



# MUSADIQ NAWAZ

REG MS CE 14036

**PAPER**

TRANSPOTATION PLANNING AND MANAGEMENT

**MAJEED NAEEM**

**Q no 1****Trip distribution of 8-zones**

$T_{ij}$  Trips produced at zone i & attracted to zone j

$P_i$  Trips produced from zone i

$A_j$  Trips attracted to zone j

$W_{ij}$  Interzonal impedance

i Origin zone

$W_{ij}$  Impedance for interchange ij

C Exponent of impedance term, 3

$A_i$  Attractiveness

j Destination Zone

| J | $A_j$ | $F_{1j}=1/W_{1j}^C$ | $K_{1j}$ | $A_j F_{1j} K_{1j}$ | $P_{1j}$              |
|---|-------|---------------------|----------|---------------------|-----------------------|
| 1 | 45    | 0.000010            | 1        | 0.00045             | 0.130                 |
| 2 | 30    | 0.000037            | 1        | 0.0011              | 0.319                 |
| 3 | 45    | 0.000010            | 1        | 0.00045             | 0.130                 |
| 4 | 37    | 0.000019            | 1        | 0.00070             | 0.2030                |
| 5 | 60    | 0.0000046           | 1        | 0.000276            | 0.080                 |
| 6 | 240   | 0.000000072         | 1        | 0.00001728          | 0.0050                |
| 7 | 45    | 0.000010            | 1        | 0.00045             | 0.130                 |
| 8 | 480   | 0.0000000090        | 1        | 0.00000432          | 0.0012                |
|   |       |                     |          | $\Sigma=0.00344$    | $\Sigma=0.9987\sim 1$ |

This table will be use for whole question

Using above table for calculation, we find

| PESHAWAR                     | CHARSADD<br>A                | MARDAN                       | NOWSHEH<br>RA                | SWABI                        | ABBOTTAB<br>AD               | KOHAT                        | D.I.KHAN                     |
|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|------------------------------|
| $Q_{IJ}=67000^*$<br>$P_{IJ}$ | $Q_{IJ}=63300^*$<br>$P_{IJ}$ | $Q_{IJ}=59400^*$<br>$P_{IJ}$ | $Q_{IJ}=56200^*$<br>$P_{IJ}$ | $Q_{IJ}=53100^*$<br>$P_{IJ}$ | $Q_{IJ}=50300^*$<br>$P_{IJ}$ | $Q_{IJ}=47800^*$<br>$P_{IJ}$ | $Q_{IJ}=51500^*$<br>$P_{IJ}$ |
| 8710                         | 8229                         | 7722                         | 7306                         | 6903                         | 6539                         | 6214                         | 6695                         |
| 21373                        | 20192                        | 18948                        | 17927                        | 16939                        | 16045                        | 15248                        | 16428                        |
| 8710                         | 8229                         | 7722                         | 7306                         | 6903                         | 6539                         | 6214                         | 6695                         |
| 13601                        | 12849                        | 12058                        | 11408                        | 10779                        | 10210                        | 9703                         | 10454                        |
| 5360                         | 5064                         | 4752                         | 4496                         | 9248                         | 4024                         | 3824                         | 4120                         |
| 335                          | 316                          | 297                          | 281                          | 265                          | 251                          | 239                          | 257                          |
| 8710                         | 8229                         | 7722                         | 7306                         | 6903                         | 6539                         | 6214                         | 6695                         |
| 80.4                         | 76                           | 71                           | 68                           | 63                           | 60                           | 57                           | 62                           |

