casual Contract Buses in PMC and PCMC area

Legend
- Bus Depots
- No. of buses
  - High: 51
  - Low: 17

Fig. 5.4
PMPML Bus Depots with total number of Buses in PMC and PCMC area

Fig. 5.5
One Kilometer Buffer along PMPML Depots in PMC and PCMC area

Legend
- PMPML Depots
- Main Roads
- 1 km. Buffer

Fig. 5.6
Two Kilometer Buffer along PMPML Depots in PMC and PCMC area

Legend
- PMPML Depots
- Main Roads
- 2 km. Buffer

Fig. 5.7
Three Kilometer Buffer along PMPML Depots in PMC and PCMC area

Legend
- PMPML Depots
- Main Roads

Fig. 5.8
Multiple Ring Buffer along PMPML Depots in PMC and PCMC area

Legend
- PMPML Depots
- Main Roads

Legend
- 1 Km. Buffer
- 2 Km. Buffer
- 3 Km. Buffer

Fig. 5.9
5.4 Inverse Distance Weighted interpolation (IDW)

An interpolation technique that estimates cell values in a raster from a set of sample points that have been weighted so that the farther a sampled point is from the cell being evaluated, the less weight it has in the calculation of the cell's value.

Figure No. 5.3, 5.4 and 5.5 shows the distribution of Regular PMPML Buses, Casual Contract Buses and Total No. of Buses in each depot respectively. Green, color shows higher concentration of buses and red, color shows less concentration of buses in each depot.

Fig 5.3 shows Swargate, N. T. Wadi, Kothrud, Katraj, Hadapsar, and Nehrunagar depots have the high concentration of regular buses in depot. Bhakti-Shakti, Sadgurunagar, Pune Station and Marketyard bus depots show less concentration of regular buses in depot.

Fig 5.4 shows Swargate, N. T. Wadi, Katraj, Hadapsar, Pune Station and Bhakti-Shakti depots are the high concentration of casual contract buses in depot. Nehrunagar, Sadgurunagar, Kothrud and Marketyard bus depots show less concentration of casual contract buses in depot.

Fig 5.5 shows the total No. of regular and casual contract buses in the study area. Swargate, N. T. Wadi, Katraj, Hadapsar and Kothrud depots are the high concentration of buses in depot compare to other depots. Nehrunagar, Sadgurunagar, Pune Station, Kothrud and Marketyard bus depots are showing less concentration of buses in depot. Bhakti-Shakti depot shows medium concentration of buses in depot.

5.5 Buffer Analysis

A zone around a map feature measured in units of distance or time. A buffer is useful for proximity analysis. A polygon is enclosing a point, line, or polygon at a specified distance.

5.5.1 Point Buffer

Figure No. 5.6, 5.7 and 5.8 shows 1 km, 2 km and 3 km. buffer along the PMPML depots. These buffers cover an area of 1 to 3 kilometer from the depot location. These areas are under public zone though they were taking the benefits of the bus transport.
5.5.2 Multiple Ring Buffer

This buffer analysis creates a new feature class of buffer features using a set of buffer distances. The new features may be dissolved using the distance values, or as a set of individual features.

Fig No. 5.9 shows the multiple ring buffers along the PMPML depots in PMC and PCMC area. Gray color shows the 1 km. buffer, Green color shows the 2 km. buffer and Blue color shows 3 km. buffer along the depots. These buffers cover the area from 1 to 3 km. These buffers are going to cover almost all the area of the city as well as some parts of the outside area.

5.6 Generation of Hospital Utility Database

In present work the author has considered only the medical services (Hospitals). In the last 5 to 6 years No. of accidents have increased dramatically. Population increase leads to the increase in no. of patients in various diseases such as heart, mental, and kidney etc.

In the present study only hospitals having multidignosis and treatment facilities and 24 hrs open hospitals have been considered, while nursing home or clinics are also considered.

In the present study an attempt has been made to list out no. of hospitals (Administrative Ward/Committee wise) with their specialty, facility available and other emergency services. At present PMC is categorized into 14 administrative wards and PCMC is categorized into 4 committees which have no. of 2262 Hospitals in PMC and PCMC which includes Govt. added hospitals and medical colleges with multispecialty hospitals. But they are concentrated in core areas. As urban built-up expands all around peripheral areas of the city, there newly added PMC and PCMC areas lacks special and super specialty hospitals. E.g. Karvenagar, and other ward lack big hospitals.

