# Appendix-3.3.3 (13) Annual GDP Growth Rates by Zone for Demand Forecast (Without Capital Relocation)

| Region | Low Case | | | | Medium Case | | | | High Case | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1995 -2000 | 2000 -2005 | 2005 -2010 | 2010 -2020 | 1995 -2000 | 2000 -2005 | 2005 -2010 | 2010 -2020 | 1995 -2000 | 2000 -2005 | 2005 -2010 | 2010 -2020 |
| (Domestic) | | | | | | | | | | | | |
| Almaty | 5.79 | 4.95 | 4.39 | 3.81 | 6.30 | 5.46 | 4.89 | 4.31 | 6.70 | 5.86 | 5.40 | 4.81 |
| West Kaz. | 5.77 | 5.42 | 5.42 | 4.89 | 6.27 | 5.93 | 5.93 | 5.40 | 6.68 | 6.33 | 6.44 | 5.90 |
| Aktyubinsk | 5.18 | 4.71 | 5.22 | 4.43 | 5.68 | 5.23 | 5.73 | 4.94 | 6.09 | 5.61 | 6.24 | 5.44 |
| Karaganda | 4.49 | 4.81 | 4.69 | 4.22 | 4.99 | 5.31 | 5.19 | 4.72 | 5.39 | 5.71 | 5.70 | 5.23 |
| Kustanay | 3.28 | 4.26 | 4.54 | 3.87 | 3.77 | 4.76 | 5.04 | 4.37 | 4.17 | 5.16 | 5.55 | 4.87 |
| Atyrau | 5.38 | 6.06 | 5.35 | 5.17 | 5.89 | 6.57 | 5.85 | 5.67 | 6.29 | 6.97 | 6.36 | 6.18 |
| East Kaz. | 4.25 | 4.81 | 4.49 | 4.12 | 4.75 | 5.31 | 4.99 | 4.62 | 5.15 | 5.71 | 5.49 | 5.13 |
| South Kaz. | 3.77 | 4.57 | 4.17 | 3.84 | 4.27 | 5.07 | 4.68 | 4.35 | 4.67 | 5.47 | 5.18 | 4.85 |
| Zhambul | 4.80 | 5.04 | 6.51 | 5.23 | 5.30 | 5.54 | 7.02 | 5.74 | 5.70 | 5.94 | 7.54 | 6.25 |
| Almola | 6.04 | 8.98 | 8.04 | 4.56 | 6.55 | 9.50 | 8.56 | 5.06 | 6.96 | 9.92 | 9.08 | 5.57 |
| Semipalatinsk | 4.62 | 5.67 | 4.68 | 4.64 | 5.12 | 6.18 | 5.18 | 5.15 | 5.53 | 6.59 | 5.68 | 5.65 |
| Kokchetau | 3.43 | 5.35 | 4.38 | 4.33 | 3.92 | 5.85 | 4.88 | 4.84 | 4.32 | 6.25 | 5.39 | 5.34 |
| Pavlodar | 4.00 | 4.76 | 4.27 | 3.99 | 4.50 | 5.27 | 4.77 | 4.49 | 4.90 | 5.67 | 5.27 | 4.99 |
| North Kaz. | 3.67 | 5.12 | 4.76 | 4.41 | 4.17 | 5.63 | 5.27 | 4.91 | 4.56 | 6.03 | 5.77 | 5.42 |
| Kzyl Orda | 6.63 | 7.51 | 4.45 | 5.43 | 7.14 | 8.02 | 4.96 | 5.94 | 7.55 | 8.43 | 5.46 | 6.45 |
| Zhezkazgan | 5.41 | 5.82 | 4.76 | 4.75 | 5.92 | 6.33 | 5.26 | 5.26 | 6.32 | 6.74 | 5.77 | 5.77 |
| Turgai | 2.03 | 4.30 | 4.81 | 4.02 | 2.52 | 4.80 | 5.32 | 4.53 | 2.91 | 5.20 | 5.82 | 5.03 |
| Mangistau | 3.15 | 6.01 | 5.19 | 5.07 | 3.65 | 6.52 | 5.70 | 5.56 | 4.04 | 6.93 | 6.21 | 6.08 |
| Taldykorgan | 2.42 | 4.55 | 4.24 | 3.87 | 2.91 | 5.05 | 4.75 | 4.37 | 3.30 | 5.45 | 5.25 | 4.87 |
| (Interm3-1) | | | | | | | | | | | | |
| Russia | 4.36 | 4.49 | 4.19 | 3.56 | 4.87 | 5.00 | 4.49 | 3.87 | 5.37 | 5.50 | 5.00 | 4.37 |
| East Europe | 4.10 | 4.39 | 3.89 | 3.23 | 4.60 | 4.69 | 4.39 | 3.53 | 5.10 | 5.20 | 4.69 | 4.03 |
| Central Asia | 4.36 | 4.49 | 4.19 | 3.56 | 4.87 | 5.00 | 4.49 | 3.87 | 5.37 | 5.50 | 5.00 | 4.37 |
| China | 8.77 | 8.19 | 7.69 | 7.03 | 9.28 | 8.70 | 8.19 | 7.53 | 9.79 | 9.20 | 8.70 | 8.03 |
| Mongolia | 4.36 | 4.49 | 4.19 | 3.56 | 4.87 | 5.00 | 4.49 | 3.87 | 5.37 | 5.50 | 5.00 | 4.37 |
| (Interm3-2) | | | | | | | | | | | | |
| Far East Asia | 3.15 | 2.90 | 2.40 | 1.76 | 3.45 | 3.20 | 2.70 | 2.06 | 3.75 | 3.50 | 3.00 | 2.36 |
| Western Asia | 5.94 | 5.51 | 4.99 | 3.95 | 6.46 | 6.02 | 5.51 | 4.44 | 6.97 | 6.53 | 6.02 | 4.95 |
| Other Asia | 6.47 | 6.12 | 5.61 | 4.63 | 6.98 | 6.62 | 6.12 | 5.13 | 7.49 | 7.13 | 6.61 | 5.63 |
| Western Europe | 2.79 | 2.68 | 2.38 | 1.90 | 3.09 | 2.98 | 2.68 | 2.20 | 3.39 | 3.28 | 2.98 | 2.50 |
| North America | 3.53 | 3.29 | 2.99 | 2.50 | 3.83 | 3.59 | 3.29 | 2.80 | 4.14 | 3.89 | 3.59 | 3.10 |
| Australia,etc. | 3.96 | 3.65 | 3.34 | 2.70 | 4.27 | 3.95 | 3.65 | 3.01 | 4.57 | 4.25 | 3.95 | 3.31 |
| Africa | 4.59 | 4.27 | 3.97 | 3.07 | 4.90 | 4.58 | 4.27 | 3.37 | 5.21 | 4.88 | 4.58 | 3.68 |
| Others | 4.69 | 4.43 | 3.92 | 3.16 | 5.19 | 4.94 | 4.43 | 3.67 | 5.70 | 5.44 | 4.94 | 4.17 |

GDP Growth Rate by Region (1995=1.0)

| | Low Case | | | | Medium Case | | | | High Case | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 2000 | 2005 | 2010 | 2020 | 2000 | 2005 | 2010 | 2020 | 2000 | 2005 | 2010 | 2020 |
| Almaty | 1.3250 | 1.6872 | 2.0915 | 3.0388 | 1.3570 | 1.7699 | 2.2473 | 3.4267 | 1.3831 | 1.8386 | 2.3911 | 3.8254 |
| West Kaz. | 1.3235 | 1.7236 | 2.2441 | 3.6165 | 1.3555 | 1.8080 | 2.4113 | 4.0781 | 1.3816 | 1.8782 | 2.5656 | 4.5526 |
| Aktyubinsk | 1.2871 | 1.6199 | 2.0895 | 3.2240 | 1.3183 | 1.6992 | 2.2452 | 3.6355 | 1.3436 | 1.7652 | 2.3888 | 4.0585 |
| Karaganda | 1.2456 | 1.5754 | 1.9812 | 2.9950 | 1.2757 | 1.6526 | 2.1288 | 3.3773 | 1.3003 | 1.7168 | 2.2650 | 3.7702 |
| Kustanay | 1.1751 | 1.4475 | 1.8073 | 2.6417 | 1.2035 | 1.5184 | 1.9419 | 2.9789 | 1.2267 | 1.5774 | 2.0661 | 3.3255 |
| Atyrau | 1.2996 | 1.7439 | 2.2628 | 3.7444 | 1.3310 | 1.8293 | 2.4313 | 4.2224 | 1.3566 | 1.9004 | 2.5569 | 4.7137 |
| East Kaz. | 1.2336 | 1.5577 | 1.9399 | 2.9641 | 1.2614 | 1.6340 | 2.0844 | 3.2745 | 1.2857 | 1.6974 | 2.2178 | 3.6558 |
| South Kaz. | 1.2034 | 1.5048 | 1.8462 | 2.6919 | 1.2325 | 1.5785 | 1.9838 | 3.0356 | 1.2562 | 1.6398 | 2.1107 | 3.3687 |
| Zhambul | 1.2642 | 1.6164 | 2.2156 | 3.6904 | 1.2947 | 1.6956 | 2.3806 | 4.1615 | 1.3196 | 1.7614 | 2.5329 | 4.6457 |
| Almola | 1.3430 | 2.0613 | 3.0346 | 4.7385 | 1.3735 | 2.1624 | 3.2607 | 5.3434 | 1.3999 | 2.2464 | 3.4693 | 5.9650 |
| Semipalatinsk | 1.2535 | 1.6519 | 2.0760 | 3.2676 | 1.2839 | 1.7328 | 2.2307 | 3.6847 | 1.3086 | 1.8001 | 2.3734 | 4.1134 |
| Kokchetau | 1.1835 | 1.5354 | 1.9026 | 2.9070 | 1.2121 | 1.6106 | 2.0443 | 3.2781 | 1.2354 | 1.6732 | 2.1751 | 3.6595 |
| Pavlodar | 1.2169 | 1.5357 | 1.8928 | 2.7983 | 1.2463 | 1.6110 | 2.0338 | 3.1555 | 1.2703 | 1.6735 | 2.1639 | 3.5227 |
| North Kaz. | 1.1974 | 1.5371 | 1.9397 | 2.9863 | 1.2264 | 1.6124 | 2.0842 | 3.3675 | 1.2500 | 1.6750 | 2.2175 | 3.7592 |
| Kzyl Orda | 1.3787 | 1.9799 | 2.4617 | 4.1776 | 1.4121 | 2.0769 | 2.6451 | 4.7109 | 1.4392 | 2.1576 | 2.8143 | 5.2590 |
| Zhezkazgan | 1.3017 | 1.7275 | 2.1793 | 3.4678 | 1.3332 | 1.8121 | 2.3417 | 3.9104 | 1.3588 | 1.8825 | 2.4915 | 4.3654 |
| Turgai | 1.1059 | 1.3651 | 1.7296 | 2.5618 | 1.1327 | 1.4319 | 1.8552 | 2.8588 | 1.1545 | 1.4875 | 1.9739 | 3.2249 |
| Mangistau | 1.1679 | 1.5638 | 2.0143 | 3.3020 | 1.1962 | 1.6404 | 2.1644 | 3.7235 | 1.2192 | 1.7041 | 2.3029 | 4.1567 |
| Taldykorgan | 1.1269 | 1.4074 | 1.7325 | 2.5314 | 1.1542 | 1.4763 | 1.8616 | 2.8546 | 1.1764 | 1.5337 | 1.9306 | 3.1862 |
| Russia | 1.2380 | 1.5422 | 1.8936 | 2.6876 | 1.2681 | 1.6181 | 2.0158 | 2.9454 | 1.2988 | 1.6974 | 2.1660 | 3.3214 |
| East Europe | 1.2224 | 1.5011 | 1.8168 | 2.4962 | 1.2521 | 1.5750 | 1.9340 | 2.7357 | 1.2824 | 1.6521 | 2.0781 | 3.0849 |
| Central Asia | 1.2380 | 1.5422 | 1.8936 | 2.6876 | 1.2681 | 1.6181 | 2.0158 | 2.9454 | 1.2988 | 1.6974 | 2.1660 | 3.3214 |
| China | 1.5227 | 2.2576 | 3.2699 | 6.4484 | 1.5585 | 2.3649 | 3.5062 | 7.2463 | 1.5949 | 2.4768 | 3.7584 | 8.1386 |
| Mongolia | 1.2380 | 1.5422 | 1.8936 | 2.6876 | 1.2681 | 1.6181 | 2.0158 | 2.9454 | 1.2988 | 1.6974 | 2.1660 | 3.3214 |
| Far East Asia | 1.1676 | 1.3469 | 1.5163 | 1.8050 | 1.1848 | 1.3569 | 1.5543 | 1.9424 | 1.2021 | 1.4279 | 1.6553 | 2.0898 |
| Western Asia | 1.3347 | 1.7449 | 2.2264 | 3.2723 | 1.3674 | 1.8315 | 2.3944 | 3.6956 | 1.4007 | 1.9219 | 2.5742 | 4.1713 |
| Other Asia | 1.3680 | 1.8407 | 2.4182 | 3.8019 | 1.4010 | 1.9307 | 2.5980 | 4.2863 | 1.4347 | 2.0247 | 2.6599 | 4.1818 |
| Western Europe | 1.1475 | 1.3097 | 1.4732 | 1.7788 | 1.1644 | 1.3486 | 1.5393 | 1.9140 | 1.1815 | 1.3885 | 1.6061 | 2.0591 |
| North America | 1.1895 | 1.3985 | 1.6203 | 2.0734 | 1.2070 | 1.4400 | 1.6930 | 2.2310 | 1.2247 | 1.4826 | 1.7687 | 2.4002 |
| Australia,etc. | 1.2144 | 1.4525 | 1.7119 | 2.2356 | 1.2323 | 1.4956 | 1.7688 | 2.4057 | 1.2504 | 1.5399 | 1.8689 | 2.5883 |
| Africa | 1.2518 | 1.5431 | 1.8743 | 2.5357 | 1.2703 | 1.5889 | 1.9585 | 2.7287 | 1.2889 | 1.6359 | 2.0462 | 2.9358 |
| Others | 1.2595 | 1.5616 | 1.8929 | 2.5840 | 1.2881 | 1.6391 | 2.0358 | 2.9183 | 1.3195 | 1.7200 | 2.1887 | 3.2939 |

## Appendix-3.3.4 (1) Procedure of Competitive Air Passenger Traffic Demand Forecast

Competitive air passenger traffic demand forecast were made by applying a step-by-step method of which the major components are briefly described as follows:

[1.1] Estimate of current inter-zonal passenger traffic flow in 1995
- a. Air passenger Origin Destination (OD) flow
- b. Railway passenger OD flow
- c. Bus passenger OD flow
- d. Total passenger OD flow ( a + b + c )

⇓

[1.2] Calculation of modal shares on each OD Pair ((O→D)+( D→O)) in 1995
- a. Share of air passenger transportation ( a/d )
- b. Share of railway passenger transportation ( b/d )
- c. Share of bus passenger transportation ( c/d )

⇓

[2] Estimate of trip time and trip cost by mode and by OD Pair

⇓

[3.1] Formulation of modal share estimate model, hereafter called the Modal Demand Model (MD) Model, using data of foregoing [1] and [2]

⇓

[3.2] Improvement of applicability of originally formulated MD Model by quantification of "dummy factors"( minus and none-minus additional time and / or cost) so that each modal share estimated by the model may approximate to the respective actual share. Hereafter, this step of work will be called a "reproduction of original situation".

⇓

[4] Forecast of total passenger traffic demand by OD pair and by case for target years

⇓

[5] Forecast of modal shares by OD Pair and by case for target years applying the MD Model

⇓

[6] Forecast of air passenger traffic demand by OD pair and by case for target years

[1.1] Estimate of current inter-zonal passenger traffic flow

a. Air passenger flow

Inter-zonal air passenger flow in 1995 is estimated as follows:

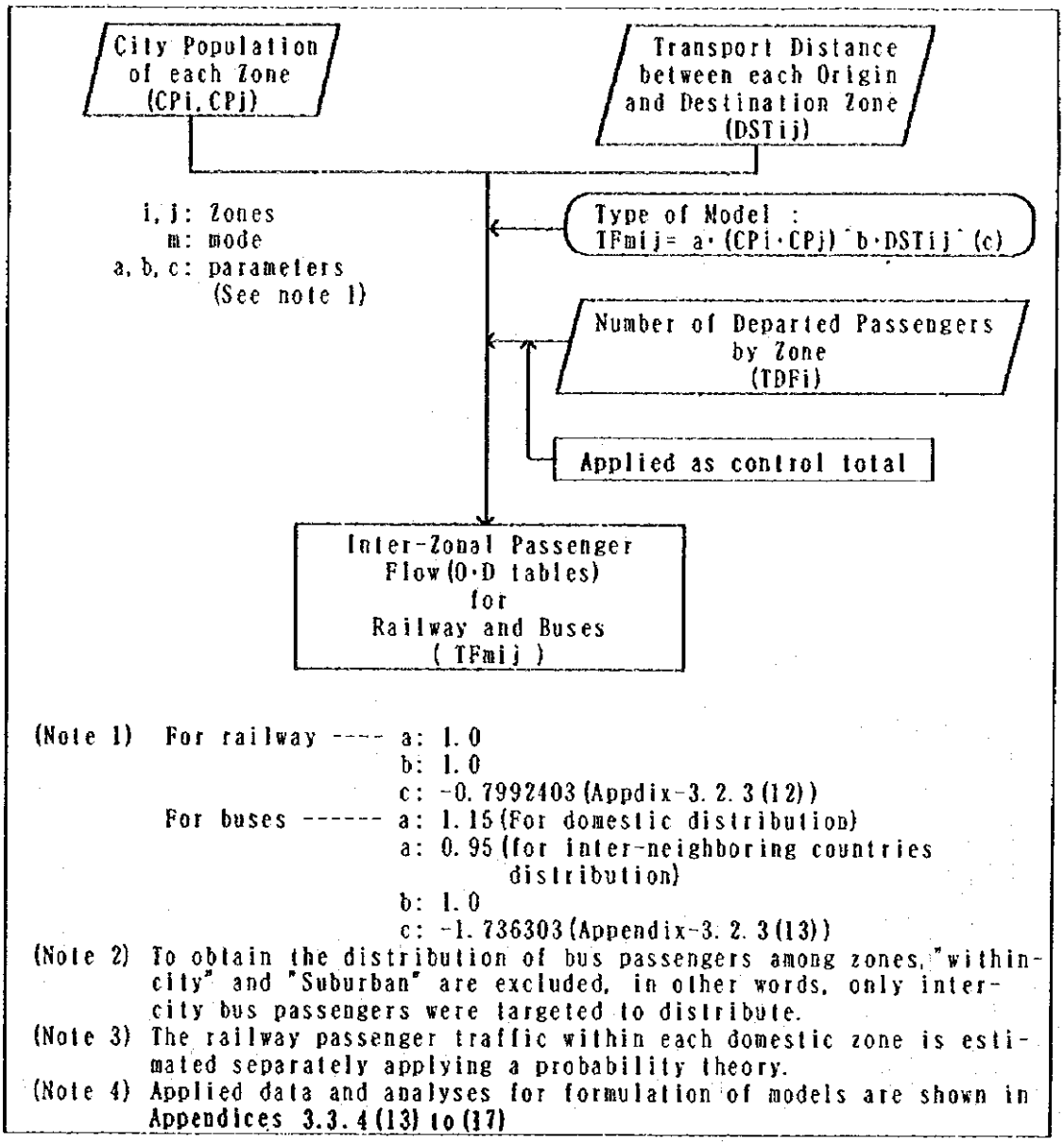
I. First, inter-zonal air passenger flows within Kazakhstan were made in the form of OD tables by simply editing the statistics of departed air passengers by destination airport from each airport in Kazakhstan. These were originally provided by Kaz-Air. The OD table is shown in Appendix-3.3.4 (2)

II. Secondly, inter-CIS and international zonal departed air passenger flows from each zone of Kazakhstan were estimated based on the statistics of Kaz-Air and Ministry of Statistics and Analysis and by applying assumed weights for distribution of air passengers over related zones. The applied weights are shown in Appendix-3.3.3 (5). The statistics of MOSA include departed air passengers classified into: international; inter-CIS (breakdown of departure and transit); inter-regional (breakdown of departure and transit); within-region; and others (See Appendix-3.3.4 (3)). It should be noted that the "weights for distribution" were only applied for estimating air passengers carried by foreign airlines. The statistics of inter-CIS and international air passengers carried by Kaz-Air are quoted int the air passenger OD table. Passengers of "Others" in the statistics are distributed proportionately over the origin/destination passengers.

III. The final air passenger OD table was compiled by assuming that the inter-CIS and international arriving air passengers equaled those departing. This was done due to the lack of arrival data; even though the migration statistics of Kazakhstan in 1995 indicates emigration exceeds immigration. In this sense The OD table may therefore show overestimates. It should be noted that this did not significantly affect the forecasts. (See Appendix-3.3.4 (4)).

b. Railway and bus passenger OD flow

It was very important to understand the traffic flow and market shares of the other competitive modes, because this forecasting method can never be applied without such information. However, as far as these traffic flows are concerned, it was only possible to make rough estimates or use some hypothetical ones due to the very limited inter-zonal traffic flow data. Refer Fig 3.3.4 1.
The formulation of applied models and applied data are shown in Appendix-3.3.4 (5)~3.3.4 (12). The OD tables for railway and bus passengers have been omitted, but this information will be shown later in the form of modal shares together with total passengers by OD pair.




(Note 1) For railway ---- a: 1.0
b: 1.0
c: -0.7992403 (Appdix-3.2.3(12))
For buses ------ a: 1.15 (For domestic distribution)
a: 0.95 (for inter-neighboring countries distribution)
b: 1.0
c: -1.736303 (Appendix-3.2.3(13))

(Note 2) To obtain the distribution of bus passengers among zones, "within-city" and "Suburban" are excluded, in other words, only inter-city bus passengers were targeted to distribute.

(Note 3) The railway passenger traffic within each domestic zone is estimated separately applying a probability theory.

(Note 4) Applied data and analyses for formulation of models are shown in Appendices 3.3.4(13) to (17)

**Fig 3.3.4.1 Method for rough Estimate of Passenger Traffic OD Flow of Railway and bus passengers**

[1.2] Estimate of Total Number of Air Passengers and Modal Share by OD Pair

Total number of passengers and modal shares by OD pair in 1995 were easily obtained from the previously obtained OD tables. The results are shown in Appendix-3.3.4 (13).

[2] Estimate of Trip Time and Trip Cost by OD Pair

Trip time and trip cost by OD pair were estimated applying the following model in Table 3.3.4.1.

**Table 3.3.4.1 Models for Estimate of Trip Time and Trip Cost**

(Tenge and Hour)

| | | | |
|---|---|---|---|
| Railway | Cost: | RCij = (0.6190926× DRij)/100 | (DRLij<=500 km) |
| | | RCij = (230.4+ 1.126075× DRij)/100 | (DRLij >500 km) |
| | Time: | RTij = DRLij/50 | |
| Bus | Cost: | BCij = (4.0 + 1.214835× DBij)/100 | |
| | Time: | BTij = Dbij/60 | |
| Air | Cost: | ACij = (909.6 +3.311398×DAij)/100 | |
| | Time: | ATij = 2.0 + DA/800 | |

Note1 : As shown in the models, the unit of each trip cost is shown at 100 tenges.
Note2 : R=railway, B= bus, A= air transportation, T= time, C= trip cost, D= distance(km), ij= zone(i) and zone(j).

Applied data and analyses to formulate the these models appear in Appendix-3.3.4 (15)~(17). The sources of data were the Bus Terminal, Currency-Tariff Chief Committee of Railway Department and Kazakhstan Airlines (KAZ-AIR). Estimated trip times and trip costs by OD pair are shown in Appendix-3.3.4 (18).

[3.1] Formulation of MD Model

Modal shares are estimated by application of the MD Model which has been developed for transportation planning. Formulation of the MD Model means searching for and determining the parameters of the simultaneous probabilistic normal distribution, which is the most essential part of the Model.

a. Principal concept of MD model

The concept of the MD model is based on the consumers behavioral theory in a free economy.

The size of the traffic demand and share of each mode between zone (i) and zone (j) is the socioeconomical behavior occurring as a result of consumers' choice of the transportation modes from those which are available at the origin and destination, and where each consumer's modal choice is presumed to follow the following two principles:

- Each consumer makes a trip when the utility of the trip is greater than the "sacrificed volume" or "total trip cost" which has to be paid for the trip.
- The higher the consumer's value of time saved is then the faster (but more expensive) the mode selected.

Now, if the simultaneous probabilistic distribution for the utility of travel and the appraisal of value of time saved for all of the relevant transportation consumers is clear, then, by combining the sacrificed volume curve with this distribution, the realizable demand ratio for each mode is easily calculated. The total possible demand is 1.0. The share of each mode is also easily calculated from the above demand ratios.

b. Simultaneous probabilistic distribution

The simultaneous probabilistic distribution consists of: independent distribution for the utility of travel; and the appraisal of time saved value. It is a product of those two distributions, which usually forms the a shape of symmetric mountain, as shown in Fig 3.3.4.1.