Using above table

$$A1 = 8710 + 8229 + 7722 + 7306 + 6903 + 6539 + 6214 + 6695 = 58318$$

$$A2 = 21373 + 20192 + 18948 + 17927 + 16939 + 16045 + 15248 + 16428 = 143100$$

$$A3 = 8710 + 8229 + 7722 + 7306 + 6903 + 6539 + 6214 + 6695 = 58318$$

$$A4 = 13601 + 12849 + 12058 + 11408 + 10779 + 10210 + 9703 + 10454 = 91062$$

$$A5 = 5360 + 5064 + 4752 + 4496 + 9248 + 4024 + 3824 + 4120 = 40888$$

$$A6 = 335 + 316 + 297 + 281 + 265 + 251 + 239 + 257 = 2241$$

$$A7 = 8710 + 8229 + 7722 + 7306 + 6903 + 6539 + 6214 + 6695 = 58318$$

$$A8 = 81 + 76 + 71 + 68 + 63 + 60 + 57 + 62 = 538$$

**Q NO 2****Finding utilities for all roads****1) AUTOS**

$$U(\text{autos}) = 3.2 - 0.85C - 0.015A - 0.5W - 0.035R$$

$$= 3.2 - 0.85(300) - 0.015(4) - 0.035(25)$$

$$U(\text{autos}) = -254.765$$

**2) Light circular rail**

$$U(\text{L.CR}) = 1.0 - 0.35C - 0.025A - 0.7W - 0.055R$$

$$= 1.0 - 0.35(70) - 0.025(7) - 0.7(10) - 0.055(30)$$

$$U(\text{L.CR}) = -32.325$$

**3) Local buses**

$$U(\text{L.B}) = 1.7 - 0.15C - 0.75A - 0.9W - 0.075R$$

$$= 1.7 - 0.15(50) - 0.75(10) - 0.9(15) - 0.075(40)$$

$$U(\text{L.B}) = -23.05$$

**4) RIDING BIKES**

$$U(\text{R.B}) = 11.3 - 0.17C - 0.012A - 0.0W - 0.045R$$

$$= 11.3 - 765 - 0.012 - 109$$

$$U(\text{R.B}) = -8.26$$

**5) RAPID RAIL**

$$U(\text{R.R}) = 1.5 - 0.25C - 0.095A - 0.6W - 0.025R$$

$$= 1.5 - 0.25(90) - 0.095(5) - 0.6(20) - 0.025(15)$$

$$U(\text{R.R}) = -33.85$$

AS WE KNOW THAT

$$P(X) = \frac{E^{VA}}{\text{SUM OF } E^{VA}_n}$$

$$\text{Autos} = P(\text{autos}) = \frac{E^{VA}}{\text{SUM OF } E^{VA}_n}$$

$$P(\text{AUTO}) = \frac{e^{-254.765}}{(e^{-254.765} + e^{-32.325} + e^{-23.05} + e^{-8.262} + e^{-33.85})}$$

$$e^{-254.765} = 0$$

**Q NO 3**

Finding link array and minimum impedance tree originated from zone A

| Stang N | Link |   | compute new path impedance |    | compare to tree table N-1 |               | Decision |
|---------|------|---|----------------------------|----|---------------------------|---------------|----------|
|         | i    | j |                            |    |                           |               |          |
|         | A    | 1 | 0                          | 4  | 4                         | 4 < Infinity  | accepted |
|         |      | 1 | 2                          | 4  | 3                         | 7 < Infinity  | accepted |
|         |      | 1 | 4                          | 4  | 3                         | 7 < Infinity  | accepted |
|         |      | 2 | 3                          | 7  | 4                         | 11 < Infinity | accepted |
|         |      | 2 | 5                          | 7  | 4                         | 11 < Infinity | accepted |
|         |      | 3 | B                          | 11 | 3                         | 14 < Infinity | accepted |
|         |      | 3 | 6                          | 11 | 12                        | 23 > 18       | rejected |
|         |      | 4 | 5                          | 7  | 5                         | 12 > 11       | rejected |
|         |      | 4 | 7                          | 7  | 7                         | 14 < Infinity | accepted |
|         |      | 5 | 6                          | 11 | 7                         | 18 < Infinity | accepted |
|         |      | 5 | 8                          | 11 | 8                         | 19 < Infinity | accepted |
|         |      | 6 | 9                          | 18 | 9                         | 27 < Infinity | accepted |
|         |      | 7 | C                          | 14 | 5                         | 19 < Infinity | accepted |
|         |      | 7 | 8                          | 14 | 10                        | 24 > 19       | rejected |
|         |      | 8 | 9                          | 19 | 12                        | 31 > 37       | rejected |
|         |      | 9 | D                          | 27 | 4                         | 31 < Infinity | accepted |

  

| Stang N | Link |   | compute new path impedance |    | compare to tree table N-1 |               | Decision |
|---------|------|---|----------------------------|----|---------------------------|---------------|----------|
|         | i    | j |                            |    |                           |               |          |
|         | A    | 1 | 0                          | 4  | 4                         | 4 < Infinity  | accepted |
|         |      | 1 | 2                          | 4  | 3                         | 7 < Infinity  | accepted |
|         |      | 1 | 4                          | 4  | 3                         | 7 < Infinity  | accepted |
|         |      | 2 | 3                          | 7  | 4                         | 11 < Infinity | accepted |
|         |      | 2 | 5                          | 7  | 4                         | 11 < Infinity | accepted |
|         |      | 3 | B                          | 11 | 3                         | 14 < Infinity | accepted |
|         |      | 4 | 7                          | 7  | 7                         | 14 < Infinity | accepted |
|         |      | 5 | 6                          | 11 | 7                         | 18 < Infinity | accepted |
|         |      | 5 | 8                          | 11 | 8                         | 19 < Infinity | accepted |
|         |      | 6 | 9                          | 18 | 9                         | 27 < Infinity | accepted |
|         |      | 7 | C                          | 14 | 5                         | 19 < Infinity | accepted |
|         |      | 9 | D                          | 27 | 4                         | 31 < Infinity | accepted |

**Q NO: 04**

Using the net present value

**1. CNG bus**

$$(25\text{uspwf}(7\%,11)-60 - (16.048+7.99)\text{uspwf}(7\%,11)+7.04\text{sppwf}(7\%,11))=-49.44$$

**2. BUS RAPID TRANSIT**

$$27\text{uspwf}(7\%,12)-50 - (19.589+12.116)\text{uspwf}(7\%,12)+11\text{sppwf}(7\%,12)=-82.49$$

**3. LIGHT RAIL**

$$29\text{uspwf}(5\%,12)-66 - (19.554+16)\text{uspwf}(5\%,12)+14\text{sppwf}(5\%,12)=-116.294$$

**4. FAST TRAIN**

$$45\text{uspwf}(8\%,14)-95 - (31.132+19.345)\text{uspwf}(8\%,14)+17\text{sppwf}(8\%,14)=-134.367$$

**5. METRO**

$$35\text{uspwf}(6\%,18)-70 - (25+19.535)\text{uspwf}(6\%,18)+16\text{sppwf}(6\%,18)=-167.64$$

**CONCLUSION:**

I will recommend CNG Bus for the government.

**THANKS**