In the present study, with the help of GIS one can easily approach any kind of medical information such as nearest multispecialty hospitals providing at glance information such as hospital location and nearest multispecialty hospital in the study area.
Table 5.2 Multispecialty Hospitals in PMC and PCMC

<table>
<thead>
<tr>
<th>Sr. No</th>
<th>Committee/Ward</th>
<th>Population</th>
<th>General / Practice</th>
<th>Gynecologist</th>
<th>Surgeon</th>
<th>General Physician</th>
<th>Family Physician</th>
<th>Pediatrics</th>
<th>Anaesthesia</th>
<th>ENT</th>
<th>Others</th>
<th>Total</th>
<th>% of Hospitals</th>
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<td>1</td>
<td>Aundh</td>
<td>179886</td>
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<td>6</td>
<td>0</td>
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<td>16</td>
<td>175</td>
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<td>0</td>
<td>1</td>
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<td>284</td>
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<td>3</td>
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<td>4</td>
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<td>1</td>
<td>23</td>
<td>117</td>
<td>284</td>
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<td>0</td>
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<td>0</td>
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<td>152</td>
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<td>3</td>
<td>3</td>
<td>1</td>
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<td>0</td>
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<td>2</td>
<td>3</td>
<td>31</td>
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</tr>
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<td><strong>Total</strong></td>
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<td><strong>1571</strong></td>
<td><strong>91</strong></td>
<td><strong>38</strong></td>
<td><strong>47</strong></td>
<td><strong>45</strong></td>
<td><strong>40</strong></td>
<td><strong>22</strong></td>
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<td><strong>2062</strong></td>
<td><strong>100</strong></td>
<td><strong>100</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>
5.7 Multispecialty Hospitals in PMC and PCMC

Table 5.1 shows multispecialty hospitals in PMC and PCMC in various administrative wards/committee. Fig No. 5.18 shows the total no. of multispecialty hospitals in each ward/committee. Total No. of hospitals are 2062 in the study area. Ghole Road 13.77% (284), Warje-Karvenagar 13.48% (278) and Kasbapeth 11.69% (241), administrative wards have highest multispecialty hospitals. General/Practice hospitals are highest compared to other hospitals, followed by other multispecialty (208) and Gynaecologists (91) in the study area. ENT, Family Physician and Pediatrics are very less in the study area.

5.7.1 General / Practice Hospitals

Figure 5.10 shows the distribution of general / practice hospitals in the study area. Bhavanipeth, Bibvewadi and Yerawada wards have more hospitals in the study area. Karve Road, Kasbapeth, Hadapsar, A, B, C and D wards/committees has less concentration of hospitals in the study area.

5.7.2 Gynaecology Hospitals

Figure 5.11 shows the distribution of gynaecology hospitals in the study area. Bhavanipeth, Bibvewadi and Yerawada wards have more hospitals in study area. Karve Road, Kasbapeth, Hadapsar, Warje-Karvenagar, Sahakarnagar, A, B, C and D wards/committees has less concentration of hospitals in the study area. Aundh, Ghole Road, Tilak Road and Sangamwadi wards have medium hospitals.

5.7.3 General Surgeon Hospitals

Figure 5.12 shows the distribution of general surgeon hospitals in the study area. Bibvewadi ward is having more hospitals in study area. Aundh, Ghole Road, Sangamwadi, Tilak Road and Yerawada wards are having medium and other wards are comes under less concentration of hospitals in the study area.

5.7.4 Family Physician Hospitals

Figure 5.13 shows the distribution of family physician hospitals in the study area. Bibvewadi, Vishrambaughwada and Yerawada wards have more hospitals in the study area. Warje-Karvenagar, Ghole Road, Sangamwadi, Tilak Road and
Bhavanipeth wards have medium and other wards come under less concentration of hospitals in the study area.

5.7.5 Pediatrics Hospitals

Figure 5.14 shows the distribution of pediatrics hospitals in the study area. Bibvewadi ward has more hospitals in the study area. Tilak Road, Yerawada, Aundh and Bhavanipeth wards have medium and other wards come under less concentration of hospitals in the study area.

5.7.6 Anaesthesia Hospitals

Figure 5.15 shows the distribution of anaesthesia hospitals in the study area. Yerawada ward has more hospitals in the study area. Bibvewadi ward is having medium and other wards come under less concentration of hospitals in the study area.

5.7.7 ENT Hospitals

Figure 5.16 shows the distribution of ENT hospitals in the study area. Yerawada ward has more hospitals in the study area. Bibvewadi and Hadapsar wards have medium and other wards come under less concentration of hospitals in the study area.

5.7.8 Other Multispecialty Hospitals

Figure 5.17 shows the distribution of other multispecialty hospitals in the study area. Bibvewadi ward is having more hospitals in the study area. Yerawada and Bhavanipeth wards are having medium and other wards are comes under less concentration of hospitals in the study area.
Fig. 5.10

Distribution of General Hospitals in PMC and PCMC

Legend
No. of Hospitals
- < 50
- 51 - 100
- 101 - 150
- 151 - 199
- > 200
Distribution of Gynaecology Hospitals in PMC and PCMC