Both of these distributions are presumed to follow logarithmic normal distributions which are indicated by the following parameters:

- Utility of travel: Mean----------$\mu$ loge(u)
- Std. Deviation ----------$\sigma$ loge(u)
- Saving time value: Mean----------$\mu$ loge(x)
- Std. Deviation ----------$\sigma$ loge(x)

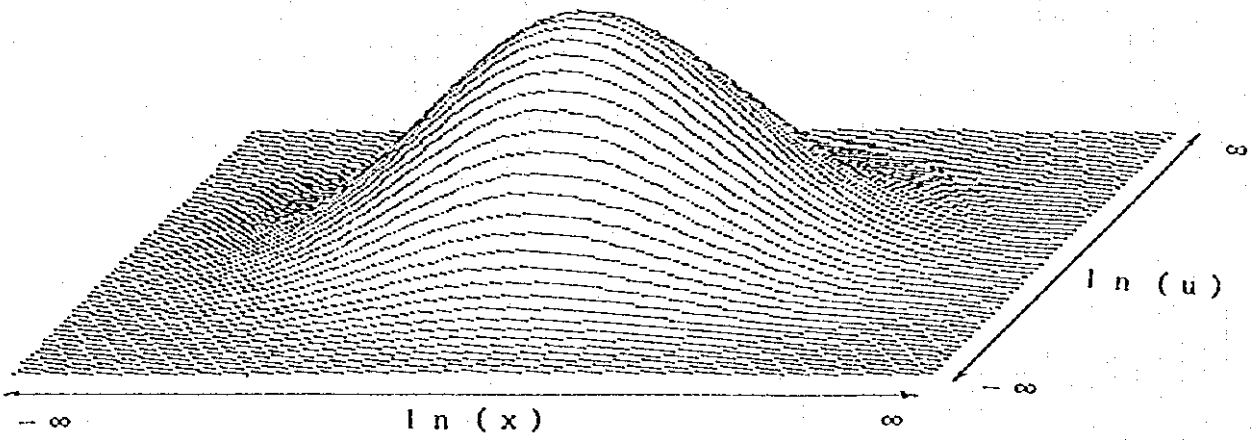



**Fig 3.3.4.1 Simultaneous Probabilistic Distribution**

Note

$u$ and $x$ are probabilistic variables where X=1/V; V means appraisal value of saving time of consumers; $u$ means utility of the travel for consumers.

$$D_{ij} = \int_{-\infty}^{\infty} g(x) \int_{-\infty}^{\infty} f(u) du dx = 1.0$$

where, $g(x)$: Distribution function of $(x)$.
$f(u)$: Distribution function of $(u)$

The normal distribution function $(x)$ is indicated by the following formula:

$$g(x) = \frac{1}{\sqrt{2\pi\sigma}} \exp\left(\frac{(x-\mu)^2}{2\sigma^2}\right)$$

c. Realizable demand ratio and share by mode

Realizable demand ratio by mode is calculated by input data of modal trip time and trip cost based on the foregoing simultaneous distribution as shown in Fig. 3.3.4.2 and Fig. 3.3.4.3.

In the Fig. 3.3.4.2, D1, D2, D3 mean respectively the realizable demand ratio of mode 1, 2 and 3 which are calculated by the following formula

$$RD_{mij} = \int_{\ln(x_{m-1})}^{\ln(x_{m,m-1})} f(x) \int_{\ln(Smij)}^{\infty} f(u) du dx$$

In the above formula, $X_{m\,m-1ij}$ means respectively the boundary or substitutional value of $(x)$ where the value (S) of mode $(m)$ equals that of mode $(m-1)$ between zone i and zone j.
For example, the substitutional value for S1 and S2 which gives S1 equals S2 is calculated as follows:

$$X_{1-2} = (t_2 - t_1)/(c_1 - c_2) \text{ or } V_{1-2} = (c_1 - c_2)/(t_2 - t_1)$$

S1, S2 and S3 indicate respectively "sacrificed volume" curve for mode 1,2 and 3.

The value of sacrificed volume is indicated in terms of time as shown in following formula.

$$\ln(S_{mij}) = \ln(T_{mij} + Xc_{mij})$$

Here, $S_{mij}$ means sacrificed volume of mode $(m)$ for zone i-j. $T_{mij}$ and $C_{mij}$ are respectively trip time and trip cost (fare and charge) of mode $(m)$ for zone i-j.

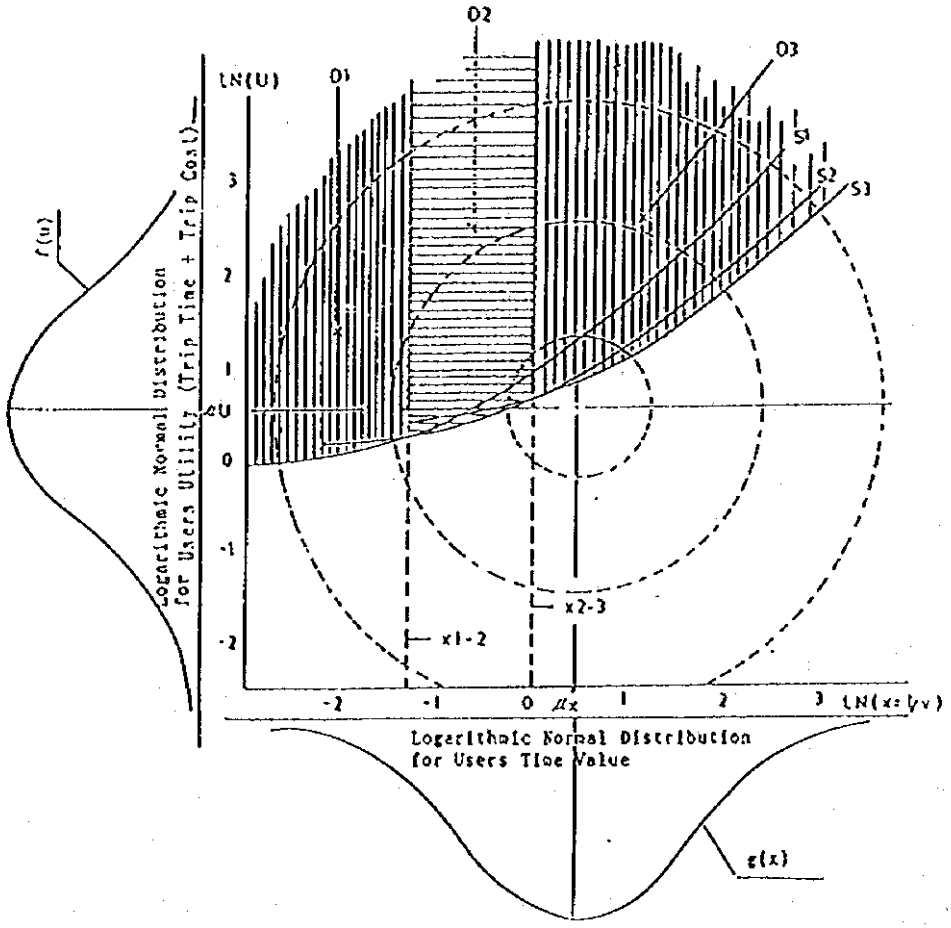



**Fig. 3.3.4.2 An illustration of Realizable Demand Ratio by Mode**

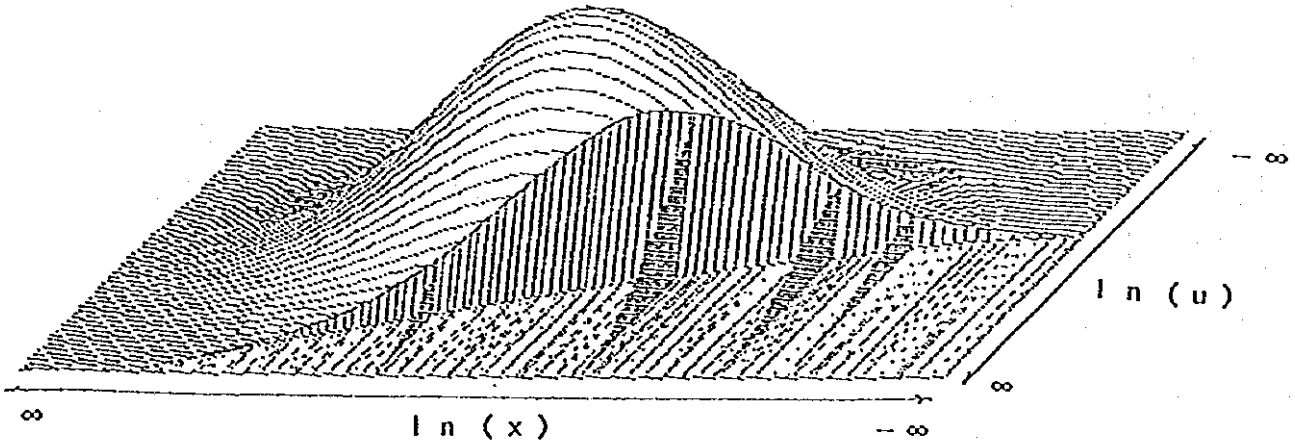



**Fig. 3.3.4.3 Graphical Description of Realizable Demand Ratio by Mode**

It should be noted that the share of each mode ($SH_m$) is indicated by the following equation:

$H_m = D_m/\Sigma D_m$

For example, share of mode (1) is indicated as follows:

$SH_1 = D_1/(D_1+D_2+D_3)$

Fig 3.3.4.2 shows a situation of modal demand estimation which is drawn by computer graphics.

Details of the MD Model is described in Appendix-3.3.4 (19) and the step-by-step procedure of the Model is shown in Appendix-3.3.4 (20).

d. Parameters of Simultaneous Normal Distribution and Time Values

The parameters of simultaneous normal distribution are automatically obtained by iterative calculations of "calibration" using data of modal shares and trip times and trip costs of OD pairs in the base year (1995) as already mentioned. The details of the methodology and process to obtain a combination of four parameters of the normal distribution are mentioned in Appendix-3.3.4 (21), 3.3.4 (22). Obtained parameters for 1995 are shown in Table 3.3.4.5, together with assumed time values by case for target years.

Details of assumptions for time values for target years are shown in Appendix-3.3.4 (23).

**Table 3.3.4.5 Parameters of Simultaneous Normal Distribution and Average Time Values by Case for Target Years**

| Year | | 1995 | 2000 | 2005 | 2010 |
|---|---|---|---|---|---|
| μlog(1/V) | Low Case | 1.20 | 1.13 | 1.01 | 0.84 |
| | Medium Case | 1.20 | 1.10 | 0.94 | 0.73 |
| | High Case | 1.20 | 1.07 | 0.86 | 0.60 |
| σlog(1/V) | (Constant) | 3.62 | 3.62 | 3.62 | 3.62 |
| μlog(U) | (Constant) | 2.42 | 2.42 | 2.42 | 2.42 |
| σlog(U) | (Constant) | 3.42 | 3.42 | 3.42 | 3.42 |
| Time Value | Low Case | 0.30 | 0.32 | 0.36 | 0.43 |
| | Medium Case | 0.30 | 0.33 | 0.39 | 0.48 |
| | High Case | 0.30 | 0.34 | 0.42 | 0.55 |

[3.2] Reproduction of Original Situation

The MD Model originally formulated could not practically be applied by itself, mainly for following two reasons:

I. Applied data for the model formulation include considerable errors. Besides the model has been formulated as an average for many different OD pairs, meaning that any peculiar factors for each OD pair were not taken into account.

II. In MD Model, the explanatory variables are limited to only the two factors of standardized trip time and trip cost among representative cities, which may not always be theoretically representative of the respective zones.

To minimize the deviation of the estimated values of the model from the actual or observed values, a "recreation of the original situation" is required. This involves adjusting the original variables of trip time and trip cost of each mode for each OD pair so as that the each deviation reduced to an acceptable minimum. A rough procedure of this work is shown in Fig 3.3.4.4.

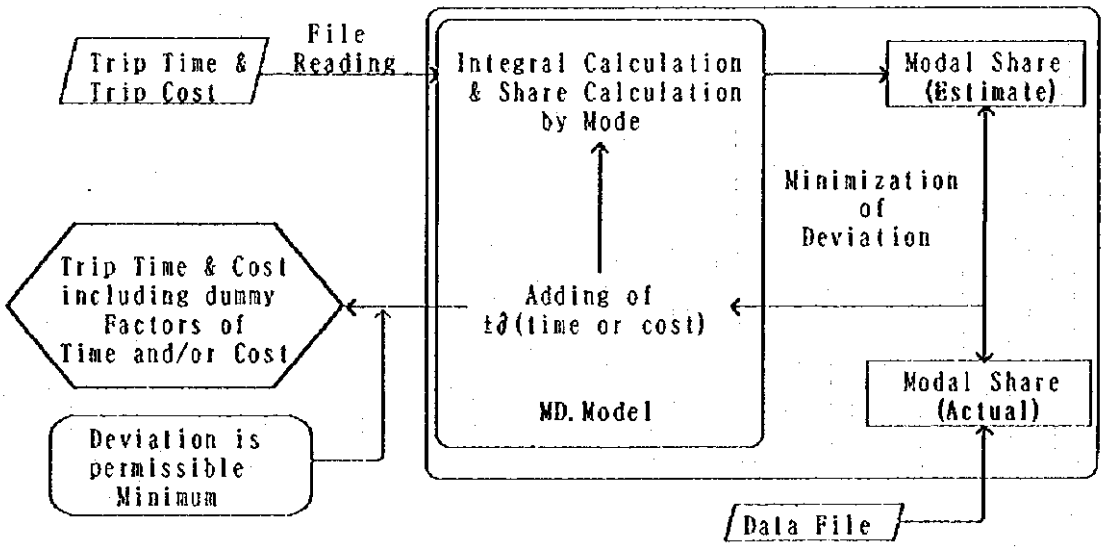



**Fig 3.3.4.4 Reproduction of Original Situation**

Total number of passengers, actual shares, estimated shares and deviations thereof by mode and by OD pair are shown in Appendix-3.3.4 (24).

[4] Forecast of Total Passenger Traffic Demand by Case for Target Years

Forecast total passenger traffic demands for each O D pair were made for each case and for each target year by applying the following formula which is formulated by regression analysis (See Appendix-3.3.4 (12)).

$$TFntij = TOij \times (GIDXtni \times GIDXtnj)^{\varepsilon}$$

where, $TF_{nt}$: Total traffic demand between zone (i) and zone (j) in case (n) for the year (t) (thousand passengers)

$TO_{ij}$: Total traffic demand between zone (i) and zone (j) in base year (1995), (thousands passengers)

$GIDX_{tni}$,$GIDX_{tnj}$: Respectively, index of GDP growth rate of zone (i) and zone (j) in case (n) for the year (t), (1995=100)

n: n means case of "Low" or "Medium" or "High".

ε: Elasticity coefficient of traffic demand to gross domestic products (GDP) ε=0.5 × 0.540121 (See Appendix 3.3.4 (12))

[5] Forecast of Modal Shares by OD Pair and By Case for Target Years Applying MD Model

Forecasts of modal shares for each OD pair and for each target year were made by applying the MD Model where different parameters of time value by case and by target year are applied (See beforementioned Table 3.3.4.5)).

[6] Forecast of Air Passenger Traffic Demand By Case for Target Years

Forecasts of air passenger traffic demand by OD pair and by case for target years were easily derived from the outputs steps [4] and [5], as shown in following formula

$$AT_{ntij} = TF_{ntij}\, ASHR_{ntij}$$

where, $AT_{ntij}$: Number of air passengers between zone (i) and zone (j) in case (n) for the year (t).

$ASHR_{ntij}$: Share of air transportation between zone (i) and zone (j) in case (n) for the year (t).

The results of air passenger traffic demand forecast are described later together with the forecast results of international air passenger traffic demand.

(2) Procedure of Non-Competitive Air Passenger Traffic Demand Forecast

Regarding non-competitive air passenger traffic demand, the forecasts were made by applying "elasticity" models which were formulated by regression analyses of the relationship between the international air passengers and GDP's of many different countries(See Appendix-3.3.4 (25). Applied types of models and elasticity coefficients by case are shown in the following.

$$ITF_{n:ij} = ITO_{ij} \times (GIDX_{t:i} \times GIDX_{t:j})^{\varepsilon_n}$$

where, $ITF_{n:ij}$: Number of international air passengers between zone (i) and zone (j) in case (n) for the year (t).

$\varepsilon_n$: Applied elasticity coefficient of traffic demand to GDP in case (n); values of " $\varepsilon_n$ " are as follows:

| | |
|---|---|
| Low Case: | 0.75 |
| Medium Case : | 1.00 |
| High Case: | 1.25 |

(3) Another Methodological Feature

Methodologically, this air traffic demand forecast study is framed on a "current-situation-basis" and a "growth-rate-basis" where future air traffic demands of OD pairs having no air traffic demands in the base year will be zero for the future target years. To avoid these defects, this study has designed a device so that the possible air traffic demands may be forecast even for the such OD pairs. The device is such that appropriate shares can be forecast depending on different transport conditions (trip time and trip cost) of respective OD pair application of the MD Model.

## Appendix-3.3.4 (2) Origin/Destination Table for Air Passengers carried by Kaz Air for 1995

| Region | Airprt | Almaty Almaty | W.Kaz. Uralsk | Aktyub Aktyub | Karaka Karaka | Kustan Kustan | Atyrau Atyrau | E.Kaz. Ust-Ka | E.Kaz. Zaysan | S.Kaz. Shimke | Zhambu Zhambu | Akmola Akmola |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Almaty | Almaty | | 981 | 9287 | 29013 | 7225 | 19053 | 7730 | 720 | 40377 | 9207 | 21087 |
| West Kaz. | Uralsk | | | 9 | | | | 15010 | | | | |
| Aktyubinsk | Aktyubinsk | 10655 | 62 | | 960 | | 3 | | | 166 | | 379 |
| Karakanda | Karakanda | 30552 | | 855 | | | 806 | 1943 | | 3508 | 22 | |
| Kustanay | Kustanay | 8131 | | | | | 99 | 380 | | | 303 | |
| Atyrau | Atyrau | | 1180 | 59 | 1129 | 123 | | | | 977 | | 644 |
| East Kaz. | Ust-Kamano | 9323 | 15600 | | 2115 | 430 | | | 1882 | 2540 | | 199 |
| " | Zaysan | | | | | | | | | | | |
| South Kaz. | Shimkent | 42291 | | 137 | 3553 | | 953 | 2172 | | | | 515 |
| Zhambul | Zhambul | 8805 | | | 5 | 396 | | | | | | |
| Akmola | Akmola | 21569 | | 254 | | | 423 | 161 | | 417 | | |
| " | Stennogors | | | | | | | | | | | |
| Semipala. | Semipalati | 19527 | | | 30 | | | | | | | |
| " | Aktogai | | | | | | | | | 98 | | |
| Kokchetau | Kokchetau | 5753 | | | | | | | | | | |
| Pavloder | Pavloder | 20338 | | 349 | | | | 174 | | 1573 | 24 | |
| " | Ekibastuz | | | | | | 97 | | | 2281 | | |
| North Kaz. | Petropavlo | 5262 | | | 73 | 230 | | | | | | |
| Kzyl-Orda | Kzyl-Orda | 8053 | | | | | | | | | | |
| Zhezkazg. | Balkhash | | | | | | 246 | | | 3 | 203 | 54 |
| " | Zhezkazgan | 10725 | | 41 | | | | | | 1366 | | |
| Turgai | Arkalyk | 6282 | | 147 | | | | | | 1841 | 3 | |
| Mangistau | Aktau | 190 | 3869 | 2857 | | 1544 | 8561 | 16892 | | | | |
| Total | Total | 215377 | 21692 | 13195 | 36878 | 9948 | 30241 | 44462 | 2522 | 55147 | 9762 | 22878 |

| Region | Airprt | Akmola Stenno | Semipa Semipa | Semipa Aktoga | Kokche Kokche | Pavlod Pavlod | Pavlod Ekibas | N.Kaz. Petrop | K.Orda K.Orda | Zhezka Balkha | Zhezka Zhezka | Turgai Arkaly |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Almaty | Almaty | | 17685 | | 5426 | 27376 | 3174 | 5182 | 7385 | | 12649 | 6095 |
| West Kaz. | Uralsk | | | | | | | | | | | |
| Aktyubinsk | Aktyubinsk | | | | | 326 | | | | 16 | | 134 |
| Karakanda | Karakanda | | 55 | | | | | | 58 | | | |
| Kustanay | Kustanay | | | | | | | | 209 | | | |
| Atyrau | Atyrau | | | | 189 | | | 142 | | | 186 | |
| East Kaz. | Ust-Kamano | | | | | 235 | | | | | | |
| " | Zaysan | | | | | | | | | | | |
| South Kaz. | Shimkent | | | | 126 | 1740 | | 2520 | | | 11 | 1316 |
| Zhambul | Zhambul | | | | | 29 | | | | | 147 | |
| Akmola | Akmola | 40 | | | | | | | | | 35 | |
| " | Stennogors | | | | | | | | | | 129 | |
| Semipala. | Semipalati | | | | | | | | 48 | | | |
| " | Aktogai | | | | | | | | | | | |
| Kokchetau | Kokchetau | | | | | | | | | | 38 | |
| Pavloder | Pavloder | | | | | | | | 524 | | | |
| " | Ekibastuz | | | | | | | | | | | |
| North Kaz. | Petropavlo | | | | | | | | | | | |
| Kzyl-Orda | Kzyl-Orda | | 79 | | | 789 | | | | | 221 | |
| Zhezkazg. | Balkhash | | | | | | | | | | 198 | |
| " | Zhezkazgan | 189 | | 287 | 50 | | | | 223 | 180 | | |
| Turgai | Arkalyk | | | | | | | | | | | |
| Mangistau | Aktau | | 1 | | 4867 | | | | | | | |
| Total | Total | 229 | 17820 | 287 | 9778 | 30415 | 3174 | 7844 | 8439 | 196 | 13014 | 7545 |

| Region | Airprt | Mangis Aktau | Domest Total | Russia total | Uzbeki total | Tajiki | Ukrain | Azerba Baku | Turkme | Turkey | Others | Grand Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Almaty | Almaty | 17094 | 246146 | 171895 | 7615 | 658 | 1508 | | | | 143 | 427965 |
| West Kaz. | Uralsk | 4211 | 19238 | | | | | | | | | 19230 |
| Aktyubinsk | Aktyubinsk | 1808 | 14509 | 5149 | | | | 96 | | | | 19754 |
| Karakanda | Karakanda | | 37791 | 35470 | | | | | | | | 73261 |
| Kustanay | Kustanay | 1274 | 10396 | 2486 | 1445 | | | | | | | 14327 |
| Atyrau | Atyrau | 8181 | 12730 | 11516 | | | 5 | | | | | 24251 |
| East Kaz. | Ust-Kamano | 17256 | 49500 | 20980 | | | | | 7918 | 378 | | 78776 |
| " | Zaysan | | 8 | | | | | | | | | 8 |
| South Kaz. | Shimkent | 1681 | 57015 | 15150 | | | | | | | | 72165 |
| Zhambul | Zhambul | 3 | 9386 | 24099 | | | | | | | | 33485 |
| Akmola | Akmola | | 22899 | 7872 | | | | | | | | 30771 |
| " | Stennogors | | 129 | 214 | | | | | | | 282 | 625 |
| Semipala. | Semipalati | 14 | 19619 | 5848 | | | | | | | | 25467 |
| " | Aktogai | | | | | | | | | | | |
| Kokchetau | Kokchetau | 3824 | 9713 | 195 | | | | | | | | 9908 |
| Pavloder | Pavloder | | 30982 | 18785 | 2135 | | | | | | | 51902 |
| " | Ekibastuz | | 8 | | | | | | | | | 8 |
| North Kaz. | Petropavlo | | 7640 | | | | | | | | | 7640 |
| Kzyl-Orda | Kzyl-Orda | | 9365 | 1825 | | | | | | | | 11190 |
| Zhezkazg. | Balkhash | | 198 | | | | | | | | | 198 |
| " | Zhezkazgan | | 12201 | 4800 | | | | | | | | 17001 |
| Turgai | Arkalyk | | 7715 | 127 | | | | | | | | 7842 |
| Mangistau | Aktau | | 39025 | 16117 | | | | | | | | 55142 |
| Total | Total | 55346 | 616189 | 342528 | 11195 | 658 | 1513 | 96 | 7918 | 378 | 425 | 980900 |

Data source: Kazakhstan Airline

## Appendix-3.3.4 (3) Number of Air Passengers Departed from each Airport and each Region in Kazakhstan

| Region | Airprt | Kaz-Air Statistics | | | Statistics of Committee of Statistics and Analysis | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Total | | International | | Inter-CIS | | | |
| | | | | | | | | | Departure | | Transit | |
| | | 1995yr Total | | | | | | | | | | |
| | | Domest. | Int'nl | Grand | 1994 | 1995 | 1994 | 1995 | 1994 | 1995 | 1994 | 1995 |
| Almaty | Almaty | 246146 | 181819 | 427965 | 906138 | 858808 | 215829 | 276364 | 250491 | 171872 | 2891 | 2934 |
| West Kaz. | Uralsk | 19230 | - | 19230 | 36907 | 29287 | 576 | 95 | 4157 | 3497 | 87 | 114 |
| Aktyubinsk | Aktyubinsk | 14509 | 5245 | 19754 | 44585 | 37672 | 1302 | 1810 | 8767 | 7356 | 82 | 73 |
| Karakanda | Karakanda | 37791 | 35470 | 73261 | 120047 | 112096 | 16655 | 30466 | 42375 | 38444 | 154 | 77 |
| Kustanay | Kustanay | 10396 | 3931 | 14327 | 55896 | 51194 | - | - | 29084 | 28932 | 29 | 23 |
| Atyrau | Atyrau | 12730 | 11521 | 24251 | 101218 | 84538 | - | 6649 | 29791 | 15446 | - | - |
| East Kaz. | Ust-Kamenc | 49500 | 29276 | 78776 | 119642 | 70917 | 167 | 303 | 30522 | 20737 | 214 | 41 |
| 〃 | Zaysan | - | - | - | - | - | - | - | - | - | - | - |
| South Kaz. | Shimkent | 57015 | 15150 | 72165 | 136084 | 90134 | 627 | 1989 | 37699 | 22740 | 4 | - |
| Zhambul | Zhambul | 9386 | 24099 | 33485 | 46941 | 26496 | - | - | 22617 | 14896 | 1 | 2 |
| Akmola | Akmola | 22999 | 7872 | 30771 | 74654 | 70988 | 24762 | 35005 | 6103 | 8454 | 56 | 1 |
| 〃 | Stennogorsk | 129 | 496 | 625 | - | - | - | - | - | - | - | - |
| Semipala. | Semipalati | 19619 | 5848 | 25467 | 57196 | 31621 | - | - | 7958 | 7542 | 29 | 17 |
| 〃 | Aktogai | - | - | - | - | - | - | - | - | - | - | - |
| Kokchetau | Kokchetau | 9713 | 195 | 9908 | 36808 | 26182 | 2863 | 3182 | 8356 | 4345 | 1 | 2 |
| Pavlodar | Pavlodar | 30982 | 20920 | 51902 | 95269 | 71813 | 269 | 1320 | 32431 | 27941 | 39 | 61 |
| 〃 | Ekibastuz | - | - | - | - | - | - | - | - | - | - | - |
| North Kaz. | Petropavlo | 7640 | - | 7640 | 18238 | 8288 | 322 | 400 | 216 | 121 | - | - |
| Kzyl-Orda | Kzyl-Orda | 9365 | 1825 | 11190 | 52800 | 41695 | 1204 | 815 | 10379 | 542 | - | - |
| Zhezkazgan | Balkhash | 198 | - | 198 | 21267 | 11592 | - | - | 3331 | 2526 | 4 | 20 |
| 〃 | Zhezkazgar | 12201 | 4800 | 17001 | 55071 | 44323 | - | 2182 | 14335 | 10685 | - | - |
| Turgai | Arkalyk | 7715 | 127 | 7842 | 19876 | 8943 | - | - | 1709 | 428 | - | - |
| Mangistau | Aktau | 39025 | 16117 | 55142 | 130992 | 129563 | 824 | 3345 | 46516 | 42675 | 270 | 69 |
| Total | Total | 616189 | 364711 | 980900 | 2127229 | 1805930 | 265400 | 363925 | 585837 | 429179 | 3841 | 3434 |

Appendix-3.1.3(2)

| Region | Airprt | Statistics of Committee of Statistics and Analysis | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Inter-Regional(State) | | | | Within Region | | Others | |
| | | Departure | | Transit | | | | | |
| | | 1994 | 1995 | 1994 | 1995 | 1994 | 1995 | 1994 | 1995 |
| Almaty | Almaty | 421691 | 369298 | 13599 | 36760 | - | - | 1637 | 1580 |
| West Kaz. | Uralsk | 21324 | 14822 | 1847 | 1959 | 186 | 7 | 8810 | 8793 |
| Aktyubinsk | Aktyubinsk | 29857 | 27839 | 274 | 364 | - | - | 4323 | 230 |
| Karakanda | Karakanda | 60348 | 42163 | 515 | 723 | - | - | - | 223 |
| Kustanay | Kustanay | 26524 | 22095 | 113 | 88 | - | - | 346 | 56 |
| Atyrau | Atyrau | 47294 | 40975 | - | - | - | - | 24133 | 21468 |
| East Kaz. | Ust-Kamenc | 62853 | 40809 | 1997 | 225 | 23938 | 7725 | 851 | 1137 |
| 〃 | Zaysan | - | - | - | - | - | - | - | - |
| South Kaz. | Shimkent | 97750 | 65405 | 4 | - | - | - | - | - |
| Zhambul | Zhambul | 23612 | 11218 | 35 | 27 | 469 | 353 | 207 | - |
| Akmola | Akmola | 40808 | 27418 | 525 | 30 | 2390 | - | 10 | - |
| 〃 | Stennogorsk | - | - | - | - | - | - | - | - |
| Semipala. | Semipalati | 38497 | 19858 | 321 | 155 | 10391 | 4049 | - | - |
| 〃 | Aktogai | - | - | - | - | - | - | - | - |
| Kokchetau | Kokchetau | 24733 | 18653 | 55 | - | - | - | - | - |
| Pavlodar | Pavlodar | 60525 | 40611 | 207 | 262 | - | - | 1798 | 1418 |
| 〃 | Ekibastuz | - | - | - | - | - | - | - | - |
| North Kaz. | Petropavlo | 17487 | 7416 | 6 | 2 | - | - | 207 | 349 |
| Kzyl-Orda | Kzyl-Orda | 28170 | 11785 | - | - | - | - | 21847 | 28553 |
| Zhezkazgan | Balkhash | 13461 | 5975 | 85 | 97 | 4386 | 2974 | - | - |
| 〃 | Zhezkazgar | 37347 | 27385 | - | - | 2108 | 1384 | 1281 | 2687 |
| Turgai | Arkalyk | 16628 | 8357 | - | - | - | - | 539 | 158 |
| Mangistau | Aktau | 71974 | 78817 | 269 | 498 | - | - | 11139 | 4959 |
| Total | Total | 1E+06 | 888099 | 18952 | 41190 | 43788 | 16492 | 76328 | 71611 |

Source: Committee of Statistics and Analysis and Kazakhstan Airline

## Appendix-3.3.4 (4) Rough Estimated Air Passenger Origin/Destination Flow (provided that No. of Arrival Passenger equals to that of Departure in International Passenger Flow)

| Region | Airprt | Almaty Almaty | W.Kaza Uralsk | Aktyub Aktyub | Karaka Karaka | Kustan Kustan | Atyrau Atyrau | E.Kaza Ust-Ka | E.Kaza Zaysan | S.Kaza Shimke | Zhambu Zhambu |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Almaty | Almaty | 0 | 1621 | 15349 | 47950 | 11941 | 31489 | 12775 | 1190 | 66731 | 15216 |
| West Kaz. | Uralsk | 0 | 9 | 11 | 0 | 0 | 0 | 18719 | 0 | 0 | 0 |
| Aktyubinsk | Aktyubinsk | 20839 | 121 | 0 | 1878 | 0 | 6 | 0 | 0 | 325 | 0 |
| Karakanda | Karakanda | 34740 | 0 | 972 | 0 | 0 | 916 | 2209 | 0 | 3989 | 25 |
| Kustanay | Kustanay | 17369 | 0 | 0 | 0 | 0 | 211 | 812 | 0 | 0 | 647 |
| Atyrau | Atyrau | 0 | 5091 | 255 | 4871 | 531 | 0 | 0 | 0 | 4215 | 0 |
| East Kaz. | Ust-Kamenogors | 8873 | 13508 | 0 | 1831 | 372 | 0 | 6689 | 1569 | 2199 | 0 |
| 〃 | Zaysan | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| South Kaz. | Shimkent | 48514 | 0 | 151 | 4076 | 0 | 1093 | 2492 | 0 | 0 | 0 |
| Zhambul | Zhambul | 10487 | 0 | 0 | 6 | 472 | 0 | 0 | 0 | 0 | 420 |
| Akmola | Akmola | 25854 | 0 | 304 | 0 | 0 | 507 | 193 | 0 | 580 | 0 |
| 〃 | Stennogorsk | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Semipala. | Semipalatink | 19852 | 0 | 0 | 30 | 0 | 0 | 0 | 0 | 0 | 0 |
| 〃 | Aktogai | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Kokchetau | Kokchetau | 11048 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 188 | 0 |
| Pavlodar | Pavlodar | 38140 | 0 | 478 | 0 | 0 | 0 | 234 | 0 | 2117 | 32 |
| 〃 | Ekibastuz | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| North Kaz. | Petropavlovsk | 5334 | 0 | 0 | 0 | 0 | 98 | 0 | 0 | 2312 | 0 |
| Kzyl-Orda | Kzyl-Orda | 32152 | 0 | 0 | 291 | 918 | 0 | 0 | 0 | 0 | 0 |
| Zhezkazgan | Balkhash | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 〃 | Zhezkazgan | 24178 | 0 | 92 | 0 | 0 | 555 | 0 | 0 | 7 | 458 |
| Turgai | Arkalyk | 6839 | 0 | 162 | 0 | 0 | 0 | 0 | 0 | 1586 | 0 |
| Mangistau | Aktau | 397 | 8094 | 4303 | 0 | 3238 | 17909 | 35338 | 0 | 3851 | 6 |
| Total | Domestic | 303816 | 28445 | 22076 | 60934 | 17464 | 52785 | 79462 | 2750 | 87941 | 16805 |
| Russia | | 258471 | 1693 | 6465 | 46276 | 10497 | 19966 | 6848 | 0 | 18212 | 4762 |
| East Asia | | 20429 | 398 | 302 | 2525 | 1883 | 1065 | 1611 | 0 | 720 | 1120 |
| Central Asia | | 20255 | 205 | 156 | 1301 | 2417 | 556 | 830 | 0 | 371 | 577 |
| China & Mongolia | | 30468 | 598 | 454 | 3792 | 2829 | 1608 | 2419 | 0 | 1082 | 1682 |
| Far East Asia | | 5513 | 108 | 82 | 686 | 512 | 290 | 438 | 0 | 196 | 304 |
| Western Asia | | 51907 | 1019 | 870 | 6460 | 4819 | 2726 | 4121 | 0 | 1843 | 2866 |
| Other Asia | | 4271 | 84 | 64 | 532 | 397 | 224 | 339 | 0 | 152 | 236 |
| West Europe | | 53002 | 1040 | 789 | 6596 | 4920 | 2784 | 4208 | 0 | 1881 | 2926 |
| North America | | 6505 | 128 | 97 | 810 | 604 | 342 | 516 | 0 | 231 | 359 |
| Australia & other America | | 1020 | 20 | 15 | 127 | 95 | 54 | 81 | 0 | 36 | 56 |
| Africa | | 121 | 2 | 2 | 15 | 11 | 6 | 10 | 0 | 4 | 7 |
| Others | | 38 | 1 | 1 | 5 | 4 | 2 | 3 | 0 | 1 | 2 |
| Total(Intern'l + CIS) | | 452002 | 5296 | 9296 | 69125 | 28987 | 29616 | 21424 | 0 | 24729 | 14898 |
| Grand Total(Dome.+Intn'l) | | 755818 | 33741 | 31371 | 130058 | 46450 | 82401 | 100886 | 2750 | 112670 | 31703 |

| Region | Airprt | Akmola Akmola | Akmola Stenno | Semipa Semipa | Semipa Aktoga | Kokche Kokche | Pavlod Pavlod | Pavlod Ekibas | N.Kaza Petrop | Kzyl-O Kzyl-O | Zhezka Balkha |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Almaty | Almaty | 34851 | 0 | 29228 | 0 | 8968 | 45244 | 5246 | 8564 | 12285 | 0 |
| West Kaz. | Uralsk | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Aktyubinsk | Aktyubinsk | 741 | 0 | 0 | 0 | 0 | 638 | 0 | 0 | 0 | 31 |
| Karakanda | Karakanda | 0 | 0 | 63 | 0 | 0 | 0 | 0 | 0 | 57 | 0 |
| Kustanay | Kustanay | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 446 | 0 |
| Atyrau | Atyrau | 2778 | 0 | 0 | 0 | 470 | 0 | 0 | 613 | 0 | 0 |
| East Kaz. | Ust-Kamenogors | 172 | 0 | 0 | 0 | 0 | 283 | 0 | 0 | 0 | 0 |
| 〃 | Zaysan | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| South Kaz. | Shimkent | 591 | 0 | 0 | 0 | 145 | 1996 | 0 | 2891 | 0 | 0 |
| Zhambul | Zhambul | 0 | 0 | 0 | 0 | 0 | 35 | 0 | 0 | 0 | 0 |
| Akmola | Akmola | 0 | 48 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 〃 | Stennogorsk | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Semipala. | Semipalatink | 0 | 0 | 4116 | 0 | 0 | 0 | 0 | 0 | 49 | 0 |
| 〃 | Aktogai | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Kokchetau | Kokchetau | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Pavlodar | Pavlodar | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 705 | 0 |
| 〃 | Ekibastuz | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| North Kaz. | Petropavlovsk | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Kzyl-Orda | Kzyl-Orda | 0 | 0 | 315 | 0 | 0 | 2831 | 0 | 0 | 0 | 0 |
| Zhezkazgan | Balkhash | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 8481 |
| 〃 | Zhezkazgan | 122 | 426 | 0 | 647 | 113 | 0 | 0 | 0 | 503 | 486 |
| Turgai | Arkalyk | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Mangistau | Aktau | 0 | 0 | 2 | 0 | 8508 | 0 | 0 | 0 | 0 | 0 |
| Total | Domestic | 39255 | 474 | 33725 | 647 | 18203 | 50947 | 5246 | 12068 | 13965 | 8918 |
| Russia | | 19248 | 0 | 6395 | 0 | 2539 | 21905 | 0 | 174 | 1376 | 814 |
| East Asia | | 2675 | 0 | 129 | 0 | 551 | 644 | 0 | 41 | 324 | 191 |
| Central Asia | | 1379 | 0 | 66 | 0 | 284 | 2510 | 0 | 21 | 167 | 99 |
| China & Mongolia | | 4018 | 0 | 193 | 0 | 828 | 968 | 0 | 61 | 486 | 287 |
| Far East Asia | | 727 | 0 | 35 | 0 | 150 | 175 | 0 | 11 | 88 | 52 |
| Western Asia | | 6846 | 0 | 329 | 0 | 1411 | 1649 | 0 | 105 | 828 | 490 |
| Other Asia | | 563 | 0 | 27 | 0 | 116 | 136 | 0 | 9 | 68 | 40 |
| West Europe | | 6990 | 0 | 336 | 0 | 1440 | 1684 | 0 | 107 | 846 | 500 |
| North America | | 858 | 0 | 41 | 0 | 177 | 207 | 0 | 13 | 104 | 61 |
| Australia & other America | | 135 | 0 | 6 | 0 | 28 | 32 | 0 | 2 | 16 | 10 |
| Africa | | 16 | 0 | 1 | 0 | 3 | 4 | 0 | 0 | 2 | 1 |
| Others | | 5 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 0 |
| Total(Intern'l + CIS) | | 43460 | 0 | 7559 | 0 | 7529 | 29914 | 0 | 544 | 4305 | 2546 |
| Grand Total(Dome.+Intn'l) | | 82715 | 474 | 41284 | 647 | 25732 | 80861 | 5246 | 12612 | 18271 | 11464 |

## Rough Estimated Air Passenger Origin/Destination Flow (provided that No. of Arrival Passenger equals to that of Departure in International Passenger Flow)

| Region | Airprt | Zhezkz Zhezkz | Turgai Arkaly | Mangis Aktau | Domesti Total | Russia | East Europe | Centra Asia | China Mongol | Far Ea Asia | Wester Asia |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Almaty | Almaty | 19913 | 10073 | 28251 | 406806 | 258471 | 20429 | 20255 | 30468 | 5513 | 51987 |
| West Kaz. | Uralsk | 0 | 0 | 5252 | 23991 | 1693 | 398 | 205 | 598 | 108 | 1819 |
| Aktyubinsk | Aktyubinsk | 0 | 262 | 3536 | 28376 | 6465 | 302 | 156 | 454 | 82 | 870 |
| Karakanda | Karakanda | 0 | 0 | 0 | 42971 | 46276 | 2525 | 1301 | 3792 | 686 | 6460 |
| Kustanay | Kustanay | 0 | 0 | 2721 | 22207 | 10497 | 1883 | 2417 | 2829 | 512 | 4819 |
| Atyrau | Atyrau | 802 | 0 | 35296 | 54922 | 19966 | 1065 | 556 | 1600 | 290 | 2726 |
| East Kaz. | Ust-Kamenogors | 0 | 0 | 14942 | 49553 | 6848 | 1611 | 830 | 2419 | 438 | 4121 |
| 〃 | Zaysan | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| South Kaz. | Shimkent | 13 | 1510 | 1928 | 65405 | 18212 | 720 | 371 | 1082 | 196 | 1843 |
| Zhambul | Zhambul | 175 | 0 | 4 | 11598 | 4762 | 1120 | 577 | 1682 | 304 | 2866 |
| Akmola | Akmola | 42 | 0 | 0 | 27448 | 19248 | 2675 | 1379 | 4018 | 727 | 6846 |
| 〃 | Stennogorsk | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Semipala. | Semipalatink | 0 | 0 | 14 | 24062 | 6395 | 129 | 66 | 193 | 35 | 329 |
| 〃 | Aktogai | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Kokchetau | Kokchetau | 73 | 0 | 7344 | 18653 | 2539 | 551 | 284 | 828 | 150 | 1411 |
| Pavlodar | Pavlodar | 0 | 0 | 0 | 41699 | 21905 | 644 | 2518 | 968 | 175 | 1649 |
| 〃 | Ekibastuz | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| North Kaz. | Petropavlovsk | 0 | 0 | 0 | 7744 | 174 | 41 | 21 | 61 | 11 | 185 |
| Kzyl-Orda | Kzyl-Orda | 882 | 0 | 0 | 37390 | 1376 | 324 | 167 | 486 | 88 | 828 |
| Zhezkazgan | Balkhash | 565 | 0 | 0 | 9046 | 814 | 191 | 99 | 287 | 52 | 490 |
| 〃 | Zhezkazgan | 3120 | 0 | 0 | 30626 | 7855 | 646 | 333 | 970 | 175 | 1652 |
| Turgai | Arkalyk | 0 | 0 | 0 | 8507 | 227 | 23 | 12 | 35 | 6 | 59 |
| Mangistau | Aktau | 0 | 0 | 0 | 81640 | 26721 | 2343 | 1208 | 3519 | 637 | 5995 |
| Total | Domestic | 25586 | 11845 | 99289 | 992645 | 460444 | 37621 | 32747 | 56289 | 10186 | 95993 |
| Russia | | 7855 | 227 | 26721 | 460444 | - | - | - | - | - | - |
| East Asia | | 646 | 23 | 2343 | 37621 | - | - | - | - | - | - |
| Central Asia | | 333 | 12 | 1208 | 32747 | - | - | - | - | - | - |
| China & Mongolia | | 970 | 35 | 3519 | 56289 | - | - | - | - | - | - |
| Far East Asia | | 175 | 6 | 637 | 10186 | - | - | - | - | - | - |
| Western Asia | | 1652 | 59 | 5995 | 95993 | - | - | - | - | - | - |
| Other Asia | | 136 | 5 | 493 | 7891 | - | - | - | - | - | - |
| West Europe | | 1687 | 60 | 6121 | 97918 | - | - | - | - | - | - |
| North America | | 207 | 7 | 751 | 12017 | - | - | - | - | - | - |
| Australia & other America | | 32 | 1 | 118 | 1885 | - | - | - | - | - | - |
| Africa | | 4 | 0 | 14 | 224 | - | - | - | - | - | - |
| Others | | 1 | 0 | 4 | 70 | - | - | - | - | - | - |
| Total(Intern'l + CIS) | | 13697 | 436 | 47923 | 813285 | - | - | - | - | - | - |
| Grand Total(Dome.+Intn'l) | | 39283 | 12281 | 147212 | 1805930 | - | - | - | - | - | - |

| Region | Airprt | Other Asia | Wester Europe | North Americ | Austra S.Amer | Africa ica | Others | Intern' Inte-Cl | Grand Total |
|---|---|---|---|---|---|---|---|---|---|
| Almaty | Almaty | 4271 | 53002 | 6505 | 1020 | 121 | 38 | 452002 | 858808 |
| West Kaz. | Uralsk | 84 | 1040 | 128 | 20 | 2 | 1 | 5296 | 29287 |
| Aktyubinsk | Aktyubinsk | 64 | 789 | 97 | 15 | 2 | 1 | 9296 | 37672 |
| Karakanda | Karakanda | 532 | 6596 | 810 | 127 | 15 | 5 | 69125 | 112096 |
| Kustanay | Kustanay | 397 | 4920 | 604 | 95 | 11 | 4 | 28987 | 51194 |
| Atyrau | Atyrau | 224 | 2784 | 342 | 54 | 6 | 2 | 29616 | 84538 |
| East Kaz. | Ust-Kamenogors | 339 | 4208 | 516 | 81 | 10 | 3 | 21424 | 70977 |
| 〃 | Zaysan | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| South Kaz. | Shimkent | 152 | 1881 | 231 | 36 | 4 | 1 | 24729 | 90134 |
| Zhambul | Zhambul | 236 | 2926 | 359 | 56 | 7 | 2 | 14898 | 26496 |
| Akmola | Akmola | 563 | 6990 | 858 | 135 | 18 | 5 | 43460 | 70988 |
| 〃 | Stennogorsk | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Semipala. | Semipalatink | 27 | 336 | 41 | 6 | 1 | 0 | 7559 | 31621 |
| 〃 | Aktogai | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Kokchetau | Kokchetau | 116 | 1440 | 177 | 28 | 3 | 1 | 7529 | 26182 |
| Pavlodar | Pavlodar | 136 | 1684 | 207 | 32 | 4 | 1 | 29914 | 71613 |
| 〃 | Ekibastuz | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| North Kaz. | Petropavlovsk | 9 | 107 | 13 | 2 | 0 | 0 | 544 | 8288 |
| Kzyl-Orda | Kzyl-Orda | 68 | 846 | 104 | 16 | 2 | 1 | 4305 | 41695 |
| Zhezkazgan | Balkhash | 40 | 500 | 61 | 10 | 1 | 0 | 2546 | 11592 |
| 〃 | Zhezkazgan | 136 | 1687 | 207 | 32 | 4 | 1 | 13697 | 44323 |
| Turgai | Arkalyk | 5 | 60 | 7 | 1 | 0 | 0 | 436 | 8943 |
| Mangistau | Aktau | 493 | 6121 | 751 | 118 | 14 | 4 | 47923 | 129563 |
| Total | Domestic | 7891 | 97918 | 12017 | 1885 | 224 | 70 | 813285 | 1805930 |
| Russia | | - | - | - | - | - | - | - | 460444 |
| East Asia | | - | - | - | - | - | - | - | 37621 |
| Central Asia | | - | - | - | - | - | - | - | 32747 |
| China & Mongolia | | - | - | - | - | - | - | - | 56289 |
| Far East Asia | | - | - | - | - | - | - | - | 10186 |
| Western Asia | | - | - | - | - | - | - | - | 95993 |
| Other Asia | | - | - | - | - | - | - | - | 7891 |
| West Europe | | - | - | - | - | - | - | - | 97918 |
| North America | | - | - | - | - | - | - | - | 12017 |
| Australia & other America | | - | - | - | - | - | - | - | 1885 |
| Africa | | - | - | - | - | - | - | - | 224 |
| Others | | - | - | - | - | - | - | - | 70 |
| Total(Intern'l + CIS) | | - | - | - | - | - | - | - | 813285 |
| Grand Total(Dome.+Intn'l) | | - | - | - | - | - | - | - | 2619215 |

## Appendix-3.3.4 (5) Population of City and Village by Region in Kazakhstan and Urban Population of Nearby Countries

| State | 1993 | | 1994 | | 1995 | |
|---|---|---|---|---|---|---|
| | City | Village | City | Village | City | Village |
| Akmola | 536.5 | 343.5 | 526.8 | 343.6 | 503.5 | 342.2 |
| Aktyubinsk | 410.4 | 348.0 | 409.3 | 350.9 | 403.3 | 349.5 |
| Almaty | 221.7 | 739.7 | 221.3 | 741.6 | 213.8 | 749.8 |
| Atyrau | 276.6 | 177.3 | 272.3 | 185.4 | 272.4 | 187.2 |
| East Kazakhstan | 624.2 | 343.0 | 614.4 | 346.6 | 597.1 | 342.4 |
| Zhambul | 589.8 | 547.1 | 581.4 | 551.2 | 483.5 | 556.1 |
| Zhezkazgan | 391.1 | 103.8 | 389.9 | 103.5 | 383.3 | 101.1 |
| West Kazakhstan | 274.5 | 394.8 | 277.1 | 397.2 | 274.0 | 395.8 |
| Karaganda | 1,127.5 | 199.2 | 1,107.4 | 198.1 | 1,077.3 | 192.8 |
| Kzyl-Orda | 362.2 | 236.2 | 365.2 | 241.1 | 363.0 | 243.1 |
| Kokchetau | 266.4 | 410.0 | 264.6 | 410.3 | 258.4 | 398.6 |
| Kustanay | 574.3 | 514.4 | 568.7 | 513.8 | 555.5 | 499.8 |
| Mangistau | 309.7 | 36.7 | 272.8 | 65.7 | 258.2 | 66.2 |
| Pavlodar | 623.2 | 349.9 | 586.4 | 379.5 | 577.9 | 365.7 |
| North Kazakhstan | 294.2 | 327.6 | 291.6 | 329.0 | 282.7 | 318.2 |
| Semipalatinsk | 432.7 | 411.5 | 428.1 | 411.1 | 407.3 | 403.7 |
| Taldykorgan | 327.4 | 414.0 | 322.8 | 415.1 | 310.8 | 410.7 |
| Turgai | 107.5 | 205.8 | 100.7 | 212.5 | 98.8 | 207.9 |
| South Kazakhstan | 776.1 | 1,165.2 | 776.2 | 1,193.0 | 773.4 | 1,214.4 |
| Almaty City | 1,197.9 | - | 1,185.4 | - | 1,172.4 | - |
| Leninsk City | 74.1 | - | 71.6 | - | 66.8 | 1.8 |
| Republic of Kazakhstan | 9,718.8 | 7,267.7 | 9,553.2 | 7,389.2 | 9,332.6 | 7,346.5 |
| Component ratio of city & village | 57.21 | 42.79 | 56.39 | 43.61 | 55.95 | 44.05 |

Note: Based on the data of the Committee of Statistics and Analysis.

Urban Population of Nearby Countries of Kazakhstan

| Region and Name of Country | 1990 Population (1000) | Urban (%) | Urban (1000) |
|---|---|---|---|
| Russia | 148263 | 66.1 | 98001.8 |
| Eastern Europe | 146746 | 64.0 | 93939.4 |
| Austria | 7712 | 58.4 | |
| Belarus | 10278 | - | |
| Bulgaria | 9011 | 96.3 | |
| Chechoslovakia | 15662 | 77.1 | |
| Estonia | 1571 | 71.8 | |
| Hungary | 10553 | 64.3 | |
| Latvia | 2683 | 71.2 | |
| Lithania | 3722 | 68.8 | |
| Luxemburg * | 365 | 84.5 | |
| Poland | 38180 | 61.8 | |
| Romania | 23200 | 53.7 | |
| Yugoslavia | 23889 | 56.1 | |
| Central Asia | 18678 | 56.0 | 10445.9 |
| Uzbekistan | 5303 | 56.0 | |
| Kyrgistan | 4394 | 56.0 | |
| Tajikistan | 5303 | 56.0 | |
| Turkmenistan | 3678 | 56.0 | |
| China | 1139060 | 19.6 | 223255.8 |
| Xinjang Uygur Zhzhiqu ** | | | 600.0 |
| Mongolia | 2190 | 57.9 | 1268.0 |

Source: United Nations "Statististical Yearbook", Vol. 38, 1993

* :1985 Census

**: Urban polation is assumed for this study.

Note: % of urban population for Russia is applied with that for former USSR. For Cetral Asian countries the same percenage(%) as that of Kazakhstan is applied.