Legend
No. of Hospitals
- < 5
- 6 - 10
- > 10

Fig. 5.11
Distribution of General Surgeon Hospitals in PMC and PCMC

Fig. 5.12
Distribution of Family Physician Hospitals in PMC and PCMC

Legend
No. of Hospitals
- < 3
- 4 - 6
- > 6

Fig. 5.13
Distribution of Paediatrics Hospitals in PMC and PCMC

Legend
No. of Hospitals
- < 4
- 5 - 7
- 8 - 11
- > 12

Fig. 5.14
Distribution of Anaesthiology Hospitals in PMC and PCMC

Legend
No. of Hospitals
- < 5
- 6 - 10
- > 10

Fig. 5.15
Distribution of ENT Hospitals in PMC and PCMC

Legend

- < 2
- 3 - 5
- > 5

Fig. 5.16
Distribution of Other Specialty Hospitals in PMC and PCMC

Legend
No. of Hospitals
- < 10
- 11 - 20
- 21 - 29
- > 30

Fig. 5.17
Total Number of Multispecialty Hospitals in PMC and PCMC area

Legend
No. of Hospitals
- 16 - 50
- 51 - 100
- 101 - 150
- 151 - 200
- 201 - 250
- 251 - 284

Fig. 5.18
5.8 Primary Schools

Table 5.3 and Figure no. 5.24 represent the total number of primary schools in PMC and PCMC area. 484 primary schools are present in the study area. A Committee 12.19% (59), D Committee 10.74% (52), C Committee 9.71% (47) and Yearawada 9.50% (46) has more primary schools in the study area. Karve Road 1.02% (5), Sahakarnagar 1.45% (7) and Sangamwadi 1.65% (8) wards have less concentration of schools. Other remaining wards come under medium concentration of schools.

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Committee/Ward</th>
<th>TGA</th>
<th>TGA in %</th>
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<th>% of Schools</th>
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<td>9.34</td>
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<tr>
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<td>P</td>
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<td>3.68</td>
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<td>M</td>
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*Source: PMC and PCMC Shikshan Mandal*
Table 5.4 Medium wise Primary Schools in PMC and PCMC

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<tr>
<th>Sr. No</th>
<th>Committee/Ward</th>
<th>Marathi</th>
<th>English</th>
<th>Hindi</th>
<th>Urdu</th>
<th>Kannad</th>
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<td>1</td>
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<td>1</td>
<td>0</td>
</tr>
<tr>
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</table>

Source: PMC and PCMC Shikshan Mandal

5.8.1 Marathi Medium Schools

Figure 5.19 shows the distribution of Marathi medium schools in the study area. A committee 54, D committee 45, C committee 37 and Yerawada 34 ward has more Marathi medium schools in the study area. Hadapsar, B committee, Warje-Karvenagar and Aundh wards have medium and other wards come under less concentration of Marathi medium schools in the study area.

5.8.2 English Medium Schools

Figure 5.20 shows the distribution of English medium schools in the study area. C committee, D committee, Sangamwadi and Yerawada wards have more English medium schools in the study area. A committee, Bibvevadi and Bhavanipeth wards has medium and other wards come under less concentration of English medium schools in the study area.
5.8.3 Hindi Medium Schools

Figure 5.21 shows the distribution of Hindi medium schools in the study area. Ghole Road ward has more Hindi medium schools in the study area. Kasbapeth ward has Hindi medium and other wards come under less concentration of Hindi medium schools in the study area.

5.8.4 Urdu Medium Schools

Figure 5.22 shows the distribution of Urdu medium schools in the study area. B. S. Dholepatil Road and Bhavanipeth wards has more Urdu medium schools in the study area. Yerawada, Kasbapeth and Ghole Road wards has Urdu medium and other wards come under less concentration of Urdu medium schools in the study area.

5.8.5 Kannad Medium Schools

Figure 5.23 shows the distribution of Kannad medium schools in the study area. B. S. Dholepatil Road, Ghole Road and Karve Road wards has Kannad medium schools in the study area. Other wards do not have any Kannad medium schools in the study area.
Fig. 5.19

Distribution of Marathi Medium Schools in PMC and PCMC

Legend
No. of Schools

- < 15
- 16 - 30
- 31 - 45
- > 45

Fig. 5.19
Distribution of English Medium Schools in PMC and PCMC

Legend
No. of Schools
- < 2
- 3 - 5
- > 5

Fig. 5.20
Distribution of Hindi Medium Schools in PMC and PCMC

Legend
No. of Schools
0
1
2
3

0 2 4 Km.

Fig. 5.21
Distribution of Kannad Medium Schools in PMC and PCMC

Legend

<table>
<thead>
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</table>

Fig. 5.23
Total No. of Primary Schools in PMC and PCMC area

Legend
No. of Schools
- 5 - 15
- 16 - 30
- 31 - 45
- 46 - 59

Fig. 5.24
5.9 Conclusion

Fifth Chapter focuses on the utility services like transportation, hospitals and primary educational facilities in Pune and Pimpri - Chinchwad area. Buffer analysis and shortest path techniques were used for bus transport i.e., PMPML with the location of PMPML depots in study area. The distribution of multispecialty hospitals in study area was shown with the help of maps. The third utility is Medium wise distribution of primary schools like Marathi, English, Hindi, Urdu and Kannad schools shown using maps.