## Appendix-3.3.4 (6) Estimated Road Transport Distance (km) and Regional Indicators

| Region | 1995 City Populat. (1000) | Almaty | W.Kaza | Aktyub | Karaka | Kustan | Atyrau | E.Kaza | S.Kaza | Zhambu | Akmola | Semipa |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1386 | 274 | 403 | 1077 | 556 | 272 | 597 | 773 | 484 | 504 | 407 |
| Almaty | 1386 | 111 | 2697 | 2223 | 1015 | 1847 | 2621 | 947 | 684 | 512 | 1234 | 1110 |
| West Kaz. | 274 | 2697 | 133 | 474 | 2139 | 1224 | 506 | 3035 | 2014 | 2185 | 1920 | 2758 |
| Aktyubinsk | 403 | 2223 | 474 | 187 | 1665 | 750 | 594 | 2926 | 1539 | 1710 | 1446 | 2283 |
| Karakanda | 1077 | 1015 | 2139 | 1665 | 116 | 1132 | 2428 | 896 | 1379 | 1103 | 219 | 618 |
| Kustanay | 556 | 1847 | 1224 | 750 | 1132 | 115 | 1344 | 1824 | 1601 | 1335 | 671 | 1750 |
| Atyrau | 272 | 2621 | 506 | 594 | 2428 | 1344 | 118 | 3324 | 1937 | 2109 | 2040 | 3046 |
| East Kaz. | 597 | 947 | 3035 | 2926 | 896 | 1824 | 3324 | 107 | 1631 | 1460 | 1106 | 278 |
| South Kaz. | 773 | 684 | 2014 | 1539 | 1379 | 1601 | 1937 | 1631 | 117 | 171 | 1493 | 1794 |
| Zhambul | 484 | 512 | 2185 | 1710 | 1103 | 1335 | 2109 | 1460 | 171 | 130 | 1322 | 1622 |
| Akmola | 504 | 1234 | 1920 | 1446 | 219 | 671 | 2040 | 1106 | 1493 | 1322 | 104 | 828 |
| Semipala. | 407 | 1110 | 2758 | 2283 | 618 | 1750 | 3046 | 278 | 1794 | 1622 | 828 | 147 |
| Kokchetau | 258 | 1532 | 1627 | 1153 | 517 | 403 | 1747 | 1413 | 1896 | 1620 | 298 | 1135 |
| Pavlodar | 645 | 1434 | 2430 | 1956 | 419 | 1181 | 2550 | 596 | 1798 | 1522 | 510 | 318 |
| North Kaz. | 283 | 1707 | 1663 | 1188 | 692 | 438 | 1782 | 1588 | 1821 | 1795 | 473 | 1310 |
| Kzyl-Orda | 363 | 1128 | 1569 | 1095 | 935 | 1157 | 1493 | 1831 | 444 | 615 | 1154 | 1553 |
| Zhezkazgan | 383 | 1541 | 1984 | 1509 | 521 | 743 | 1907 | 1417 | 858 | 1029 | 740 | 1139 |
| Turgai | 98 | 1847 | 1332 | 857 | 521 | 437 | 1451 | 2244 | 1164 | 1335 | 665 | 1139 |
| Mangistau | 258 | 3128 | 1299 | 1110 | 2935 | 1860 | 830 | 3831 | 2444 | 2616 | 2686 | 3393 |
| Taldykorgan | 311 | 246 | 2944 | 2469 | 1199 | 2331 | 2867 | 816 | 930 | 758 | 1480 | 864 |

| Region | 1995 City Populat. (1000) | Kokche | Pavlod | N.Kaza | Kzyl-O | Zhezka | Turgai | Mangis | T.Korg | Russia | E.Asia | C.Asia |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 258 | 645 | 283 | 363 | 383 | 98 | 258 | 311 | 98002 | 93939 | 10446 |
| Almaty | 1386 | 1532 | 1434 | 1707 | 1128 | 1541 | 1847 | 3128 | 246 | 3907 | 4627 | 1114 |
| West Kaz. | 274 | 1627 | 2430 | 1663 | 1569 | 1984 | 1332 | 1299 | 2944 | 1200 | 1920 | 2444 |
| Aktyubinsk | 403 | 1153 | 1956 | 1188 | 1095 | 1509 | 857 | 1110 | 2469 | 1800 | 1920 | 1969 |
| Karakanda | 1077 | 517 | 419 | 692 | 935 | 521 | 521 | 2935 | 1199 | 2892 | 3612 | 1809 |
| Kustanay | 556 | 403 | 1181 | 438 | 1157 | 743 | 437 | 1860 | 2331 | 2000 | 2720 | 2031 |
| Atyrau | 272 | 1747 | 2550 | 1782 | 1493 | 1907 | 1451 | 830 | 2867 | 2394 | 3114 | 2367 |
| East Kaz. | 597 | 1413 | 596 | 1588 | 1831 | 1417 | 2244 | 3831 | 816 | 3788 | 4508 | 2061 |
| South Kaz. | 773 | 1896 | 1798 | 1821 | 444 | 858 | 1164 | 2444 | 930 | 3339 | 4059 | 490 |
| Zhambul | 484 | 1620 | 1522 | 1795 | 615 | 1029 | 1335 | 2616 | 758 | 3510 | 4230 | 601 |
| Akmola | 504 | 298 | 510 | 473 | 1154 | 740 | 665 | 2686 | 1480 | 2673 | 3393 | 1923 |
| Semipala. | 407 | 1135 | 318 | 1310 | 1553 | 1139 | 1139 | 3393 | 864 | 3510 | 4230 | 2224 |
| Kokchetau | 258 | 96 | 808 | 175 | 1452 | 1038 | 403 | 2263 | 1891 | 2375 | 3095 | 2326 |
| Pavlodar | 645 | 808 | 121 | 668 | 1354 | 940 | 1129 | 3066 | 1182 | 2868 | 3588 | 2228 |
| North Kaz. | 283 | 175 | 668 | 72 | 1377 | 963 | 657 | 2298 | 1991 | 2200 | 2920 | 2251 |
| Kzyl-Orda | 363 | 1452 | 1354 | 1377 | 162 | 414 | 720 | 2000 | 1374 | 2895 | 3615 | 874 |
| Zhezkazgan | 383 | 1038 | 940 | 963 | 414 | 191 | 306 | 2414 | 1787 | 2743 | 3463 | 1288 |
| Turgai | 98 | 403 | 1129 | 657 | 720 | 306 | 114 | 2629 | 2093 | 2437 | 3157 | 1594 |
| Mangistau | 258 | 2263 | 3066 | 2298 | 2000 | 2414 | 2629 | 139 | 3374 | 2910 | 3630 | 2874 |
| Taldykorgan | 311 | 1891 | 1182 | 1891 | 1374 | 1787 | 2093 | 3374 | 118 | 4091 | 4811 | 1360 |

| Region | 1995 City Populat. (1000) | Xinjau | Mongol | Territory Th.sq.km |
|---|---|---|---|---|
| | | 600 | 1268 | |
| Almaty | 1386 | 1128 | 3228 | 105.7 |
| West Kaz. | 274 | 3825 | 5925 | 151.3 |
| Aktyubinsk | 403 | 3351 | 5451 | 300.6 |
| Karakanda | 1077 | 1460 | 3560 | 115.4 |
| Kustanay | 556 | 2592 | 4692 | 113.9 |
| Atyrau | 272 | 3749 | 5849 | 118.6 |
| East Kaz. | 597 | 1466 | 3566 | 97.5 |
| South Kaz. | 773 | 1112 | 3212 | 117.3 |
| Zhambul | 484 | 1640 | 3740 | 144.3 |
| Akmola | 504 | 1679 | 3779 | 92.0 |
| Semipala. | 407 | 1188 | 3288 | 185.8 |
| Kokchetau | 258 | 1977 | 4077 | 78.2 |
| Pavlodar | 645 | 1506 | 3606 | 124.8 |
| North Kaz. | 283 | 2152 | 4252 | 45.0 |
| Kzyl-Orda | 363 | 2256 | 4356 | 226.0 |
| Zhezkazgan | 383 | 1981 | 4081 | 312.6 |
| Turgai | 98 | 1981 | 4081 | 111.8 |
| Mangistau | 258 | 4256 | 6356 | 165.6 |
| Taldykorgan | 311 | 888 | 2988 | 118.5 |

Note: Route-km(RTKM) in within zone(region) is obtained applying following formula:
RTKM = a*SQRT(Sq.km/3.1416), a:parameter.

## Appendix-3.3.4 (7) Estimated Railway Transport Distance (km) and Regional Indicators

| Region | 1995 City Populat. (1000) | Almaty | W.Kaza | Aktyub | Karaka | Kustan | Atyrau | E.Kaza | S.Kaza | Zhambu | Akmola | Semipa |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 0 | 1386 | 274 | 403 | 1077 | 556 | 272 | 597 | 773 | 484 | 504 | 407 |
| Almaty | 1386 | 111 | 2581 | 2107 | 1020 | 1895 | 2531 | 1240 | 679 | 508 | 1245 | 945 |
| West Kaz. | 274 | 2581 | 133 | 474 | 2074 | 1153 | 1068 | 2914 | 1902 | 2073 | 1849 | 2819 |
| Aktyubinsk | 403 | 2107 | 474 | 187 | 1600 | 679 | 594 | 2440 | 1428 | 1599 | 1375 | 2345 |
| Karakanda | 1077 | 1020 | 2074 | 1600 | 116 | 933 | 2024 | 1280 | 1009 | 838 | 225 | 1195 |
| Kustanay | 556 | 1895 | 1153 | 679 | 933 | 115 | 1103 | 1720 | 1937 | 2108 | 708 | 1678 |
| Atyrau | 272 | 2531 | 1068 | 594 | 2024 | 1103 | 118 | 2823 | 1852 | 2023 | 1799 | 2769 |
| East Kaz. | 597 | 1240 | 2914 | 2440 | 1280 | 1720 | 2823 | 107 | 1919 | 1748 | 1055 | 295 |
| South Kaz. | 773 | 679 | 1902 | 1428 | 1009 | 1937 | 1852 | 1919 | 117 | 171 | 1234 | 1624 |
| Zhambul | 484 | 508 | 2073 | 1599 | 838 | 2108 | 2023 | 1748 | 171 | 130 | 1063 | 1453 |
| Akmola | 504 | 1245 | 1849 | 1375 | 225 | 708 | 1799 | 1055 | 1234 | 1063 | 104 | 978 |
| Semipala. | 407 | 945 | 2819 | 2345 | 1195 | 1678 | 2769 | 295 | 1624 | 1453 | 970 | 147 |
| Kokchetav | 258 | 1543 | 1709 | 1235 | 523 | 410 | 1659 | 1353 | 1532 | 1361 | 298 | 1268 |
| Pavlodar | 645 | 1755 | 2359 | 1885 | 735 | 920 | 2309 | 545 | 1744 | 1573 | 510 | 545 |
| North Kaz. | 283 | 1718 | 1884 | 1410 | 698 | 585 | 1834 | 1528 | 1707 | 1536 | 473 | 1443 |
| Kzyl-Orda | 363 | 1389 | 1192 | 984 | 1453 | 1227 | 1142 | 2068 | 2462 | 881 | 1678 | 2334 |
| Zhezkazgan | 383 | 1281 | 2595 | 2121 | 521 | 1454 | 2545 | 1801 | 1530 | 1359 | 746 | 1716 |
| Turgai | 98 | 1879 | 1679 | 1205 | 863 | 579 | 1629 | 1693 | 1872 | 1701 | 1454 | 2424 |
| Mangistau | 258 | 3073 | 1610 | 1136 | 2566 | 1645 | 798 | 3406 | 2393 | 2565 | 2341 | 3311 |
| Taldykorgan | 311 | 347 | 2928 | 2454 | 1367 | 2242 | 2878 | 1075 | 1026 | 855 | 1592 | 780 |

| Region | 1995 City Populat. (1000) | Kokcha | Pavlod | N.Kaza | Kzyl-O | Zhezka | Turgai | Mangis | T.Korg | Russia | E.Asia | C.Asia |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 0 | 258 | 645 | 283 | 363 | 383 | 98 | 258 | 311 | 98002 | 93939 | 10446 |
| Almaty | 1386 | 1543 | 1755 | 1718 | 1389 | 1281 | 1879 | 3073 | 347 | 3918 | 4638 | 1129 |
| West Kaz. | 274 | 1709 | 2359 | 1884 | 1192 | 2595 | 1679 | 1610 | 2928 | 1200 | 1920 | 2352 |
| Aktyubinsk | 403 | 1235 | 1885 | 1410 | 984 | 2121 | 1205 | 1136 | 2454 | 1808 | 1920 | 1878 |
| Karakanda | 1077 | 523 | 735 | 698 | 1453 | 521 | 863 | 2566 | 1367 | 2898 | 3618 | 1459 |
| Kustanay | 556 | 410 | 920 | 585 | 1227 | 1454 | 579 | 1645 | 2242 | 2000 | 2720 | 2387 |
| Atyrau | 272 | 1659 | 2309 | 1834 | 1142 | 2545 | 1629 | 798 | 2878 | 2394 | 3114 | 2302 |
| East Kaz. | 597 | 1353 | 545 | 1528 | 2068 | 1801 | 1693 | 3406 | 1075 | 3728 | 4448 | 2369 |
| South Kaz. | 773 | 1532 | 1744 | 1707 | 2462 | 1530 | 1872 | 2393 | 1026 | 3228 | 3948 | 450 |
| Zhambul | 484 | 1361 | 1573 | 1536 | 881 | 1359 | 1701 | 2565 | 855 | 3399 | 4119 | 621 |
| Akmola | 504 | 298 | 510 | 473 | 1678 | 746 | 1454 | 2341 | 1592 | 2673 | 3393 | 1684 |
| Semipala. | 407 | 1268 | 545 | 1443 | 2334 | 1716 | 2424 | 3311 | 780 | 3643 | 4363 | 2074 |
| Kokchetav | 258 | 96 | 808 | 175 | 1783 | 1044 | 1752 | 2201 | 1890 | 2375 | 3095 | 1982 |
| Pavlodar | 645 | 808 | 121 | 983 | 2188 | 1256 | 1964 | 2851 | 1590 | 3183 | 3903 | 2194 |
| North Kaz. | 283 | 175 | 983 | 72 | 2151 | 1219 | 1927 | 2376 | 2063 | 2200 | 2920 | 2157 |
| Kzyl-Orda | 363 | 1783 | 2188 | 2151 | 162 | 1974 | 1753 | 1684 | 1736 | 2784 | 3238 | 2912 |
| Zhezkazgan | 383 | 1044 | 1256 | 1219 | 1974 | 191 | 2200 | 3087 | 1628 | 3454 | 4174 | 1980 |
| Turgai | 98 | 1752 | 1964 | 1927 | 1753 | 2200 | 114 | 2171 | 2226 | 2579 | 3299 | 2322 |
| Mangistau | 258 | 2201 | 2851 | 2376 | 1684 | 3087 | 2171 | 139 | 3420 | 2936 | 3656 | 2843 |
| Taldykorgan | 311 | 1890 | 1590 | 2063 | 1736 | 1628 | 2226 | 3420 | 118 | 4263 | 4983 | 1476 |

| Region | 1995 City Populat. (1000) | Xinjau | Mongol | Territory Sq.km |
|---|---|---|---|---|
| | 0 | 600 | 1268 | |
| Almaty | 1386 | 1250 | 0 | 105.7 |
| West Kaz. | 274 | 1128 | 0 | 151.3 |
| Aktyubinsk | 403 | 3357 | 0 | 300.6 |
| Karakanda | 1077 | 1590 | 0 | 115.4 |
| Kustanay | 556 | 2523 | 0 | 113.9 |
| Atyrau | 272 | 3781 | 0 | 118.6 |
| East Kaz. | 597 | 1455 | 0 | 97.5 |
| South Kaz. | 773 | 1929 | 0 | 117.3 |
| Zhambul | 484 | 1798 | 0 | 144.3 |
| Akmola | 504 | 1815 | 0 | 92.0 |
| Semipala. | 407 | 1160 | 0 | 185.8 |
| Kokchetav | 258 | 2113 | 0 | 78.2 |
| Pavlodar | 645 | 1705 | 0 | 124.8 |
| North Kaz. | 283 | 2288 | 0 | 45.8 |
| Kzyl-Orda | 363 | 2639 | 0 | 226.0 |
| Zhezkazgan | 383 | 2111 | 0 | 312.6 |
| Turgai | 98 | 2453 | 0 | 111.8 |
| Mangistau | 258 | 4323 | 0 | 165.6 |
| Taldykorgan | 311 | 1050 | 0 | 118.5 |

Note: Route-km(RTKM) in within zone(region) is obtained applying following formula:
RTKM = a*SQRT(Sq.km/3.1416), a:parameter.

## Appendix-3.3.4 (8) Estimated Air Transport Distance (km) and Regional Indicators

| Region | City Pop. | Almaty | W.Kaza | Aktyub | Karaka | Kustan | Atyrau | E.Kaza | S.Kaza | Zhambu | Akmola | Semipa |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Almaty | 1386 | 110 | 2210 | 1790 | 760 | 1550 | 2280 | 880 | 670 | 590 | 960 | 860 |
| West Kaz. | 274 | 2210 | 132 | 410 | 110 | 960 | 450 | 2150 | 1670 | 1740 | 1370 | 1970 |
| Aktyubinsk | 403 | 1790 | 410 | 186 | 1230 | 550 | 610 | 1770 | 1300 | 1330 | 1040 | 1600 |
| Karakanda | 1077 | 760 | 110 | 1230 | 115 | 790 | 1840 | 1100 | 1110 | 930 | 200 | 510 |
| Kustanay | 556 | 1550 | 960 | 550 | 790 | 114 | 1160 | 1480 | 1310 | 1260 | 560 | 1160 |
| Atyrau | 272 | 2200 | 450 | 610 | 1840 | 1160 | 117 | 2680 | 1500 | 1580 | 1450 | 2060 |
| East Kaz. | 597 | 880 | 2150 | 1770 | 1100 | 1480 | 2680 | 106 | 1300 | 1150 | 790 | 420 |
| South Kaz. | 773 | 670 | 1670 | 1380 | 1110 | 1310 | 1500 | 1300 | 116 | 220 | 1090 | 1200 |
| Zhambul | 484 | 590 | 1740 | 1330 | 930 | 1260 | 1580 | 1150 | 220 | 129 | 900 | 1060 |
| Akmola | 504 | 960 | 1370 | 1040 | 200 | 560 | 1450 | 790 | 1090 | 900 | 103 | 610 |
| Semipala. | 407 | 860 | 1970 | 1600 | 510 | 1160 | 2060 | 420 | 1200 | 1060 | 610 | 146 |
| Kokchetau | 258 | 1250 | 1370 | 960 | 450 | 370 | 1380 | 1070 | 1210 | 1140 | 260 | 1150 |
| Pavlodar | 645 | 1060 | 1720 | 1470 | 380 | 880 | 1840 | 470 | 1440 | 1100 | 410 | 310 |
| North Kaz. | 283 | 1250 | 1220 | 970 | 610 | 400 | 1450 | 1030 | 1370 | 1310 | 430 | 1120 |
| Kzyl-Orda | 363 | 940 | 1250 | 850 | 790 | 910 | 1260 | 1270 | 420 | 510 | 820 | 1130 |
| Zhezkazgan | 383 | 1000 | 1210 | 840 | 460 | 660 | 1170 | 1100 | 630 | 610 | 460 | 945 |
| Turgai | 98 | 1330 | 1070 | 720 | 500 | 390 | 1130 | 1100 | 960 | 870 | 440 | 930 |
| Mangistau | 258 | 2180 | 820 | 880 | 1790 | 1430 | 370 | 2430 | 1650 | 1630 | 1700 | 2180 |
| Taldykorgan | 311 | 290 | 2330 | 1660 | 658 | 1380 | 2030 | 630 | 770 | 610 | 840 | 610 |

| Region | City Pop. | Kokche | Pavlod | N.Kaza | Kzyl-O | Zhezka | Turgai | Mangis | T.Korg | Russia | E. Asi | C.Asia |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Almaty | 1386 | 1250 | 1060 | 1250 | 940 | 1000 | 1330 | 2180 | 290 | 3270 | 3790 | 880 |
| West Kaz. | 274 | 1370 | 1720 | 1220 | 1250 | 1210 | 1070 | 820 | 2330 | 1070 | 1750 | 1880 |
| Aktyubinsk | 403 | 960 | 1470 | 970 | 850 | 840 | 720 | 880 | 1660 | 1490 | 2140 | 1480 |
| Karakanda | 1077 | 450 | 380 | 610 | 790 | 460 | 500 | 1790 | 658 | 2500 | 3040 | 1300 |
| Kustanay | 556 | 370 | 880 | 480 | 910 | 660 | 390 | 1430 | 1380 | 1790 | 2280 | 1600 |
| Atyrau | 272 | 1380 | 1840 | 1450 | 1260 | 1170 | 1130 | 370 | 2030 | 1520 | 2200 | 1560 |
| East Kaz. | 597 | 1070 | 470 | 1030 | 1270 | 1100 | 1100 | 2430 | 630 | 3110 | 3610 | 1770 |
| South Kaz. | 773 | 1210 | 1440 | 1370 | 420 | 630 | 960 | 1650 | 770 | 2840 | 3360 | 390 |
| Zhambul | 484 | 1140 | 1100 | 1310 | 510 | 610 | 870 | 1630 | 610 | 2960 | 3480 | 540 |
| Akmola | 504 | 260 | 410 | 430 | 820 | 460 | 440 | 1700 | 840 | 2310 | 2880 | 1370 |
| Semipala. | 407 | 1150 | 310 | 1120 | 1130 | 945 | 930 | 2180 | 610 | 3170 | 3470 | 1620 |
| Kokchetau | 258 | 95 | 510 | 190 | 960 | 610 | 370 | 2190 | 1110 | 2120 | 2620 | 1670 |
| Pavlodar | 645 | 510 | 120 | 610 | 1160 | 870 | 720 | 2090 | 810 | 2620 | 3110 | 1650 |
| North Kaz. | 283 | 190 | 610 | 72 | 1220 | 780 | 530 | 1770 | 1260 | 2810 | 2500 | 1770 |
| Kzyl-Orda | 363 | 960 | 1160 | 1220 | 161 | 360 | 890 | 1240 | 1000 | 2320 | 3070 | 620 |
| Zhezkazgan | 383 | 610 | 870 | 780 | 360 | 189 | 330 | 1340 | 870 | 2320 | 2870 | 948 |
| Turgai | 98 | 370 | 720 | 530 | 890 | 330 | 113 | 1380 | 1020 | 2180 | 2540 | 1200 |
| Mangistau | 258 | 2190 | 2090 | 1770 | 1240 | 1340 | 1380 | 138 | 2320 | 1860 | 2330 | 1540 |
| Taldykorgan | 311 | 1110 | 810 | 1260 | 1000 | 870 | 1020 | 2320 | 117 | 3300 | 3760 | 1150 |

| Region | City Pop. | Urumqi | Mongol | Territory |
|---|---|---|---|---|
| Almaty | 1386 | 930 | 2450 | 105.7 |
| West Kaz. | 274 | 2900 | 3950 | 151.3 |
| Aktyubinsk | 403 | 2470 | 3610 | 300.6 |
| Karakanda | 1077 | 1370 | 2510 | 115.4 |
| Kustanay | 556 | 2140 | 3110 | 113.9 |
| Atyrau | 272 | 2840 | 4090 | 118.6 |
| East Kaz. | 597 | 800 | 3040 | 97.5 |
| South Kaz. | 773 | 1530 | 1830 | 117.3 |
| Zhambul | 484 | 1370 | 2870 | 144.3 |
| Akmola | 504 | 1530 | 2590 | 92.0 |
| Semipala. | 407 | 960 | 1990 | 185.8 |
| Kokchetau | 258 | 1770 | 2700 | 78.2 |
| Pavlodar | 645 | 1300 | 2210 | 124.8 |
| North Kaz. | 283 | 1900 | 2730 | 45.0 |
| Kzyl-Orda | 363 | 1820 | 3210 | 226.0 |
| Zhezkazgan | 383 | 1700 | 2960 | 312.6 |
| Turgai | 98 | 2000 | 3160 | 111.8 |
| Mangistau | 258 | 3000 | 4300 | 165.6 |
| Taldykorgan | 311 | 770 | 2250 | 118.5 |

Note: Route-km(RTKM) in within zone(region) is obtained applying following formula:
RTKM = a*SQRT(Sq.km/3.1416), a: parameter(3/5).

## Appendix-3.3.4 (9) Number of Passengers carried by Bus Transportation

Thousands

| State | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 |
|---|---|---|---|---|---|---|
| Total Kazakhstan | 3443714.0 | 3191673.4 | 2620995.3 | 2237033.0 | 1622900.0 | 1447113.0 |
| Akmola | 129577.0 | 108434.2 | 90552.4 | 67181.0 | 52900.0 | 36763.0 |
| Aktyubinsk | 88359.0 | 76844.3 | 64152.2 | 50010.0 | 42000.0 | 35478.0 |
| Almaty | 102521.0 | 90911.0 | 67468.5 | 47368.0 | 38700.0 | 25906.0 |
| Atyrau | 66933.0 | 59641.4 | 37804.2 | 21509.0 | 10500.0 | 7356.0 |
| East Kazakhstan | 307626.0 | 292484.6 | 242988.2 | 185232.0 | 104400.0 | 91361.0 |
| Zhambul | 232693.0 | 220948.0 | 189803.0 | 162700.0 | 119400.0 | 86082.0 |
| Zhezkazgan | 109378.0 | 103590.6 | 63414.2 | 70844.0 | 80000.0 | 22736.0 |
| West Kazakhstan | 92094.0 | 86679.3 | 69661.1 | 65609.0 | 53800.0 | 58174.0 |
| Karaganda | 460135.0 | 435174.2 | 361267.1 | 325482.0 | 258900.0 | 190488.0 |
| Kzyl-Orda | 102226.0 | 97544.1 | 100644.6 | 72564.0 | 45900.0 | 34468.0 |
| Kokchetau | 95248.0 | 84873.1 | 57788.2 | 44252.0 | 34600.0 | 30178.0 |
| Kustanay | 198761.0 | 179529.2 | 157616.8 | 116821.0 | 70800.0 | 53288.0 |
| Mangistau | 73955.0 | 70899.4 | 58590.4 | 33760.0 | 18000.0 | 79900.0 |
| Pavlodar | 191319.0 | 188217.0 | 186789.0 | 173101.0 | 113200.0 | 124425.0 |
| North Kazakhstan | 60946.0 | 55285.5 | 41021.8 | 34460.0 | 20100.0 | 11504.0 |
| Semipalatinsk | 174603.0 | 163486.1 | 147421.4 | 101485.0 | 76500.0 | 78232.0 |
| Taldykorgan | 125584.0 | 120814.9 | 113983.0 | 85123.0 | 47700.0 | 23293.0 |
| Turgai | 23615.0 | 19679.5 | 12208.2 | 10501.0 | 5900.0 | 3142.0 |
| South Kazakhstan | 288703.0 | 258611.0 | 173452.0 | 172240.0 | 112800.0 | 86765.0 |
| Almaty City | 501829.0 | 462205.0 | 363487.0 | 390273.0 | 314300.0 | 367574.0 |
| Leninsk City | 17609.0 | 15901.0 | 10882.0 | 6518.0 | 2500.0 | - |

Number of Passengers carried by Bus Transportation for Common Use

(thousands)

| State | Total | Within city | Suburban | Inter-city | Intern'l in CIS | Intern'l exclud. CIS |
|---|---|---|---|---|---|---|
| Total Kazakhstan | 1447113 | 1248543 | 150593 | 44626 | 3347 | 4 |
| Akmola | 36763 | 34876 | 1045 | 842 | - | - |
| Aktyubinsk | 35478 | 34874 | 221 | 250 | 133 | - |
| Almaty | 25906 | 9329 | 15099 | 1455 | 23 | - |
| Atyrau | 7356 | 5545 | 1389 | 414 | 8 | - |
| East Kazakhstan | 91361 | 86371 | 3969 | 975 | 46 | - |
| Zhambul | 86082 | 78594 | 12363 | 3125 | - | - |
| Zhezkazgan | 22736 | 19338 | 3323 | 75 | - | - |
| West Kazakhstan | 58174 | 33991 | 8348 | 13223 | 2620 | - |
| Karaganda | 190488 | 180384 | 9447 | 724 | 13 | - |
| Kzyl-Orda | 34468 | 15456 | 11392 | 7620 | - | - |
| Kokchetau | 30178 | 28637 | 897 | 609 | 35 | - |
| Kustanay | 53288 | 49792 | 2851 | 645 | - | - |
| Mangistau | 79900 | 45848 | 30742 | 3318 | - | - |
| Pavlodar | 124425 | 116974 | 5280 | 1950 | 221 | - |
| North Kazakhstan | 11504 | 10531 | 458 | 473 | 42 | - |
| Semipalatinsk | 78232 | 73549 | 3964 | 703 | 16 | - |
| Taldykorgan | 23293 | 11158 | 8244 | 3887 | - | 4 |
| Turgai | 3142 | 2886 | 202 | 54 | - | - |
| South Kazakhstan | 86765 | 54564 | 27745 | 4266 | 190 | - |
| Almaty City | 367574 | 363934 | 3622 | 18 | - | - |
| Leninsk City | - | | | | | |

Source: Committee of Statistics and Analysis

## Appendix-3.3.4 (10) Number of Passengers carried by Railway Transportation

(thousands)

| State | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 |
|---|---|---|---|---|---|---|
| Total Kazakhstan | 38261.4 | 40002.0 | 39734.8 | 44034.3 | 41118.9 | 33748.4 |
| Akmola | 2698.5 | 3079.7 | 3270.6 | 3918.5 | 3581.1 | 3344.0 |
| Aktyubinsk | 1570.0 | 1607.8 | 1341.3 | 1241.9 | 1300.3 | 1214.2 |
| Almaty | 2127.5 | 2244.8 | 2389.9 | 2730.6 | 2553.4 | 2384.3 |
| Atyrau | 1397.7 | 1406.8 | 1178.5 | 1023.2 | 919.3 | 858.4 |
| East Kazakhstan | 1399.0 | 1365.9 | 1435.0 | 1475.3 | 1313.2 | 1226.3 |
| Zhambul | 1197.5 | 1418.1 | 1264.2 | 1252.2 | 861.9 | 804.8 |
| Zhezkazgan | 1048.3 | 1182.2 | 1059.5 | 1110.2 | 1003.7 | 937.2 |
| West Kazakhstan | 872.5 | 885.1 | 883.7 | 907.9 | 694.8 | 648.8 |
| Karaganda | 5464.5 | 4870.6 | 5053.4 | 4474.3 | 4572.2 | 4269.5 |
| Kzyl-Orda | 1187.5 | 1307.3 | 1005.8 | 779.6 | 983.8 | 918.7 |
| Kokchetau | 1203.3 | 1263.2 | 1232.6 | 1188.6 | 1487.3 | 1388.8 |
| Kustanay | 1477.2 | 2160.7 | 2244.4 | 2043.7 | 2156.5 | 2013.7 |
| Mangistau | 559.8 | 755.8 | 779.9 | 618.8 | 670.4 | 626.0 |
| Pavlodar | 9241.5 | 9473.2 | 9806.4 | 13036.9 | 12946.6 | 12089.4 |
| North Kazakhstan | 2606.9 | 2741.4 | 2619.8 | 3703.4 | 2462.2 | 2299.2 |
| Semipalatinsk | 1531.7 | 1540.1 | 1341.3 | 1174.3 | 1024.8 | 957.0 |
| Taldykorgen | 547.5 | 561.2 | 529.2 | 511.6 | 416.0 | 388.5 |
| Turgai | 668.8 | 465.4 | 404.2 | 635.6 | 488.3 | 456.9 |
| South Kazakhstan | 1461.7 | 1672.7 | 1620.1 | 1857.1 | 1348.6 | 1259.3 |
| Russia (Orenbourg) | | | 275.0 | 350.6 | 216.4 | 202.1 |
| Kirgistan/Altai Krai | | | | | 110.1 | 102.8 |
| | | | | | 8.0 | 7.5 |

Source: Committee of Statistics and Analysis

Note : Data by state in 1995 are estimated using the total in 1995 as control total which is available data, assuming relative weight on passengers by region in 1994 as constant.

## Appendix-3.3.4 (11) Passenger Transportation by Transport Mode in Kazakhstan

(1) Number of Passengers (Mil. Passengers)

| Year | Railway | Auto | Water | Air | Total |
|---|---|---|---|---|---|
| 1985 | 34.10 | 3433.90 | 2.60 | 7.40 | 3478.00 |
| 1986 | 35.80 | 3516.00 | 2.80 | 7.64 | 3562.24 |
| 1987 | 37.50 | 3598.10 | 3.00 | 7.88 | 3646.48 |
| 1988 | 39.20 | 3680.20 | 3.20 | 8.12 | 3730.72 |
| 1989 | 40.90 | 3762.30 | 3.40 | 8.36 | 3814.96 |
| 1990 | 42.60 | 3844.40 | 3.60 | 8.60 | 3899.20 |
| 1991 | 40.00 | 3264.80 | 3.10 | 7.90 | 3315.80 |
| 1992 | 39.70 | 2945.90 | 1.30 | 5.10 | 2992.00 |
| 1993 | 42.70 | 2357.70 | 1.30 | 3.60 | 2405.30 |

(2) Passenger-km (Mrd. Passenger-km)

| Year | Railway | Auto | Water | Air | Total |
|---|---|---|---|---|---|
| 1985 | 15.80 | 33.30 | 0.10 | 10.50 | 59.70 |
| 1986 | 16.58 | 34.30 | 0.10 | 11.06 | 62.04 |
| 1987 | 17.36 | 35.30 | 0.10 | 11.62 | 64.38 |
| 1988 | 18.14 | 36.30 | 0.10 | 12.18 | 66.72 |
| 1989 | 18.92 | 37.30 | 0.10 | 12.74 | 69.06 |
| 1990 | 19.70 | 38.30 | 0.10 | 13.30 | 71.40 |
| 1991 | 19.40 | 35.70 | 0.10 | 12.60 | 67.80 |
| 1992 | 19.70 | 28.30 | 0.04 | 8.80 | 56.84 |
| 1993 | 24.50 | 22.90 | 0.02 | 6.80 | 54.22 |

(3) Average Length of Transprtation (Km)

| Year | Railway | Auto | Water | Air | Total |
|---|---|---|---|---|---|
| 1985 | 463.34 | 9.70 | 38.46 | 1418.92 | 17.17 |
| 1986 | 463.13 | 9.76 | 35.71 | 1447.64 | 17.42 |
| 1987 | 462.93 | 9.81 | 33.33 | 1474.62 | 17.66 |
| 1988 | 462.76 | 9.86 | 31.25 | 1500.00 | 17.88 |
| 1989 | 462.59 | 9.91 | 29.41 | 1523.92 | 18.10 |
| 1990 | 462.44 | 9.96 | 27.78 | 1546.51 | 18.31 |
| 1991 | 485.00 | 10.93 | 32.26 | 1594.94 | 20.45 |
| 1992 | 496.22 | 9.61 | 30.77 | 1725.49 | 19.00 |
| 1993 | 573.77 | 9.71 | 15.38 | 1888.89 | 22.54 |

Source: Statistics of Kazakhstan

## Appendix-3.3.4 (12) Regression Analysis on Relationship between Passenger Traffic and Economic Indicators

| Year | (Y1) ln((1)) | (Y2) ln((3)) | (X1) ln((5)) | (X2) ln((6)) | Regression Output (1) | | |
|---|---|---|---|---|---|---|---|
| | | | | | Items | (X1)-(Y1) | (X2)-(Y1) |
| 1970 | 10.611671 | 13.283083 | 12.061213 | 11.539141 | Constant | 4.087349 | 3.751825 |
| 1975 | 10.740627 | 13.474021 | 12.281328 | 11.803443 | Std Err of Y Est | 0.025609 | 0.029229 |
| 1976 | 10.751178 | 13.472385 | 12.320836 | 11.838059 | R Squared | 0.968223 | 0.958602 |
| 1977 | 10.769916 | 13.474474 | 12.367360 | 11.878674 | No. of Observation | 20 | 20 |
| 1978 | 10.807878 | 13.524475 | 12.417391 | 11.938153 | Degree of Freedom | 18 | 18 |
| 1979 | 10.847705 | 13.563628 | 12.470762 | 11.990069 | | | |
| 1980 | 10.853600 | 13.569658 | 12.501189 | 11.997328 | | | |
| 1981 | 10.854489 | 13.580243 | 12.533898 | 12.019191 | X Coefficient | 0.540121 | 0.590954 |
| 1982 | 10.858557 | 13.597806 | 12.567879 | 12.092638 | Std Err of Coef. | 0.023063 | 0.028946 |
| 1983 | 10.869349 | 13.619451 | 12.597399 | 12.095066 | Exp(Constant) | 59.5817 | 42.5988 |
| 1984 | 10.877708 | 13.631957 | 12.641375 | 12.120142 | Items | (X1)-(Y2) | (X2)-(Y2) |
| 1985 | 10.894273 | 13.662585 | 12.688373 | 12.155521 | Constant | 4.348408 | 3.913351 |
| 1986 | 10.907001 | 13.682721 | 12.716828 | 12.192757 | Std Err of Y Est | 0.035906 | 0.042883 |
| 1987 | 10.955550 | 13.743195 | 12.765031 | 12.233866 | R Squared | 0.966630 | 0.952402 |
| 1988 | 11.007021 | 13.813295 | 12.822991 | 12.286782 | No. of Observation | 20 | 20 |
| 1989 | 11.060384 | 13.879727 | 12.867415 | 12.323199 | Degree of Freedom | 18 | 18 |
| 1990 | 11.078984 | 13.918212 | 12.916950 | 12.358646 | | | |
| 1991 | 11.101251 | 13.941876 | 12.952789 | 12.384965 | X Coefficient | 0.738409 | 0.805950 |
| 1992 | 11.113865 | 13.956985 | 12.959233 | 12.394122 | Std Err of Coef. | 0.032338 | 0.042467 |
| 1993 | 11.116321 | 13.956993 | 12.955589 | 12.408440 | Exp(Constant) | 77.3552 | 50.0664 |

Formula:
Y1 = 59.5817 * X1^0.540121, R^2 = 0.968223
Y1 = 42.5988 * X2^0.590954, R^2 = 0.958602
Y2 = 77.3552 * X1^0.738409, R^2 = 0.966630
Y2 = 50.0664 * X2^0.805950, R^2 = 0.952402

Key Economic Indicators and Passenger Traffic Volume in Japan

| Year | No. of Pax. (Million) (1) | No. of Pax. (Million) (2) | Pax-km. (Million) (3) | Pax-km. (Million) (4) | Gross National Products ('85 constant price) (Billion) (5) | Private Sector Final Consump. Expendit. ('85 constant price) (Billion) (6) |
|---|---|---|---|---|---|---|
| 1950 | 10004 | 10004 | 117126 | 117126 | | |
| 1955 | 14116 | 14116 | 165826 | 165826 | | |
| 1960 | 20291 | 20291 | 243275 | 243275 | | |
| 1965 | 30793 | 30793 | 382481 | 382481 | | |
| 1970 | 48606 | 48606 | 587178 | 587178 | 173028.7 | 102656.2 |
| 1975 | 46195 | 46195 | 710711 | 710711 | 215631.8 | 133711.9 |
| 1976 | 46685 | 46685 | 709549 | 709549 | 224321.5 | 138421.6 |
| 1977 | 47568 | 47568 | 711033 | 711033 | 235004.4 | 144159.2 |
| 1978 | 49369 | 49369 | 747489 | 747489 | 247061.2 | 152993.8 |
| 1979 | 51416 | 51416 | 777336 | 777336 | 260605.3 | 161146.4 |
| 1980 | 51720 | 51720 | 782031 | 782031 | 268817.9 | 162320.5 |
| 1981 | 51766 | 51766 | 790359 | 790359 | 277367.4 | 165908.3 |
| 1982 | 51977 | 51977 | 804363 | 804363 | 287184.3 | 178551.0 |
| 1983 | 52541 | 52541 | 821963 | 821963 | 295788.1 | 178986.6 |
| 1984 | 52982 | 52982 | 832307 | 832307 | 309086.0 | 183531.6 |
| 1985 | 53867 | 53867 | 858194 | 858194 | 323959.2 | 190140.9 |
| 1986 | 54557 | 54557 | 875649 | 875649 | 333309.9 | 197354.6 |
| 1987 | 57271 | 69352 | 930237 | 1107983 | 349769.8 | 205472.1 |
| 1988 | 60296 | 73167 | 997787 | 1190641 | 370641.7 | 216811.1 |
| 1989 | 63601 | 77259 | 1066323 | 1267043 | 387478.2 | 224852.4 |
| 1990 | 64795 | 77934 | 1108160 | 1298436 | 407155.5 | 232965.5 |
| 1991 | 66254 | 80347 | 1134697 | 1338963 | 422012.0 | 239178.4 |
| 1992 | 67095 | 81764 | 1151971 | 1353314 | 424740.1 | 241378.7 |
| 1993 | 67260 | 82271 | 1151980 | 1355779 | 423161.6 | 244859.6 |
| 1994 | 67486 | 82758 | 1154396 | 1360318 | - | - |

Source: "National Transportation Statistics Handbook,1995" edited by Ministry of Transport, Transport Policy Bureau Information and Research Department.

Note : Thick-lineed frame in (2) and (4) include light passenger and cargo automobiles for private use.

## Appendix-3.3.4 (13) Formulation of Model for Distribution of Inter - Neighboring Countries Railway Passengers

Type of formula : $TRij = (CPi*CPj)*Dij^{(-x)}$

TRij : No. of railway passengers between zone (i) and zone (j).
Pi, Pj : City population of zone (i) and zone (j) respectively (Thousands).
Dij : Transport distance between zone (i) and zone (j) (km)

In this study a parameter (-x) is obtained based on the relevant traffic data on the route of Almaty~Russia as follows:

TRij : 182532
CPi : 98002
CPj : 1386.2
Dij : 3918

$-X = \ln((98002*1386.2)/182532)/\ln(3918)$

$-(x)\ 0.7992403$

(Data-1) Railway Passengers carried in 1995 and 1996

(Million passenger-km)

| Items | 1995 | 1996 1st Quarter |
|---|---|---|
| Total | 13782 | 3053 |
| Almaty Railway Devision | 5177 | 1180 |
| West Kazakhstan Railway Devision | 3924 | 872 |
| Akmola Railway Devision | 4681 | 1001 |

Source: Railway Dep., MOTC

(Data-2) Number of Railway Passengers for April 1996

| O - D | Number of Passengers | |
|---|---|---|
| | (April) (A) | (A) x 12 (B) |
| Almaty - Moscow | 15211 | 182532 |
| Almaty - Urmqi | 1093 | 13116 |

Source: Railway Dep., MOTC

## Appendix-3.3.4 (14) Analysis on Distribution of Inter - City Bus Passengers

| from Almaty to: | No. of bus pax. Dec./1995 (1) | No. of bus pax. (1)x12 (2) | Population (Thousands) City(i) (3) | City(j) (4) | Product (3)x(4) (5) | Distance (km) (6) |
|---|---|---|---|---|---|---|
| Bishkek | 3037 | 36444 | 1150.5 | 4009.0 | 4612355 | 236 |
| Ust-Kamenogorsk | 646 | 7752 | 1150.5 | 326.3 | 375408 | 926 |
| Urdzar | 925 | 11100 | 1150.5 | 44.1 | 50737 | 745 |
| Kebenbai | 956 | 11472 | 1150.5 | 52.0 | 59826 | 496 |
| Balkhash | 971 | 11652 | 1150.5 | 84.4 | 97102 | 657 |
| Chimkent | 594 | 7128 | 1150.5 | 397.6 | 457439 | 713 |
| Karaganda | 116 | 1392 | 1150.5 | 573.7 | 660042 | 1015 |
| Zhamble | 2362 | 28344 | 1150.5 | 318.6 | 357345 | 516 |

Source: Almaty "new bus terminal"

Regression analysis

| | ln(2) (Y) | ln(5) (x1) | ln(6) (x2) |
|---|---|---|---|
| Bishkek | 8.018625 | 15.344249 | 5.463832 |
| Ust-Kamenogorsk | 6.470800 | 12.835769 | 6.830874 |
| Urdzar | 6.829794 | 10.834412 | 6.613384 |
| Kebenbai | 6.862758 | 10.999196 | 6.206576 |
| Balkhash | 6.878326 | 11.483519 | 6.487684 |
| Chimkent | 6.386879 | 13.033398 | 6.569481 |
| Karaganda | 4.753590 | 13.400859 | 6.922644 |
| Zhamble | 7.767264 | 12.786458 | 6.246107 |

a. Regression Output for x1,x2 and Y.

| | | |
|---|---|---|
| Constant | 22.185879 | |
| Std Err of Y Est | 0.6263732 | |
| R Squared | 0.7146643 | |
| No. of Observation | 8 | |
| Degree of Freedom | 5 | |
| X Coefficient | -0.19516 | -2.02302 |
| Std Err of Coef. | 0.1794879 | 0.5798724 |

Note: The obtained sign(-) for (x1) is not significant.

b. Regression Output for x1 and Y.

| | |
|---|---|
| Constant | 5.6113522 |
| Std Err of Y Est | 1.0606787 |
| R Squared | 0.0181646 |
| No. of Observation | 8 |
| Degree of Freedom | 6 |
| X Coefficient | 0.0901259 |
| Std Err of Coef. | 0.270508 |

Note: "R Squared" is not significant.

c. Regression Output for x2 and Y.

| | |
|---|---|
| Constant | 17.888855 |
| Std Err of Y Est | 0.6358697 |
| R Squared | 0.6471361 |
| No. of Observation | 8 |
| Degree of Freedom | 6 |
| X Coefficient | -1.736303 |
| Std Err of Coef. | 0.5234265 |

Note: "R Squared" and sign of x coefficient are significant.

# Appendix-3.3.4 (15) Formulation of Cost Estimate Model for Air Passengers

(1) International Air Tariff including VAT - Kazakhstan Airline

| Air Route | Distance (km) | Tariff * | |
|---|---|---|---|
| | | US$ | Tenge |
| Ashgabad - Almaty | 1888 | 83 | 5057 |
| Ashgabad - Ust-Kamenogorsk | 2730 | 190 | 11577 |
| Baku - Aktau | 390 | 50 | 3047 |
| Bolgograd - Aktau | 780 | 65 | 3961 |
| Dashande - Almaty | 880 | 80 | 4874 |
| Ekaterinburg - Almaty | 1920 | 147 | 8957 |
| Ekaterinburg - Zhambiul | 1880 | 138 | 8409 |
| Ekaterinburg - Zhezkazgan | 1120 | 82 | 4996 |
| Ekaterinburg - Kokshetau | 710 | 59 | 3595 |
| Ekaterinburg - Pavlodar | 1210 | 93 | 5667 |
| Ekaterinburg - Petropavlovsk | 680 | 46 | 2803 |
| Irkutsk - Almaty | 2650 | 200 | 12186 |
| Kaliningrad - Almaty | 4440 | 200 | 12186 |
| Kaliningrad - Uralsk | 2185 | 103 | 6276 |
| Kiev - Almaty | 3820 | 168 | 10236 |
| Kiev - Uralsk | 1616 | 86 | 5240 |
| Mineal Vodi - Aktau | 650 | 50 | 3047 |
| Mineal Vodi - Almaty | 2830 | 152 | 9262 |
| Mineal Vodi - Atyrau | 760 | 55 | 3351 |
| Mineal Vodi - Karaganda | 2680 | 108 | 6581 |
| Mineal Vodi - Kustanai | 1928 | 144 | 8774 |
| Moskow - Akmola | 2310 | 150 | 9140 |
| Moskow - Aktau | 1868 | 93 | 5667 |
| Moskow - Aktyubinsk | 1490 | 105 | 6398 |
| Moskow - Almaty | 3270 | 180 | 10968 |
| Moskow - Atyrau | 1520 | 140 | 8530 |
| Moskow - Balkhash | 2840 | 155 | 9444 |
| Moskow - Zhambie | 2960 | 161 | 9810 |
| Moskow - Zhezkazgan | 2320 | 106 | 6459 |
| Moskow - Karaganda | 2500 | 136 | 8287 |
| Moskow - Kokshetau | 2120 | 115 | 7007 |
| Moskow - Kustanai | 1790 | 130 | 7921 |
| Moskow - Pavlodar | 2620 | 145 | 8835 |
| Moskow - Petropavlovsk | 2010 | 105 | 6398 |
| Moskow - Semipalatinsk | 3170 | 172 | 10480 |
| Moskow - | 1070 | 85 | 5179 |
| Moskov - Ust-Kamenogorsk | 3110 | 180 | 10968 |
| Moskow - Shimkent | 2840 | 155 | 9444 |
| Novosibirsk - Almaty | 1430 | 85 | 5179 |
| Novosibirsk - Ust-Kamenogorsk | 620 | 75 | 4570 |
| Nukus - Aktau | 710 | 47 | 2864 |
| Nukus - Kzyl-Orda | 690 | 59 | 3595 |
| Nukus - Shimkent | 930 | 86 | 5240 |
| Omsk - Akmola | 470 | 40 | 2437 |
| Omsk - Almaty | 1430 | 85 | 5179 |
| Omsk - SZhambul | 1608 | 93 | 5667 |
| Omsk - Zhezkazgan | 920 | 52 | 3168 |
| Omsk - Kokshetau | 310 | 32 | 1950 |
| Omsk - Pavlodar | 480 | 25 | 1523 |
| Omsk - Shimkent | 1550 | 95 | 5788 |
| Posty-on-Done - Aktau | 1060 | 84 | 5118 |
| Samara - Aktau | 1090 | 91 | 5545 |
| Samara - Almaty | 2460 | 140 | 8530 |
| Samara - Atyrau | 730 | 78 | 4753 |
| St. Petersburg - Aktybinsk | 2140 | 102 | 6215 |
| St. Petersburg - Almaty | 3798 | 170 | 10358 |
| Tashkent - Almaty | 780 | 60 | 3656 |
| Tashkent - Balkhash | 690 | 71 | 4326 |
| Tashkent - Zhezkazgan | 750 | 58 | 3534 |
| Tashkent - Kustanai | 1430 | 92 | 5606 |
| Tashkent - Pavlodar | 1640 | 105 | 6398 |
| Tashkent - Shimkent | 120 | 25 | 1523 |
| Urdzhar - Almaty | 660 | 41 | 2498 |
| Urdzhar - Semipalatinsk | 420 | 25 | 1523 |
| Yha - Almaty | 2110 | 130 | 7921 |
| Yha - Kokshetau | 1250 | 79 | 4814 |

*Exchange rate(Tenge/US$): 60.93

Regression Analysis

| Regression Output | | |
|---|---|---|
| Constant | | 1779.3 |
| Std Err of Y Est | | 1106.2 |
| R Squared | | 0.850656 |
| No. of Observation | | 66 |
| Degree of Freedom | | 64 |
| X Coefficient | 2.670243 | |
| Std Err of Coef. | 0.139855 | |

TRFIA = 1779.3 + 2.6702 x DIST(km)

(2) Domestic Air Tariff Including VAT - Kazakhstan Airline

| Air Route | Distance (km) | Tariff * US$ | Tariff * Tenge |
|---|---|---|---|
| Akmola - Aktyubinsk | 1040 | 91 | 6545 |
| Akmola - Almaty | 960 | 84 | 5118 |
| Akmola - Arkalyk | 440 | 45 | 2742 |
| Akmola - Atyrau | 1650 | 107 | 6520 |
| Akmola - Karaganda | 200 | 13 | 792 |
| Akmola - Kzyl-Orda | 820 | 107 | 6520 |
| Akmola - Pavlodar | 410 | 22 | 1340 |
| Akmola - Ust-Kamenogorsk | 880 | 60 | 3656 |
| Akmola - Shimkent | 1090 | 70 | 4265 |
| Aktau - Aktyubinsk | 880 | 62 | 3778 |
| Aktau - Almaty | 2180 | 120 | 7312 |
| Aktau - Atyrau | 370 | 35 | 2133 |
| Aktau - Kzyl-Orda | 1240 | 90 | 5484 |
| Aktau - Kokshetau | 2190 | 83 | 5057 |
| Aktau - Kustanai | 1430 | 109 | 6642 |
| Aktau - Uralsk | 820 | 86 | 5240 |
| Aktau - Ust-Kamenogorsk | 880 | 70 | 4265 |
| Aktau - Shimkent | 1650 | 112 | 6824 |
| Aktyubinsk - Almaty | 1790 | 90 | 5484 |
| Aktyubinsk - Arkalyk | 720 | 57 | 3473 |
| Aktyubinsk - Atyrau | 610 | 40 | 2437 |
| Aktyubinsk - Zhezkazgan | 840 | 64 | 3900 |
| Aktyubinsk - Karaganda | 1230 | 87 | 5301 |
| Aktyubinsk - Kokshetau | 960 | 55 | 3351 |
| Aktyubinsk - Kustanai | 550 | 51 | 3107 |
| Aktyubinsk - Pavlodar | 1470 | 83 | 5057 |
| Aktyubinsk - Petropavlovsk | 970 | 62 | 3778 |
| Aktyubinsk - Uralsk | 410 | 44 | 2681 |
| Almaty - Arkalyk | 1330 | 90 | 5484 |
| Almaty - Atyrau | 2280 | 115 | 7007 |
| Almaty - Balkhash | 450 | 37 | 2254 |
| Almaty - Zhambul | 590 | 40 | 2437 |
| Almaty - Zhezkazgan | 1080 | 65 | 3961 |
| Almaty - Zaisan | 960 | 90 | 5484 |
| Almaty - Karaganda | 760 | 58 | 3534 |
| Almaty - Kzyl-Orda | 940 | 85 | 5179 |
| Almaty - Kokshetau | 1250 | 85 | 5179 |
| Almaty - Kostanai | 1550 | 110 | 6702 |
| Almaty - Pavlodar | 1060 | 75 | 4570 |
| Almaty - Petropavlovsk | 1250 | 90 | 5484 |
| Almaty - Semipalatinsk | 860 | 59 | 3595 |
| Almaty - Uralsk | 2210 | 120 | 7312 |
| Almaty - Ust-Kamenogorsk | 880 | 58 | 3534 |
| Almaty - Shimkent | 670 | 45 | 2742 |
| Almaty - Ekibastuz | 980 | 66 | 4021 |
| Arkalyk - Zhambul | 1090 | 49 | 2986 |
| Arkalyk - Zhezkazgan | 330 | 22 | 1340 |
| Arkalyk - Karaganda | 590 | 40 | 2437 |
| Arkalyk - Kzyl-Orda | 690 | 83 | 5057 |
| Arkalyk - Shimkent | 960 | 62 | 3778 |
| Atyrau - Zhezkazgan | 1440 | 80 | 4874 |
| Atyrau - Karaganda | 1840 | 137 | 8348 |
| Atyrau - Kzyl-Orda | 1260 | 77 | 4692 |
| Atyrau - Kustanai | 1160 | 79 | 4814 |
| Atyrau - Petropavlovsk | 1570 | 102 | 6215 |
| Atyrau - Uralsk | 450 | 38 | 2315 |
| Balkhash - Zhezkazgan | 600 | 30 | 1828 |
| Balkhash - Pavlodar | 630 | 37 | 2254 |
| Zhambul - Zhezkazgan | 760 | 60 | 3656 |
| Zhambul - Karaganda | 930 | 61 | 3717 |
| Zhambul - Shimkent | 220 | 11 | 670 |
| Zhezkazgan - Kzyl-Orda | 360 | 42 | 2559 |
| Zhezkazgan - Pavlodar | 870 | 49 | 2986 |
| Zhezkazgan - Shimkent | 630 | 55 | 3351 |
| Karaganda - Kostanai | 790 | 54 | 3290 |
| Karaganda - Ust-Kamenogorsk | 840 | 75 | 4570 |
| Karaganda - Shimkent | 1110 | 66 | 4021 |
| Kzyl-Orda - Pavlodar | 1220 | 95 | 5788 |
| Kzyl-Orda - Shimkent | 420 | 27 | 1645 |
| Kokshetau - Uralsk | 1370 | 101 | 6154 |
| Kokshetau - Ust-Kamenogorsk | 1010 | 60 | 3656 |
| Kostanai - Petropavlovsk | 420 | 30 | 1828 |
| Kostanai - Ust-Kamenogorsk | 1480 | 88 | 5362 |
| Kostanai - Shimkent | 1310 | 83 | 5057 |
| Pavlodar - Petropavlovsk | 610 | 57 | 3473 |
| Pavlodar - Shimkent | 1440 | 95 | 5788 |
| Semipalatinsk - Ust-Kamenogorsk | 170 | 8 | 487 |
| Uralsk - Ust-Kamenogorsk | 2330 | 190 | 11577 |

* Exchange rate(Tenge/US$): 60.93

## Formulation of Cost Estimate Model for Air Passengers

Regression Analysis (2)

| Regression Output | | |
|---|---|---|
| Constant | | 989.6 |
| Std Err of Y Est | | 919.4 |
| R Squared | | 0.769595 |
| No. of Observation | | 78 |
| Degree of Freedom | | 76 |
| X Coefficient | 3.311398 | |
| Std Err of Coef. | 0.287835 | |

TRFDA = 989.6 + 3.3114 x DIST(km)

# Appendix-3.3.4 (16) Formulation of Cost Estimate Model for Railway Passengers

Railway Tariff (Tenge)

| From Almaty to: | Distance (km) | Tariff (Tenge) | | |
|---|---|---|---|---|
| | | Reserved | Compart-ment | Sleeping car |
| Akmola | 1343 | 545 | 865 | 1741 |
| Aktau | 3150 | 1198 | 1890 | 3796 |
| Aktyubinsk | 2252 | 846 | 1336 | 2686 |
| Arkalyk | 1912 | 775 | 1224 | 2464 |
| Atyrau | 2675 | 986 | 1558 | 3130 |
| Balkhash | 873 | 368 | 588 | 1186 |
| Zhambul | 543 | 254 | 408 | 826 |
| Zhezkazgan | 1374 | 545 | 865 | 1741 |
| Karaganda | 1077 | 440 | 700 | 1408 |
| Kzyl-Orda | 1219 | 510 | 810 | 1630 |
| Kokshetau | 1514 | 651 | 1031 | 2074 |
| Kustanai | 2025 | 775 | 1225 | 2464 |
| Pavlodar | 1733 | 704 | 1114 | 2241 |
| Petropavlovsk | 1809 | 704 | 1114 | 2241 |
| Semipalatinsk | 1034 | 440 | 700 | 1408 |
| Taldykorgan | 347 | 183 | 298 | 603 |
| Uralsk | 2711 | 1057 | 1668 | 3352 |
| Shimkent | 755 | 334 | 534 | 1076 |

Regression Analysis for Railway Tariff(1)
-- Reserved --

| Regression Output | |
|---|---|
| Constant | 65.1 |
| Std Err of Y Est | 19.7 |
| R Squared | 0.995334 |
| No. of Observation | 18 |
| Degree of Freedom | 16 |
| X Coefficient | 0.357862 |
| Std Err of Coef. | 0.006126 |

TRFRLRS = 65.1 + 0.3579 x DIST(km)

Regression Analysis for Railway Tariff(2)
-- Compartment --

| Regression Output(1.1) | |
|---|---|
| Constant | 0 |
| Std Err of Y Est | 58.17361078 |
| R Squared | 0.982421341 |
| No. of Observation | 18 |
| Degree of Freedom | 17 |
| X Coefficient | 0.619092607 |
| Std Err of Coef. | 0.007845735 |

TRFRLCMP = 112.8 + 0.5613 x DIST(km)

Regression Analysis for Railway Tariff(2)
-- Compartment --

| Regression Output(1.2) | |
|---|---|
| Constant | 112.8 |
| Std Err of Y Est | 30.6709265 |
| R Squared | 0.995401051 |
| No. of Observation | 18 |
| Degree of Freedom | 16 |
| X Coefficient | 0.561334 |
| Std Err of Coef. | 0.009539 |

TRFRLCMP = 112.8 + 0.5613 x DIST(km)

Regression Analysis for Railway Tariff(3)
-- Sleeping car --

| Regression Output | |
|---|---|
| Constant | 238.4 |
| Std Err of Y Est | 61.82779663 |
| R Squared | 0.995356 |
| No. of Observation | 18 |
| Degree of Freedom | 16 |
| X Coefficient | 1.126075 |
| Std Err of Coef. | 0.019229 |

TRFRLSL = 238.4 + 1.1261 x DIST(km)

## Appendix-3.3.4 (17) Formulation of Cost Estimate Model for Bus Passengers

Bus Tariff (Tenge) (Available since 13.07.1995)

| From Almaty to: | Distance (km) | Tariff (Tenge) | |
|---|---|---|---|
| | | Soft | Hard |
| Abai | 853 | 1044 | 870 |
| Akbakai | 584 | 714 | 596 |
| Algabas | 884 | 1020 | 851 |
| Akkyl | 605 | 740 | 617 |
| Aksu-Auly | 929 | 1137 | 948 |
| Aksusuck | 296 | 362 | 302 |
| Ackchetau | 818 | 1001 | 834 |
| Akchi | 140 | 172 | 143 |
| Akyl-Tobe | 460 | 564 | 469 |
| Ahanevo | 555 | 680 | 565 |
| Amangeldy | 409 | 500 | 417 |
| Aosa | 548 | 670 | 559 |
| Balkhash | 657 | 838 | 670 |
| Baital | 523 | 640 | 533 |
| Baikadam | 686 | 840 | 700 |
| Berlik | 380 | 466 | 388 |
| Chimkent | 994 | 1094 | 912 |
| Berikol | 583 | 714 | 595 |
| Bishkek | 238 | 292 | 243 |
| Blogovesh | 261 | 320 | 266 |
| Burubaital | 355 | 435 | 368 |
| Burhae | 595 | 728 | 607 |
| Belye Vody | 682 | 834 | 696 |
| Balykshi | 422 | 516 | 430 |
| Ualnovka | 634 | 776 | 647 |
| Gbardeiskii | 177 | 216 | 180 |
| Georgibka | 208 | 254 | 212 |
| Grigorevka | 541 | 662 | 552 |
| Zhambul | 516 | 632 | 526 |
| Zhetysai | 957 | 1172 | 976 |
| Zhanatas | 710 | 870 | 724 |
| Zhaimea | 175 | 214 | 179 |
| Ilych | 935 | 1144 | 954 |
| Ilyich | 630 | 772 | 643 |
| Kalkaman | 1447 | 1772 | 1476 |
| Karaganda | 1059 | 1296 | 1080 |
| Karabalta | 311 | 380 | 317 |
| Karaboget | 509 | 624 | 519 |
| Karakemir | 558 | 682 | 569 |
| Karatau | 632 | 774 | 645 |
| Kenes | 236 | 288 | 241 |
| Kenes | 259 | 318 | 264 |
| Kentau | 915 | 1120 | 933 |
| Kuyahty | 466 | 570 | 475 |
| Kishmish | 259 | 318 | 264 |
| Konshengel | 197 | 283 | 236 |
| Karasnogorka | 181 | 222 | 185 |
| Kum-Ozek | 495 | 606 | 505 |
| Kordai | 168 | 206 | 171 |
| Karakol | 642 | 786 | 655 |
| Leninskoe | 784 | 960 | 800 |
| Lugovoe | 406 | 496 | 414 |
| Maitobe | 604 | 740 | 616 |
| Masanchi | 279 | 341 | 286 |
| Kynkaly Malyi | 607 | 742 | 620 |
| Merke | 366 | 448 | 374 |
| Mirhyi | 478 | 586 | 488 |
| Michelors | 509 | 624 | 519 |
| Molodezhna | 1180 | 1444 | 1244 |
| Mynaral | 428 | 524 | 436 |
| Naualy | 813 | 996 | 830 |
| St. Otar | 183 | 224 | 162 |
| Otarskl | 159 | 194 | 162 |
| Pavlodar | 1529 | 1872 | 1560 |
| Priozersk | 533 | 652 | 644 |
| Roslavl | 167 | 204 | 170 |
| Sary-Shagan | 544 | 666 | 554 |
| Samsi | 74 | 90 | 76 |
| Sary-Agash | 831 | 1018 | 868 |
| Selpo | 527 | 645 | 536 |
| Slavyanka | 991 | 1212 | 1010 |
| Suzak | 995 | 1218 | 1014 |
| Syzgan | 968 | 1184 | 988 |
| Targan | 95 | 116 | 96 |
| Taskumya | 864 | 1058 | 882 |
| Temirlanovka | 760 | 930 | 776 |

## Formulation of Cost Estimate Model for Bus Passengers

Bus Tariff (Tenge) (Available since 13.07.1995)

| From Almaty to: | Distance (km) | Tariff (Tenge) | |
|---|---|---|---|
| | | Soft | Hard |
| Turkestan | 878 | 1074 | 896 |
| Taldy-Ozek | 452 | 554 | 462 |
| Tashkent | 860 | 1052 | 878 |
| Tokmak | 276 | 338 | 282 |
| Tokmak | 312 | 382 | 318 |
| Tortkol | 807 | 988 | 824 |
| Ulan-Bel | 650 | 796 | 664 |
| Ulken | 484 | 494 | 412 |
| Uspenovka | 236 | 288 | 240 |
| Furmanovka | 443 | 542 | 452 |
| Hantau | 409 | 500 | 417 |
| Chayan | 814 | 996 | 830 |
| Chardara | 948 | 1160 | 966 |
| Chimkent | 713 | 872 | 728 |
| Cherhaya Rechka | 230 | 282 | 234 |
| Shildastau | 146 | 178 | 148 |
| Shignac | 376 | 460 | 384 |
| Cholpan Ata | 505 | 618 | 516 |
| Sholak Korgan | 902 | 1104 | 928 |
| Chu | 320 | 392 | 326 |
| Shiderty | 1329 | 1626 | 1350 |
| Shortobe | 269 | 328 | 274 |

Regression Analysis for Bus Tariff(1)
-- Soft --

| Regression Output | | |
|---|---|---|
| Constant | | 4.0 |
| Std Err of Y Est | | 14.76340874 |
| R Squared | | 0.998455 |
| No. of Observation | | 98 |
| Degree of Freedom | | 96 |
| X Coefficient | 1.214835 | |
| Std Err of Coef. | 0.004877 | |

TRFSSFT = 4.0 + 1.2148 x DIST(km)

Regression Analysis for Bus Tariff(2)
-- Hard --

| Regression Output | | |
|---|---|---|
| Constant | | 2.7 |
| Std Err of Y Est | | 16.7113485 |
| R Squared | | 0.997172 |
| No. of Observation | | 98 |
| Degree of Freedom | | 96 |
| X Coefficient | 1.015636 | |
| Std Err of Coef. | 0.005520 | |

TRFBSHD = 2.7 + 1.0156 x DIST(km)

## Appendix-3.3.4 (18) Trip Time and Trip Cost by Zone OD Pair

| Zone Pair | | Railway | | n.a | | Air | | n.a | | Bus | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| (i) | (j) | Time | Cost | | | Time | Cost | | | Time | Cost |
| 1 | 1 | 2.82 | 0.69 | 0 | 0 | 2.14 | 12.74 | 0 | 0 | 1.85 | 1.39 |
| 2 | 1 | 46.93 | 31.37 | 0 | 0 | 4.76 | 82.28 | 0 | 0 | 44.95 | 32.80 |
| 3 | 1 | 38.31 | 26.03 | 0 | 0 | 4.24 | 68.37 | 0 | 0 | 37.05 | 27.05 |
| 4 | 1 | 18.55 | 13.79 | 0 | 0 | 2.95 | 34.26 | 0 | 0 | 16.92 | 12.37 |
| 5 | 1 | 34.45 | 23.64 | 0 | 0 | 3.94 | 60.42 | 0 | 0 | 30.78 | 22.48 |
| 6 | 1 | 46.02 | 30.81 | 0 | 0 | 4.75 | 81.95 | 0 | 0 | 43.68 | 31.88 |
| 7 | 1 | 22.55 | 16.27 | 0 | 0 | 3.10 | 38.24 | 0 | 0 | 15.78 | 11.54 |
| 8 | 1 | 12.35 | 9.95 | 0 | 0 | 2.84 | 31.28 | 0 | 0 | 11.40 | 8.35 |
| 9 | 1 | 9.24 | 8.02 | 0 | 0 | 2.74 | 28.63 | 0 | 0 | 8.53 | 6.26 |
| 10 | 1 | 22.64 | 16.32 | 0 | 0 | 3.20 | 40.89 | 0 | 0 | 20.57 | 15.03 |
| 11 | 1 | 17.18 | 12.95 | 0 | 0 | 3.08 | 37.57 | 0 | 0 | 18.50 | 13.52 |
| 12 | 1 | 28.85 | 19.68 | 0 | 0 | 3.56 | 50.49 | 0 | 0 | 25.53 | 18.65 |
| 13 | 1 | 31.91 | 22.07 | 0 | 0 | 3.33 | 44.28 | 0 | 0 | 23.90 | 17.46 |
| 14 | 1 | 31.24 | 21.65 | 0 | 0 | 3.56 | 50.49 | 0 | 0 | 28.45 | 20.78 |
| 15 | 1 | 25.25 | 17.95 | 0 | 0 | 3.18 | 40.22 | 0 | 0 | 18.80 | 13.74 |
| 16 | 1 | 23.29 | 16.73 | 0 | 0 | 3.25 | 42.21 | 0 | 0 | 25.68 | 18.76 |
| 17 | 1 | 34.16 | 23.46 | 0 | 0 | 3.66 | 53.14 | 0 | 0 | 30.78 | 22.48 |
| 18 | 1 | 55.87 | 36.91 | 0 | 0 | 4.73 | 81.28 | 0 | 0 | 52.13 | 38.04 |
| 19 | 1 | 6.31 | 2.15 | 0 | 0 | 2.36 | 18.70 | 0 | 0 | 4.10 | 3.03 |
| 20 | 1 | 71.24 | 46.42 | 0 | 0 | 6.89 | 117.38 | 0 | 0 | 65.12 | 47.50 |
| 21 | 1 | 84.33 | 54.53 | 0 | 0 | 6.74 | 134.60 | 0 | 0 | 77.12 | 56.25 |
| 22 | 1 | 20.53 | 15.02 | 0 | 0 | 3.10 | 38.24 | 0 | 0 | 18.57 | 13.57 |
| 23 | 1 | 22.73 | 16.38 | 0 | 0 | 3.16 | 39.89 | 0 | 0 | 18.80 | 13.74 |
| 24 | 1 | 0.00 | 0.00 | 0 | 0 | 5.06 | 90.23 | 0 | 0 | 53.80 | 39.25 |
| 2 | 2 | 2.42 | 0.82 | 0 | 0 | 2.17 | 13.47 | 0 | 0 | 2.22 | 1.66 |
| 3 | 2 | 8.62 | 7.64 | 0 | 0 | 2.51 | 22.67 | 0 | 0 | 7.98 | 5.80 |
| 4 | 2 | 37.71 | 25.66 | 0 | 0 | 2.14 | 12.74 | 0 | 0 | 35.65 | 26.03 |
| 5 | 2 | 20.96 | 15.29 | 0 | 0 | 3.20 | 40.89 | 0 | 0 | 20.40 | 14.91 |
| 6 | 2 | 19.42 | 14.33 | 0 | 0 | 2.56 | 24.00 | 0 | 0 | 8.43 | 6.19 |
| 7 | 2 | 52.98 | 35.12 | 0 | 0 | 4.69 | 80.29 | 0 | 0 | 50.58 | 36.91 |
| 8 | 2 | 34.58 | 23.72 | 0 | 0 | 4.09 | 64.40 | 0 | 0 | 33.57 | 24.51 |
| 9 | 2 | 37.69 | 25.65 | 0 | 0 | 4.18 | 66.71 | 0 | 0 | 36.42 | 26.58 |
| 10 | 2 | 33.62 | 23.13 | 0 | 0 | 3.71 | 54.46 | 0 | 0 | 32.80 | 23.36 |
| 11 | 2 | 51.25 | 34.05 | 0 | 0 | 4.46 | 74.33 | 0 | 0 | 45.97 | 33.55 |
| 12 | 2 | 31.07 | 21.55 | 0 | 0 | 3.71 | 54.46 | 0 | 0 | 27.12 | 19.81 |
| 13 | 2 | 42.89 | 28.87 | 0 | 0 | 4.15 | 66.05 | 0 | 0 | 40.50 | 29.56 |
| 14 | 2 | 34.25 | 23.52 | 0 | 0 | 3.53 | 49.50 | 0 | 0 | 27.72 | 20.24 |
| 15 | 2 | 21.67 | 15.73 | 0 | 0 | 3.56 | 50.49 | 0 | 0 | 26.15 | 19.10 |
| 16 | 2 | 47.18 | 31.53 | 0 | 0 | 3.51 | 49.16 | 0 | 0 | 33.07 | 24.14 |
| 17 | 2 | 30.53 | 21.21 | 0 | 0 | 3.34 | 44.53 | 0 | 0 | 22.20 | 16.22 |
| 18 | 2 | 29.27 | 20.43 | 0 | 0 | 3.03 | 36.25 | 0 | 0 | 21.65 | 15.82 |
| 19 | 2 | 53.24 | 35.28 | 0 | 0 | 4.91 | 86.25 | 0 | 0 | 49.07 | 35.80 |
| 20 | 2 | 21.82 | 15.82 | 0 | 0 | 3.34 | 44.53 | 0 | 0 | 20.80 | 14.62 |
| 21 | 2 | 34.91 | 23.92 | 0 | 0 | 4.19 | 67.85 | 0 | 0 | 32.00 | 23.36 |
| 22 | 2 | 42.76 | 28.79 | 0 | 0 | 4.35 | 71.35 | 0 | 0 | 40.73 | 29.73 |
| 23 | 2 | 20.51 | 15.01 | 0 | 0 | 5.63 | 105.13 | 0 | 0 | 63.75 | 46.51 |
| 24 | 2 | 0.00 | 0.00 | 0 | 0 | 6.94 | 139.90 | 0 | 0 | 98.75 | 72.02 |
| 3 | 3 | 3.40 | 1.16 | 0 | 0 | 2.23 | 15,26 | 0 | 0 | 3.12 | 2.31 |
| 4 | 3 | 29.09 | 20.32 | 0 | 0 | 3.54 | 49.83 | 0 | 0 | 27.75 | 20.27 |
| 5 | 3 | 12.35 | 9.95 | 0 | 0 | 2.69 | 27.31 | 0 | 0 | 12.50 | 9.15 |
| 6 | 3 | 10.80 | 8.99 | 0 | 0 | 2.76 | 29.30 | 0 | 0 | 9.90 | 7.26 |
| 7 | 3 | 44.36 | 29.78 | 0 | 0 | 4.21 | 67.71 | 0 | 0 | 48.77 | 35.59 |
| 8 | 3 | 25.96 | 18.38 | 0 | 0 | 3.63 | 52.14 | 0 | 0 | 25.65 | 18.74 |
| 9 | 3 | 29.07 | 20.31 | 0 | 0 | 3.66 | 53.14 | 0 | 0 | 28.50 | 20.81 |
| 10 | 3 | 25.80 | 17.79 | 0 | 0 | 3.38 | 43.53 | 0 | 0 | 24.10 | 17.61 |
| 11 | 3 | 42.64 | 28.71 | 0 | 0 | 4.08 | 62.08 | 0 | 0 | 38.05 | 27.77 |
| 12 | 3 | 22.45 | 16.21 | 0 | 0 | 3.20 | 40.99 | 0 | 0 | 19.22 | 14.05 |
| 13 | 3 | 34.27 | 23.53 | 0 | 0 | 3.84 | 57.77 | 0 | 0 | 32.60 | 23.80 |
| 14 | 3 | 25.64 | 18.18 | 0 | 0 | 3.21 | 41.22 | 0 | 0 | 19.80 | 14.47 |
| 15 | 3 | 17.89 | 13.38 | 0 | 0 | 3.06 | 37.24 | 0 | 0 | 18.25 | 13.34 |
| 16 | 3 | 38.56 | 26.19 | 0 | 0 | 3.05 | 36.91 | 0 | 0 | 25.15 | 18.37 |
| 17 | 3 | 21.91 | 15.87 | 0 | 0 | 2.98 | 32.94 | 0 | 0 | 14.28 | 10.45 |
| 18 | 3 | 20.65 | 15.10 | 0 | 0 | 3.18 | 38.24 | 0 | 0 | 18.50 | 13.52 |
| 19 | 3 | 44.62 | 29.94 | 0 | 0 | 4.08 | 64.07 | 0 | 0 | 41.15 | 30.03 |
| 20 | 3 | 32.73 | 22.57 | 0 | 0 | 3.86 | 58.44 | 0 | 0 | 30.00 | 21.91 |
| 21 | 3 | 34.91 | 23.92 | 0 | 0 | 4.68 | 79.96 | 0 | 0 | 32.00 | 23.36 |
| 22 | 3 | 34.15 | 23.45 | 0 | 0 | 3.85 | 58.10 | 0 | 0 | 32.82 | 23.96 |
| 23 | 3 | 61.04 | 40.11 | 0 | 0 | 5.09 | 90.89 | 0 | 0 | 55.85 | 40.75 |
| 24 | 3 | 0.00 | 0.00 | 0 | 0 | 6.51 | 128.64 | 0 | 0 | 90.85 | 66.26 |
| 4 | 4 | 2.11 | 0.72 | 0 | 0 | 2.14 | 12.90 | 0 | 0 | 1.93 | 1.45 |
| 5 | 4 | 16.96 | 12.81 | 0 | 0 | 2.99 | 35.26 | 0 | 0 | 18.87 | 13.79 |

# Trip Time and Trip Cost by Zone OD Pair

| Zone Pair | | Railway | | n.a | | Air | | n.a | | Bus | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| (i) | (j) | Time | Cost | | | Time | Cost | | | Time | Cost |
| 6 | 4 | 36.80 | 25.10 | 0 | 0 | 4.30 | 70.93 | 0 | 0 | 40.47 | 29.54 |
| 7 | 4 | 23.27 | 16.72 | 0 | 0 | 3.38 | 45.52 | 0 | 0 | 14.93 | 10.92 |
| 8 | 4 | 18.35 | 13.67 | 0 | 0 | 3.39 | 45.65 | 0 | 0 | 22.98 | 16.79 |
| 9 | 4 | 15.24 | 11.74 | 0 | 0 | 3.16 | 39.89 | 0 | 0 | 18.38 | 13.44 |
| 10 | 4 | 4.89 | 1.39 | 0 | 0 | 2.25 | 15.72 | 0 | 0 | 3.65 | 2.70 |
| 11 | 4 | 21.73 | 15.76 | 0 | 0 | 2.64 | 25.98 | 0 | 0 | 10.30 | 7.55 |
| 12 | 4 | 9.51 | 8.19 | 0 | 0 | 2.56 | 24.80 | 0 | 0 | 8.62 | 6.32 |
| 13 | 4 | 13.36 | 10.58 | 0 | 0 | 2.48 | 21.68 | 0 | 0 | 6.98 | 5.13 |
| 14 | 4 | 12.69 | 10.16 | 0 | 0 | 2.76 | 29.30 | 0 | 0 | 11.53 | 8.45 |
| 15 | 4 | 26.42 | 18.67 | 0 | 0 | 2.99 | 35.26 | 0 | 0 | 15.58 | 11.40 |
| 16 | 4 | 9.47 | 8.17 | 0 | 0 | 2.58 | 24.33 | 0 | 0 | 8.68 | 6.37 |
| 17 | 4 | 15.69 | 12.02 | 0 | 0 | 2.63 | 25.65 | 0 | 0 | 8.68 | 6.37 |
| 18 | 4 | 46.65 | 31.20 | 0 | 0 | 4.24 | 68.37 | 0 | 0 | 48.92 | 35.78 |
| 19 | 4 | 24.85 | 17.70 | 0 | 0 | 2.82 | 30.89 | 0 | 0 | 19.98 | 14.61 |
| 20 | 4 | 52.69 | 34.94 | 0 | 0 | 5.13 | 91.88 | 0 | 0 | 48.20 | 35.17 |
| 21 | 4 | 65.78 | 43.85 | 0 | 0 | 5.80 | 109.76 | 0 | 0 | 60.20 | 43.92 |
| 22 | 4 | 26.53 | 18.73 | 0 | 0 | 3.63 | 52.14 | 0 | 0 | 30.15 | 22.02 |
| 23 | 4 | 28.91 | 20.21 | 0 | 0 | 3.71 | 54.46 | 0 | 0 | 24.33 | 17.78 |
| 24 | 4 | 0.00 | 0.00 | 0 | 0 | 5.14 | 92.21 | 0 | 0 | 59.33 | 43.29 |
| 5 | 5 | 2.09 | 0.71 | 0 | 0 | 2.14 | 12.87 | 0 | 0 | 1.92 | 1.44 |
| 6 | 5 | 20.05 | 14.72 | 0 | 0 | 3.45 | 47.51 | 0 | 0 | 22.40 | 16.37 |
| 7 | 5 | 31.27 | 21.67 | 0 | 0 | 3.85 | 58.10 | 0 | 0 | 30.40 | 22.20 |
| 8 | 5 | 35.22 | 24.12 | 0 | 0 | 3.64 | 52.48 | 0 | 0 | 26.68 | 19.49 |
| 9 | 5 | 38.33 | 26.04 | 0 | 0 | 3.58 | 50.82 | 0 | 0 | 22.25 | 16.26 |
| 10 | 5 | 12.87 | 10.28 | 0 | 0 | 2.70 | 27.64 | 0 | 0 | 11.18 | 8.19 |
| 11 | 5 | 30.51 | 21.20 | 0 | 0 | 3.45 | 47.51 | 0 | 0 | 29.17 | 21.30 |
| 12 | 5 | 7.45 | 6.92 | 0 | 0 | 2.46 | 21.35 | 0 | 0 | 6.72 | 4.94 |
| 13 | 5 | 16.73 | 12.66 | 0 | 0 | 3.10 | 38.24 | 0 | 0 | 19.68 | 14.39 |
| 14 | 5 | 10.64 | 8.89 | 0 | 0 | 2.50 | 22.34 | 0 | 0 | 7.30 | 5.36 |
| 15 | 5 | 22.31 | 16.12 | 0 | 0 | 3.14 | 39.23 | 0 | 0 | 19.28 | 14.18 |
| 16 | 5 | 26.44 | 18.68 | 0 | 0 | 2.83 | 30.95 | 0 | 0 | 12.38 | 9.07 |
| 17 | 5 | 10.53 | 8.82 | 0 | 0 | 2.49 | 22.01 | 0 | 0 | 7.28 | 5.35 |
| 18 | 5 | 29.91 | 20.83 | 0 | 0 | 3.79 | 56.45 | 0 | 0 | 31.80 | 22.64 |
| 19 | 5 | 40.76 | 27.55 | 0 | 0 | 3.73 | 54.79 | 0 | 0 | 38.85 | 28.36 |
| 20 | 5 | 36.36 | 24.83 | 0 | 0 | 4.24 | 68.37 | 0 | 0 | 33.33 | 24.34 |
| 21 | 5 | 49.45 | 32.93 | 0 | 0 | 4.85 | 84.60 | 0 | 0 | 45.33 | 33.08 |
| 22 | 5 | 43.40 | 29.18 | 0 | 0 | 4.80 | 82.08 | 0 | 0 | 33.85 | 24.71 |
| 23 | 5 | 45.87 | 30.71 | 0 | 0 | 4.68 | 79.96 | 0 | 0 | 43.28 | 31.53 |
| 24 | 5 | 0.00 | 0.00 | 0 | 0 | 5.89 | 112.08 | 0 | 0 | 78.20 | 57.04 |
| 6 | 6 | 2.15 | 0.73 | 0 | 0 | 2.15 | 12.97 | 0 | 0 | 1.97 | 1.47 |
| 7 | 6 | 51.33 | 34.09 | 0 | 0 | 5.35 | 97.84 | 0 | 0 | 55.40 | 40.42 |
| 8 | 6 | 33.67 | 23.16 | 0 | 0 | 3.88 | 58.77 | 0 | 0 | 32.28 | 23.57 |
| 9 | 6 | 36.78 | 25.08 | 0 | 0 | 3.98 | 61.42 | 0 | 0 | 35.15 | 25.66 |
| 10 | 6 | 32.71 | 22.56 | 0 | 0 | 3.81 | 57.11 | 0 | 0 | 34.00 | 24.82 |
| 11 | 6 | 50.35 | 33.49 | 0 | 0 | 4.58 | 77.31 | 0 | 0 | 50.77 | 37.04 |
| 12 | 6 | 30.16 | 20.99 | 0 | 0 | 3.73 | 54.79 | 0 | 0 | 29.12 | 21.26 |
| 13 | 6 | 41.98 | 28.31 | 0 | 0 | 4.30 | 70.03 | 0 | 0 | 42.50 | 31.02 |
| 14 | 6 | 33.35 | 22.96 | 0 | 0 | 3.81 | 57.11 | 0 | 0 | 29.76 | 21.69 |
| 15 | 6 | 20.76 | 15.16 | 0 | 0 | 3.58 | 50.82 | 0 | 0 | 24.88 | 18.18 |
| 16 | 6 | 46.27 | 30.96 | 0 | 0 | 3.46 | 47.84 | 0 | 0 | 31.78 | 23.21 |
| 17 | 6 | 29.62 | 20.65 | 0 | 0 | 3.41 | 46.51 | 0 | 0 | 24.18 | 17.67 |
| 18 | 6 | 14.51 | 11.29 | 0 | 0 | 2.46 | 21.35 | 0 | 0 | 13.83 | 10.12 |
| 19 | 6 | 52.33 | 34.71 | 0 | 0 | 4.54 | 76.32 | 0 | 0 | 47.78 | 34.87 |
| 20 | 6 | 43.53 | 29.26 | 0 | 0 | 3.98 | 59.43 | 0 | 0 | 39.90 | 29.12 |
| 21 | 6 | 56.62 | 37.37 | 0 | 0 | 4.75 | 81.95 | 0 | 0 | 51.90 | 37.87 |
| 22 | 6 | 41.85 | 28.23 | 0 | 0 | 3.95 | 60.75 | 0 | 0 | 39.45 | 28.80 |
| 23 | 6 | 68.75 | 44.88 | 0 | 0 | 5.55 | 103.14 | 0 | 0 | 62.48 | 45.58 |
| 24 | 6 | 0.00 | 0.00 | 0 | 0 | 7.11 | 144.53 | 0 | 0 | 97.48 | 71.10 |
| 7 | 7 | 1.95 | 0.66 | 0 | 0 | 2.13 | 12.61 | 0 | 0 | 1.78 | 1.34 |
| 8 | 7 | 34.89 | 23.91 | 0 | 0 | 3.63 | 52.14 | 0 | 0 | 27.18 | 19.85 |
| 9 | 7 | 31.78 | 21.99 | 0 | 0 | 3.44 | 47.18 | 0 | 0 | 24.33 | 17.78 |
| 10 | 7 | 19.18 | 14.18 | 0 | 0 | 2.99 | 35.26 | 0 | 0 | 18.43 | 13.48 |
| 11 | 7 | 5.36 | 1.83 | 0 | 0 | 2.53 | 23.08 | 0 | 0 | 4.63 | 3.42 |
| 12 | 7 | 24.60 | 17.54 | 0 | 0 | 3.34 | 44.53 | 0 | 0 | 23.55 | 17.21 |
| 13 | 7 | 9.91 | 8.44 | 0 | 0 | 2.59 | 24.66 | 0 | 0 | 9.93 | 7.28 |
| 14 | 7 | 27.78 | 19.51 | 0 | 0 | 3.29 | 43.28 | 0 | 0 | 26.47 | 19.33 |
| 15 | 7 | 37.60 | 25.59 | 0 | 0 | 3.59 | 51.15 | 0 | 0 | 30.52 | 22.28 |
| 16 | 7 | 32.75 | 22.58 | 0 | 0 | 3.38 | 45.52 | 0 | 0 | 23.62 | 17.25 |
| 17 | 7 | 30.78 | 21.37 | 0 | 0 | 3.38 | 45.52 | 0 | 0 | 37.40 | 27.30 |
| 18 | 7 | 61.93 | 40.66 | 0 | 0 | 5.04 | 89.56 | 0 | 0 | 63.85 | 46.58 |
| 19 | 7 | 19.55 | 14.41 | 0 | 0 | 2.79 | 29.96 | 0 | 0 | 13.60 | 9.95 |
| 20 | 7 | 67.78 | 44.28 | 0 | 0 | 5.89 | 112.08 | 0 | 0 | 63.13 | 46.06 |
| 21 | 7 | 80.87 | 52.39 | 0 | 0 | 6.51 | 128.64 | 0 | 0 | 75.13 | 54.80 |
| 22 | 7 | 43.07 | 28.98 | 0 | 0 | 4.21 | 67.71 | 0 | 0 | 34.35 | 25.08 |
| 23 | 7 | 26.45 | 18.69 | 0 | 0 | 3.00 | 35.59 | 0 | 0 | 24.43 | 17.85 |

# Trip Time and Trip Cost by Zone OD Pair

| Zone Pair | | Railway | | n.a | | Air | | n.a | | Bus | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| (i) | (j) | Time | Cost | | | Time | Cost | | | Time | Cost |
| 24 | 7 | 0.00 | 0.00 | 0 | 0 | 5.80 | 109.76 | 0 | 0 | 59.43 | 43.36 |
| 8 | 8 | 2.13 | 0.72 | 0 | 0 | 2.15 | 12.94 | 0 | 0 | 1.95 | 1.46 |
| 9 | 8 | 3.11 | 1.06 | 0 | 0 | 2.28 | 16.38 | 0 | 0 | 2.85 | 2.12 |
| 10 | 8 | 22.44 | 16.20 | 0 | 0 | 3.36 | 45.19 | 0 | 0 | 24.88 | 18.18 |
| 11 | 8 | 29.53 | 20.59 | 0 | 0 | 3.50 | 48.83 | 0 | 0 | 29.00 | 21.83 |
| 12 | 8 | 27.85 | 19.56 | 0 | 0 | 3.51 | 49.16 | 0 | 0 | 31.68 | 23.07 |
| 13 | 8 | 31.71 | 21.94 | 0 | 0 | 3.80 | 56.78 | 0 | 0 | 29.97 | 21.88 |
| 14 | 8 | 31.04 | 21.53 | 0 | 0 | 3.71 | 54.46 | 0 | 0 | 30.35 | 22.16 |
| 15 | 8 | 44.76 | 30.03 | 0 | 0 | 2.53 | 23.00 | 0 | 0 | 7.48 | 5.43 |
| 16 | 8 | 27.82 | 19.53 | 0 | 0 | 2.79 | 29.96 | 0 | 0 | 14.38 | 10.46 |
| 17 | 8 | 34.04 | 23.38 | 0 | 0 | 3.28 | 40.89 | 0 | 0 | 19.48 | 14.18 |
| 18 | 8 | 43.51 | 29.25 | 0 | 0 | 4.86 | 63.73 | 0 | 0 | 40.73 | 29.73 |
| 19 | 8 | 18.65 | 13.86 | 0 | 0 | 2.96 | 34.59 | 0 | 0 | 15.58 | 11.34 |
| 20 | 8 | 58.69 | 38.65 | 0 | 0 | 5.55 | 103.14 | 0 | 0 | 55.65 | 40.60 |
| 21 | 8 | 71.78 | 46.76 | 0 | 0 | 6.28 | 120.36 | 0 | 0 | 67.65 | 49.35 |
| 22 | 8 | 8.18 | 7.37 | 0 | 0 | 2.49 | 22.01 | 0 | 0 | 7.17 | 5.26 |
| 23 | 8 | 35.07 | 24.03 | 0 | 0 | 3.91 | 59.76 | 0 | 0 | 18.53 | 13.55 |
| 24 | 8 | 0.00 | 0.00 | 0 | 0 | 4.29 | 69.69 | 0 | 0 | 53.53 | 39.06 |
| 9 | 9 | 2.36 | 0.80 | 0 | 0 | 2.16 | 13.37 | 0 | 0 | 2.17 | 1.62 |
| 10 | 9 | 19.33 | 14.27 | 0 | 0 | 3.13 | 38.90 | 0 | 0 | 22.03 | 16.10 |
| 11 | 9 | 26.42 | 18.67 | 0 | 0 | 3.33 | 44.20 | 0 | 0 | 27.03 | 19.74 |
| 12 | 9 | 24.75 | 17.63 | 0 | 0 | 3.43 | 46.85 | 0 | 0 | 27.00 | 19.72 |
| 13 | 9 | 28.60 | 20.02 | 0 | 0 | 3.38 | 45.52 | 0 | 0 | 25.37 | 18.53 |
| 14 | 9 | 27.93 | 19.60 | 0 | 0 | 3.64 | 52.48 | 0 | 0 | 29.92 | 21.85 |
| 15 | 9 | 16.82 | 12.22 | 0 | 0 | 2.64 | 25.98 | 0 | 0 | 10.25 | 7.51 |
| 16 | 9 | 24.71 | 17.61 | 0 | 0 | 2.76 | 29.30 | 0 | 0 | 17.15 | 12.54 |
| 17 | 9 | 30.93 | 21.46 | 0 | 0 | 3.09 | 37.91 | 0 | 0 | 22.25 | 16.26 |
| 18 | 9 | 46.64 | 31.19 | 0 | 0 | 4.84 | 63.87 | 0 | 0 | 43.68 | 31.82 |
| 19 | 9 | 15.55 | 11.93 | 0 | 0 | 2.76 | 29.30 | 0 | 0 | 12.63 | 9.25 |
| 20 | 9 | 61.80 | 40.58 | 0 | 0 | 5.78 | 107.11 | 0 | 0 | 58.58 | 42.68 |
| 21 | 9 | 74.89 | 48.69 | 0 | 0 | 6.35 | 124.33 | 0 | 0 | 70.50 | 51.43 |
| 22 | 9 | 11.29 | 9.30 | 0 | 0 | 2.68 | 26.98 | 0 | 0 | 10.02 | 7.34 |
| 23 | 9 | 32.69 | 22.55 | 0 | 0 | 3.71 | 54.46 | 0 | 0 | 27.33 | 19.96 |
| 24 | 9 | 0.00 | 0.00 | 0 | 0 | 5.59 | 104.13 | 0 | 0 | 62.33 | 45.47 |
| 10 | 10 | 1.89 | 0.64 | 0 | 0 | 2.13 | 12.51 | 0 | 0 | 1.73 | 1.30 |
| 11 | 10 | 17.64 | 13.23 | 0 | 0 | 2.76 | 29.30 | 0 | 0 | 13.80 | 10.10 |
| 12 | 10 | 5.42 | 1.84 | 0 | 0 | 2.33 | 17.71 | 0 | 0 | 4.97 | 3.66 |
| 13 | 10 | 9.27 | 8.05 | 0 | 0 | 2.51 | 22.67 | 0 | 0 | 8.50 | 6.24 |
| 14 | 10 | 8.60 | 7.63 | 0 | 0 | 2.54 | 23.34 | 0 | 0 | 7.88 | 5.79 |
| 15 | 10 | 30.51 | 21.20 | 0 | 0 | 3.83 | 36.25 | 0 | 0 | 19.23 | 14.06 |
| 16 | 10 | 13.56 | 10.70 | 0 | 0 | 2.58 | 24.33 | 0 | 0 | 12.33 | 9.03 |
| 17 | 10 | 26.44 | 18.68 | 0 | 0 | 2.55 | 23.67 | 0 | 0 | 11.08 | 8.12 |
| 18 | 10 | 42.56 | 28.67 | 0 | 0 | 4.13 | 65.39 | 0 | 0 | 44.77 | 32.67 |
| 19 | 10 | 28.95 | 20.23 | 0 | 0 | 3.85 | 36.91 | 0 | 0 | 24.67 | 18.02 |
| 20 | 10 | 48.60 | 32.40 | 0 | 0 | 4.89 | 85.59 | 0 | 0 | 44.55 | 32.51 |
| 21 | 10 | 61.69 | 40.51 | 0 | 0 | 5.60 | 104.46 | 0 | 0 | 56.55 | 41.26 |
| 22 | 10 | 30.62 | 21.27 | 0 | 0 | 3.71 | 54.46 | 0 | 0 | 32.85 | 23.40 |
| 23 | 10 | 33.00 | 22.74 | 0 | 0 | 3.91 | 59.76 | 0 | 0 | 27.98 | 20.44 |
| 24 | 10 | 0.00 | 0.00 | 0 | 0 | 5.24 | 94.86 | 0 | 0 | 62.98 | 45.95 |
| 11 | 11 | 2.67 | 0.91 | 0 | 0 | 2.18 | 13.93 | 0 | 0 | 2.45 | 1.83 |
| 12 | 11 | 23.85 | 16.58 | 0 | 0 | 3.44 | 47.18 | 0 | 0 | 18.92 | 13.83 |
| 13 | 11 | 9.91 | 8.44 | 0 | 0 | 2.39 | 19.36 | 0 | 0 | 5.30 | 3.90 |
| 14 | 11 | 26.24 | 18.55 | 0 | 0 | 3.40 | 46.18 | 0 | 0 | 21.83 | 15.95 |
| 15 | 11 | 42.44 | 28.59 | 0 | 0 | 3.41 | 46.51 | 0 | 0 | 25.88 | 18.91 |
| 16 | 11 | 31.28 | 21.63 | 0 | 0 | 3.18 | 40.39 | 0 | 0 | 18.98 | 13.88 |
| 17 | 11 | 44.87 | 29.60 | 0 | 0 | 3.16 | 39.89 | 0 | 0 | 18.98 | 13.88 |
| 18 | 11 | 60.28 | 39.59 | 0 | 0 | 4.73 | 81.28 | 0 | 0 | 56.55 | 41.26 |
| 19 | 11 | 14.18 | 11.09 | 0 | 0 | 2.76 | 29.30 | 0 | 0 | 14.40 | 10.54 |
| 20 | 11 | 66.24 | 43.33 | 0 | 0 | 5.96 | 114.07 | 0 | 0 | 58.50 | 42.68 |
| 21 | 11 | 79.33 | 51.43 | 0 | 0 | 6.34 | 124.00 | 0 | 0 | 70.50 | 51.43 |
| 22 | 11 | 37.71 | 25.66 | 0 | 0 | 4.03 | 62.74 | 0 | 0 | 37.87 | 27.06 |
| 23 | 11 | 21.89 | 15.37 | 0 | 0 | 3.28 | 40.89 | 0 | 0 | 19.80 | 14.47 |
| 24 | 11 | 0.00 | 0.00 | 0 | 0 | 4.49 | 74.99 | 0 | 0 | 54.80 | 39.98 |
| 12 | 12 | 1.75 | 0.59 | 0 | 0 | 2.12 | 12.24 | 0 | 0 | 1.60 | 1.21 |
| 13 | 12 | 14.69 | 11.40 | 0 | 0 | 2.64 | 25.98 | 0 | 0 | 13.47 | 9.86 |
| 14 | 12 | 3.18 | 1.88 | 0 | 0 | 2.24 | 15.39 | 0 | 0 | 2.92 | 2.17 |
| 15 | 12 | 32.42 | 22.38 | 0 | 0 | 3.28 | 40.89 | 0 | 0 | 24.28 | 17.68 |
| 16 | 12 | 18.98 | 14.06 | 0 | 0 | 2.76 | 29.30 | 0 | 0 | 17.30 | 12.65 |
| 17 | 12 | 31.85 | 22.03 | 0 | 0 | 2.46 | 21.35 | 0 | 0 | 6.72 | 4.94 |
| 18 | 12 | 40.02 | 27.89 | 0 | 0 | 4.74 | 81.62 | 0 | 0 | 37.72 | 27.53 |
| 19 | 12 | 34.36 | 23.59 | 0 | 0 | 3.39 | 45.85 | 0 | 0 | 31.52 | 23.01 |
| 20 | 12 | 43.18 | 29.05 | 0 | 0 | 4.65 | 79.38 | 0 | 0 | 39.58 | 28.89 |
| 21 | 12 | 56.27 | 37.16 | 0 | 0 | 5.28 | 95.85 | 0 | 0 | 51.58 | 37.64 |
| 22 | 12 | 36.04 | 24.62 | 0 | 0 | 4.09 | 64.40 | 0 | 0 | 38.77 | 28.30 |
| 23 | 12 | 38.42 | 26.10 | 0 | 0 | 4.21 | 67.71 | 0 | 0 | 32.95 | 24.06 |

# Trip Time and Trip Cost by Zone OD Pair

| Zone Pair | | Railway | | n.a | | Air | | n.a | | Bus | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| (i) | (j) | Time | Cost | | | Time | Cost | | | Time | Cost |
| 24 | 12 | 0.00 | 0.00 | 0 | 0 | 5.38 | 98.50 | 0 | 0 | 67.95 | 49.57 |
| 13 | 13 | 2.20 | 0.75 | 0 | 0 | 2.15 | 13.07 | 0 | 0 | 2.02 | 1.51 |
| 14 | 13 | 17.87 | 13.37 | 0 | 0 | 2.76 | 29.30 | 0 | 0 | 11.13 | 8.16 |
| 15 | 13 | 39.78 | 26.94 | 0 | 0 | 3.45 | 47.51 | 0 | 0 | 22.57 | 16.49 |
| 16 | 13 | 22.84 | 16.45 | 0 | 0 | 3.09 | 37.91 | 0 | 0 | 15.67 | 11.46 |
| 17 | 13 | 35.71 | 24.42 | 0 | 0 | 2.90 | 32.94 | 0 | 0 | 18.82 | 13.76 |
| 18 | 13 | 51.84 | 34.41 | 0 | 0 | 4.61 | 78.30 | 0 | 0 | 51.10 | 37.29 |
| 19 | 13 | 28.91 | 20.21 | 0 | 0 | 3.01 | 35.92 | 0 | 0 | 19.70 | 14.40 |
| 20 | 13 | 57.87 | 38.15 | 0 | 0 | 5.28 | 95.85 | 0 | 0 | 47.80 | 34.88 |
| 21 | 13 | 70.96 | 46.25 | 0 | 0 | 5.89 | 112.09 | 0 | 0 | 59.80 | 43.63 |
| 22 | 13 | 39.89 | 27.01 | 0 | 0 | 4.06 | 63.73 | 0 | 0 | 37.13 | 27.11 |
| 23 | 13 | 31.00 | 21.50 | 0 | 0 | 3.63 | 52.14 | 0 | 0 | 25.10 | 18.34 |
| 24 | 13 | 0.00 | 0.00 | 0 | 0 | 4.76 | 82.28 | 0 | 0 | 60.10 | 43.85 |
| 14 | 14 | 1.31 | 0.45 | 0 | 0 | 2.09 | 11.48 | 0 | 0 | 1.20 | 0.91 |
| 15 | 14 | 39.11 | 26.53 | 0 | 0 | 3.53 | 49.50 | 0 | 0 | 22.95 | 16.77 |
| 16 | 14 | 22.16 | 16.03 | 0 | 0 | 2.98 | 34.92 | 0 | 0 | 16.05 | 11.74 |
| 17 | 14 | 35.04 | 24.00 | 0 | 0 | 2.66 | 26.65 | 0 | 0 | 10.95 | 8.02 |
| 18 | 14 | 43.20 | 29.06 | 0 | 0 | 4.21 | 67.71 | 0 | 0 | 38.30 | 27.96 |
| 19 | 14 | 37.51 | 25.53 | 0 | 0 | 3.58 | 50.82 | 0 | 0 | 31.52 | 23.01 |
| 20 | 14 | 40.00 | 27.08 | 0 | 0 | 4.51 | 75.66 | 0 | 0 | 36.67 | 26.77 |
| 21 | 14 | 53.09 | 35.19 | 0 | 0 | 5.13 | 91.88 | 0 | 0 | 48.67 | 35.51 |
| 22 | 14 | 39.22 | 26.59 | 0 | 0 | 4.21 | 67.71 | 0 | 0 | 37.52 | 27.39 |
| 23 | 14 | 41.60 | 28.07 | 0 | 0 | 4.38 | 72.81 | 0 | 0 | 35.87 | 26.18 |
| 24 | 14 | 0.00 | 0.00 | 0 | 0 | 5.41 | 99.50 | 0 | 0 | 70.87 | 51.69 |
| 15 | 15 | 2.95 | 1.00 | 0 | 0 | 2.20 | 14.43 | 0 | 0 | 2.70 | 2.01 |
| 16 | 15 | 35.89 | 24.53 | 0 | 0 | 2.45 | 21.02 | 0 | 0 | 6.90 | 5.07 |
| 17 | 15 | 31.87 | 22.04 | 0 | 0 | 3.11 | 38.57 | 0 | 0 | 12.00 | 8.79 |
| 18 | 15 | 30.62 | 21.27 | 0 | 0 | 3.55 | 50.16 | 0 | 0 | 33.33 | 24.34 |
| 19 | 15 | 31.56 | 21.85 | 0 | 0 | 3.25 | 42.21 | 0 | 0 | 22.90 | 16.73 |
| 20 | 15 | 50.62 | 33.65 | 0 | 0 | 4.90 | 85.92 | 0 | 0 | 48.25 | 35.21 |
| 21 | 15 | 58.87 | 38.77 | 0 | 0 | 5.84 | 110.76 | 0 | 0 | 60.25 | 43.96 |
| 22 | 15 | 52.95 | 35.10 | 0 | 0 | 2.78 | 29.63 | 0 | 0 | 14.57 | 10.66 |
| 23 | 15 | 47.90 | 32.02 | 0 | 0 | 4.28 | 69.36 | 0 | 0 | 37.60 | 27.45 |
| 24 | 15 | 0.00 | 0.00 | 0 | 0 | 6.01 | 115.39 | 0 | 0 | 72.60 | 52.96 |
| 16 | 16 | 3.47 | 1.18 | 0 | 0 | 2.24 | 15.35 | 0 | 0 | 3.18 | 2.36 |
| 17 | 16 | 40.00 | 27.00 | 0 | 0 | 2.41 | 20.02 | 0 | 0 | 5.10 | 3.76 |
| 18 | 16 | 56.13 | 37.07 | 0 | 0 | 3.68 | 53.47 | 0 | 0 | 40.23 | 29.37 |
| 19 | 16 | 29.60 | 20.64 | 0 | 0 | 3.09 | 37.91 | 0 | 0 | 29.70 | 21.75 |
| 20 | 16 | 62.80 | 41.20 | 0 | 0 | 4.90 | 85.92 | 0 | 0 | 45.72 | 33.36 |
| 21 | 16 | 75.89 | 49.31 | 0 | 0 | 5.59 | 104.13 | 0 | 0 | 57.72 | 42.11 |
| 22 | 16 | 36.00 | 24.60 | 0 | 0 | 3.18 | 40.22 | 0 | 0 | 21.47 | 15.69 |
| 23 | 16 | 38.38 | 26.08 | 0 | 0 | 4.13 | 65.39 | 0 | 0 | 33.02 | 24.11 |
| 24 | 16 | 0.00 | 0.00 | 0 | 0 | 5.70 | 107.11 | 0 | 0 | 68.02 | 49.62 |
| 17 | 17 | 2.87 | 0.71 | 0 | 0 | 2.14 | 12.84 | 0 | 0 | 1.90 | 1.42 |
| 18 | 17 | 39.47 | 26.75 | 0 | 0 | 3.73 | 54.79 | 0 | 0 | 43.82 | 31.98 |
| 19 | 17 | 40.47 | 27.37 | 0 | 0 | 3.28 | 42.87 | 0 | 0 | 34.88 | 25.47 |
| 20 | 17 | 46.89 | 31.35 | 0 | 0 | 4.73 | 81.28 | 0 | 0 | 40.62 | 29.65 |
| 21 | 17 | 59.98 | 39.45 | 0 | 0 | 5.18 | 93.21 | 0 | 0 | 52.62 | 38.39 |
| 22 | 17 | 42.22 | 28.45 | 0 | 0 | 3.50 | 48.83 | 0 | 0 | 26.57 | 19.40 |
| 23 | 17 | 44.60 | 29.93 | 0 | 0 | 4.50 | 75.32 | 0 | 0 | 33.02 | 24.11 |
| 24 | 17 | 0.00 | 0.00 | 0 | 0 | 5.95 | 113.74 | 0 | 0 | 68.02 | 49.62 |
| 18 | 18 | 2.53 | 0.86 | 0 | 0 | 2.17 | 13.67 | 0 | 0 | 2.32 | 1.73 |
| 19 | 18 | 62.18 | 40.82 | 0 | 0 | 4.90 | 85.92 | 0 | 0 | 56.23 | 41.03 |
| 20 | 18 | 53.38 | 35.37 | 0 | 0 | 4.33 | 70.69 | 0 | 0 | 48.58 | 35.39 |
| 21 | 18 | 66.47 | 43.47 | 0 | 0 | 4.91 | 86.25 | 0 | 0 | 60.58 | 44.14 |
| 22 | 18 | 51.69 | 34.32 | 0 | 0 | 3.93 | 60.09 | 0 | 0 | 47.90 | 34.95 |
| 23 | 18 | 78.60 | 50.98 | 0 | 0 | 5.75 | 108.44 | 0 | 0 | 70.93 | 51.74 |
| 24 | 18 | 0.00 | 0.00 | 0 | 0 | 7.38 | 151.49 | 0 | 0 | 105.93 | 77.25 |
| 19 | 19 | 2.15 | 0.73 | 0 | 0 | 2.15 | 12.97 | 0 | 0 | 1.97 | 1.47 |
| 20 | 19 | 77.51 | 50.31 | 0 | 0 | 6.13 | 118.37 | 0 | 0 | 68.18 | 49.74 |
| 21 | 19 | 90.60 | 58.42 | 0 | 0 | 6.78 | 133.61 | 0 | 0 | 80.18 | 58.49 |
| 22 | 19 | 26.84 | 18.92 | 0 | 0 | 3.44 | 47.18 | 0 | 0 | 22.67 | 16.56 |
| 23 | 19 | 19.09 | 14.13 | 0 | 0 | 2.96 | 34.59 | 0 | 0 | 14.80 | 10.83 |
| 24 | 19 | 0.00 | 0.00 | 0 | 0 | 4.81 | 83.60 | 0 | 0 | 49.80 | 36.34 |
| 20 | 20 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 21 | 20 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 22 | 20 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 23 | 20 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 24 | 20 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 21 | 21 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 22 | 21 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 23 | 21 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 24 | 21 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 22 | 22 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 23 | 22 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 24 | 22 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 23 | 23 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 24 | 23 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 24 | 24 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

## Appendix-3.3.4 (19) Concept of MD Model

(1) General Concept

The concept of the MD. Model is based on the consumers behabioral theory under free economy.
The size of the traffic demand and share of each mode between zone (i) and zone (j) is the socioeconomical phenomenon occurred as the results of the consumers choice of the transportation modes (hereafter called as "modal choice") available on the said origin and destination, where each consumer's modal choice is presumed to follow the following two (2) principles:

(1) Each consumer makes a trip when his utility of the trip is bigger than the "sacrificed volume" or "total trip cost" which he has to pay for the trip.

(2) The higher the consumer's saving time value is, the faster (but more expensive) mode of transportation is selected.

Now, if the simultaneous probabilistic distrbution for the utility of travel and the appraisal of saving time value for whole of the relevant consumers of the transportation is clear, then by combining the sacrificed volume curve with this distribution, the realizable demand ratio of each mode is easily calculated as the total possible demand being equal to 1.0. The share of each mode is also easily calculated from the above demand ratios.

(2) Simultaneous Probabilistic Distribution

The simultaneous probabilistic distribution consists of respectively independent distribution for the utility of travel and that for the appraisal on saving time value in travel i.e. it is a product of those two distributions, which forms , in usual, a shape of symmetric mountain as shown in Figure 1. Both of the above distributions are presumed to follow logarithmic normal distribution which is indicated by the following parameters:

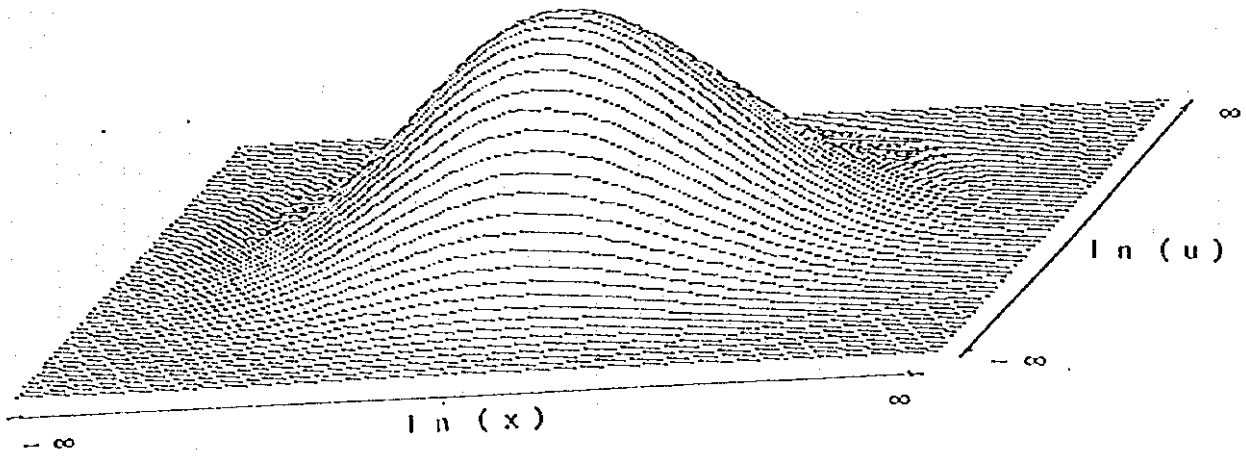



Figure 1 Simultaneous Probabilistic Distribution

- Utility of travel: Mean…… $\mu$ loge (u)
  Std. deviation…… $\sigma$ loge (u)
- Saving time value : Mean…… $\mu$ loge (x)
  Std. deviation…… $\sigma$ loge (x)

(Note) U and X are probabilistic variables where X=1/V; V means appraisal value of saving time of consumers; U means utility of the travel for consumers.

$$Dij = \int_{-\infty}^{\infty} g(x) \int_{-\infty}^{\infty} f(u) \, du \, dx = 1.0 \quad \cdots\cdots\cdots\cdots \quad (1)$$

where, $g(x)$ : Distribution function of (x).
$f(u)$ : Distribution function of (u)

The normal distribution function of (x) is indicated by the following formula:

$$g(x) = \frac{1}{\sqrt{2\pi}\,\sigma} \exp\left(\frac{(x-\mu)^2}{2\sigma^2}\right) \quad \cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots \quad (1.1)$$

## 2.3 Realizable Demand Ratio by Mode

Realizable demand ratio by mode is caliculated by input data of modal trip time and trip cost based on the foregoing simultaneous distribution as shown in Figure 2.1 and 2.2.

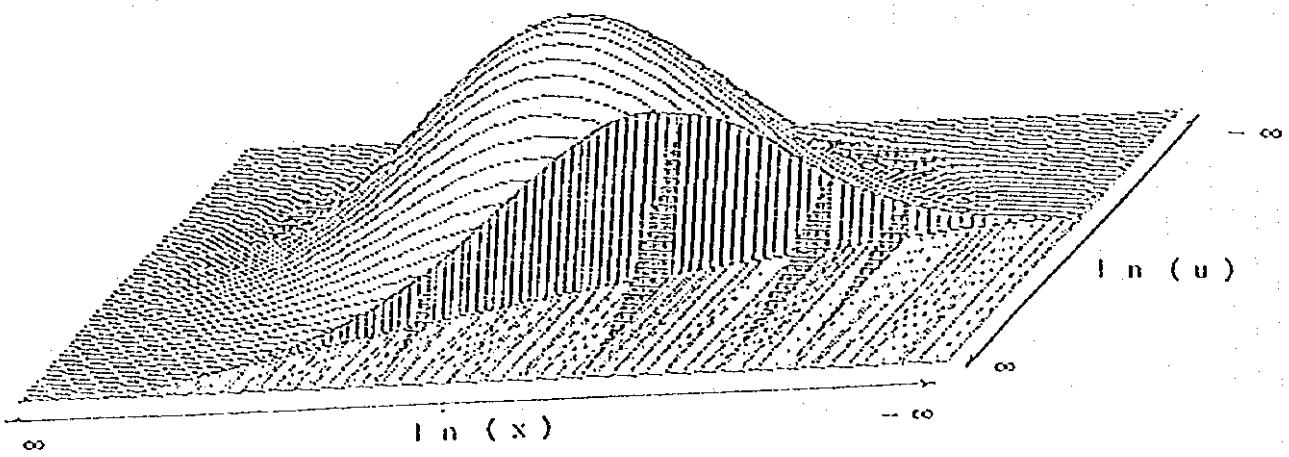



Figure 2.1 Graphical Description of Realizable Demand Ratio by Mode

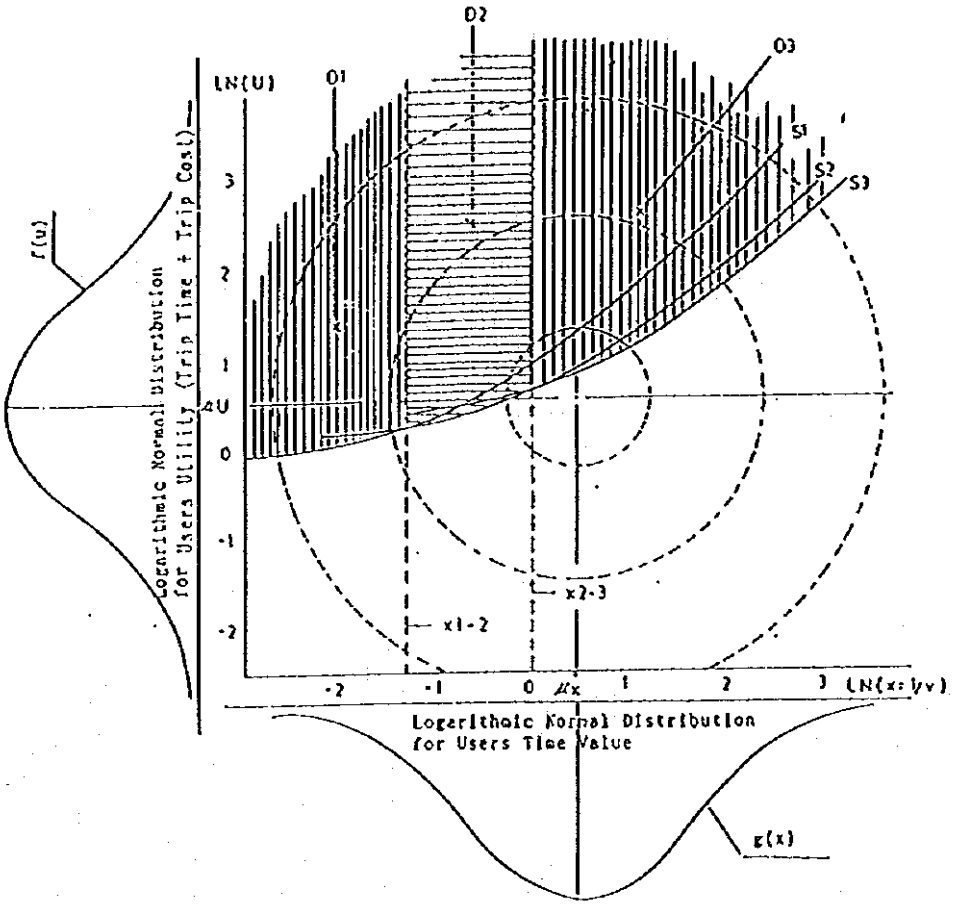



Figure 2.2 An illustration of Realizable Demand Ratio by Mode

In the upper figure, D1, D2, D3 mean respectively the realizable demand ratio of mode 1, 2 and 3 which are calculated by Formula (2).

$$RDmij = \int_{\ln(X_{m\cdot m-1})}^{\ln(X_{m\cdot m+1})} f(x) \int_{\ln(Smij)}^{\infty} f(u)\, du\, dx \quad \cdots\cdots\cdots\cdots\cdots (2)$$

In the formula (2), Xm·m-1ij means respectively the boundary or substitutional value of (x) where the value (S) of mode (m) equals that of mode (m-1) between zone i and zone j.

For example, the substitutional value for S1 and S2 which gives S1 equals S2 is calculated as follows:

$$X_{1-2} = (t_2-t_1)/(c_1-c_2), \quad \text{or} \quad V_{1-2} = (c_1-c_2)/(t_2-t_1) \cdots\cdots\cdots\cdots (3)$$

S1, S2 and S3 indicate respectively "sacrificed volume" curve for mode 1, 2 and 3. The value of sacrificed volume is indicated in terms of time as shown in Formula (4).

$$\ln(Smij) = \ln(Tmij + XCmij) \cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots\cdots (4)$$

here, Smij means sacrificed volume of mode (m) for zone i-j. Tmij and Cmij are respectively trip time and trip cost(fare and charge) of mode (m) for zone i-j.

Here it should be noteworthy that the share of each mode (SHm) is indicated by the following equation:

$$SHm = Dm / \Sigma Dm \quad \cdots\cdots (5)$$

For example, share of mode (1) is indicated as follows:

$$SH1 = D1 / (D1+D2+D3) \quad \cdots\cdots (6)$$

The lower graphical figure in Figure 2 shows an situation of modal demand estimation which is drawn by computer graphics. The input data used for this estimation are shown in Table 1.

Table 1 Trip Time and Trip Cost by Mode

(Hour, Thousand Yen)

| | Existing Node | | | | | | | | | | | New Node |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| Time | 1.66 | 2.00 | - | 3.96 | - | - | 3.21 | - | - | 5.35 | 15.74 | 2.50 |
| Cost | 15.00 | 12.00 | - | 9.00 | - | - | 7.00 | - | - | 5.00 | 4.00 | 5.50 |

The following values of parameters are applied for the above calculation:

$\mu \log_e(u)$ : 1.40
$\sigma \log_e(u)$ : 1.72
$\mu \log_e(x)$ : 1.20
$\sigma \log_e(x)$ : 1.72

The boundary point or substitutional value of (x) are shown in Table 2 and Figure 3.

Table 2 Substitutional value of ln(X) (ln(1/v))

| Nodes | 1 & 2 | 2 & 7 | 7 & 10 | 10 & 11 |
|---|---|---|---|---|
| Value (ln(1/v)) | -2.18212 | -1.41898 | 0.06917 | 2.34029 |

The calculated results of modal demand ratios are shown in Table 3.

Table 3 Calculated Modal Demand Ratios

(%)

| | Existing Modes | | | | | | | | | | | New Mode |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| Values (%) | 1.38 | 1.95 | - | 0 | - | - | 6.98 | - | - | 8.10 | 0.69 | - |

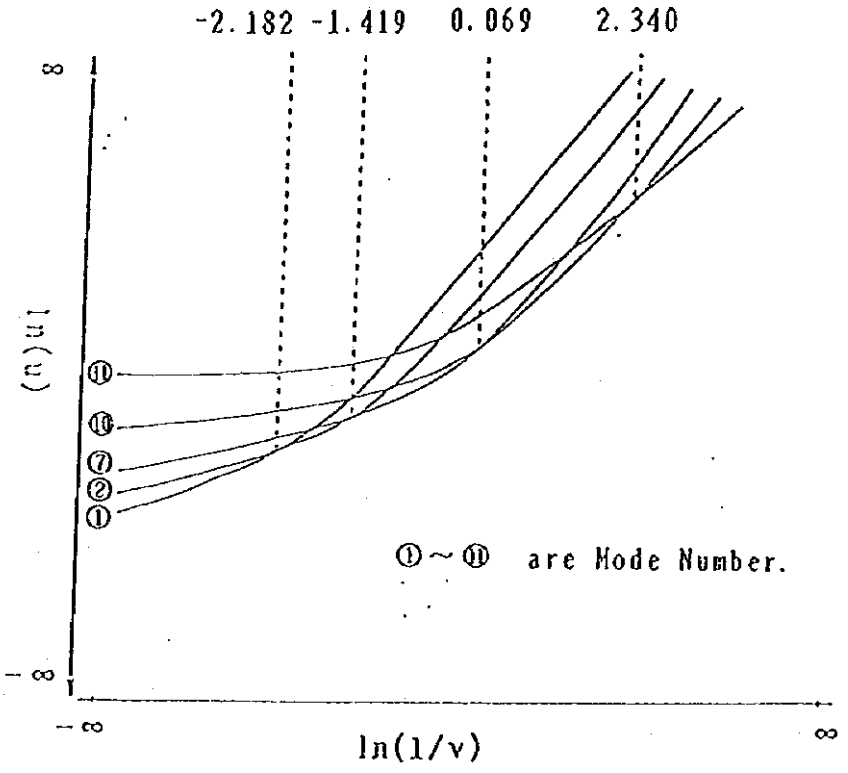



Figure 3 Boundary point or Substitutional Value

It should be noted that the demand ratio of mode (4) is zero(0). This is because any unreasonable mode is automatically excluded in this model since the model is formed based on strict economical principles. The cause of this omission of mode (4) is explained by the theory of "consumer's indiffrence curve" shown in Figure 4.

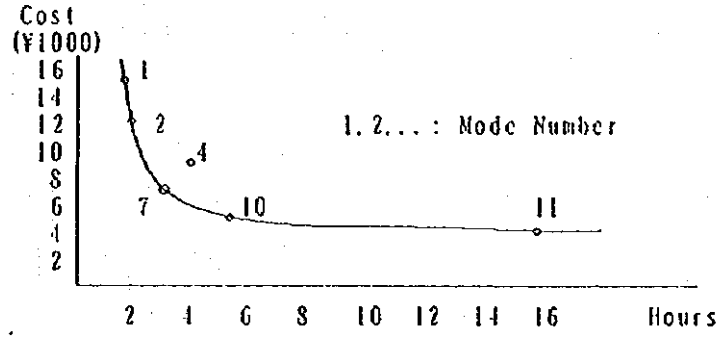
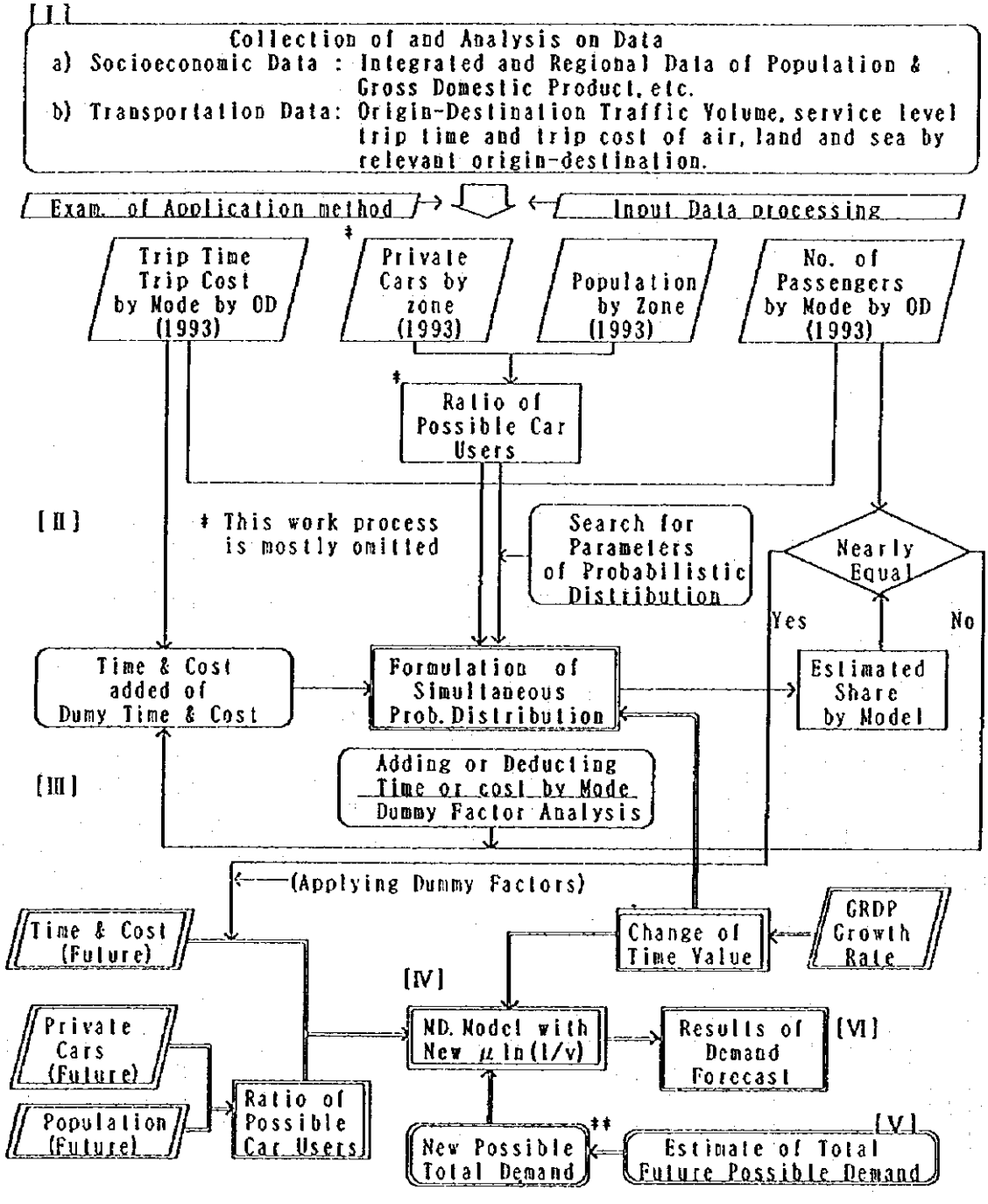


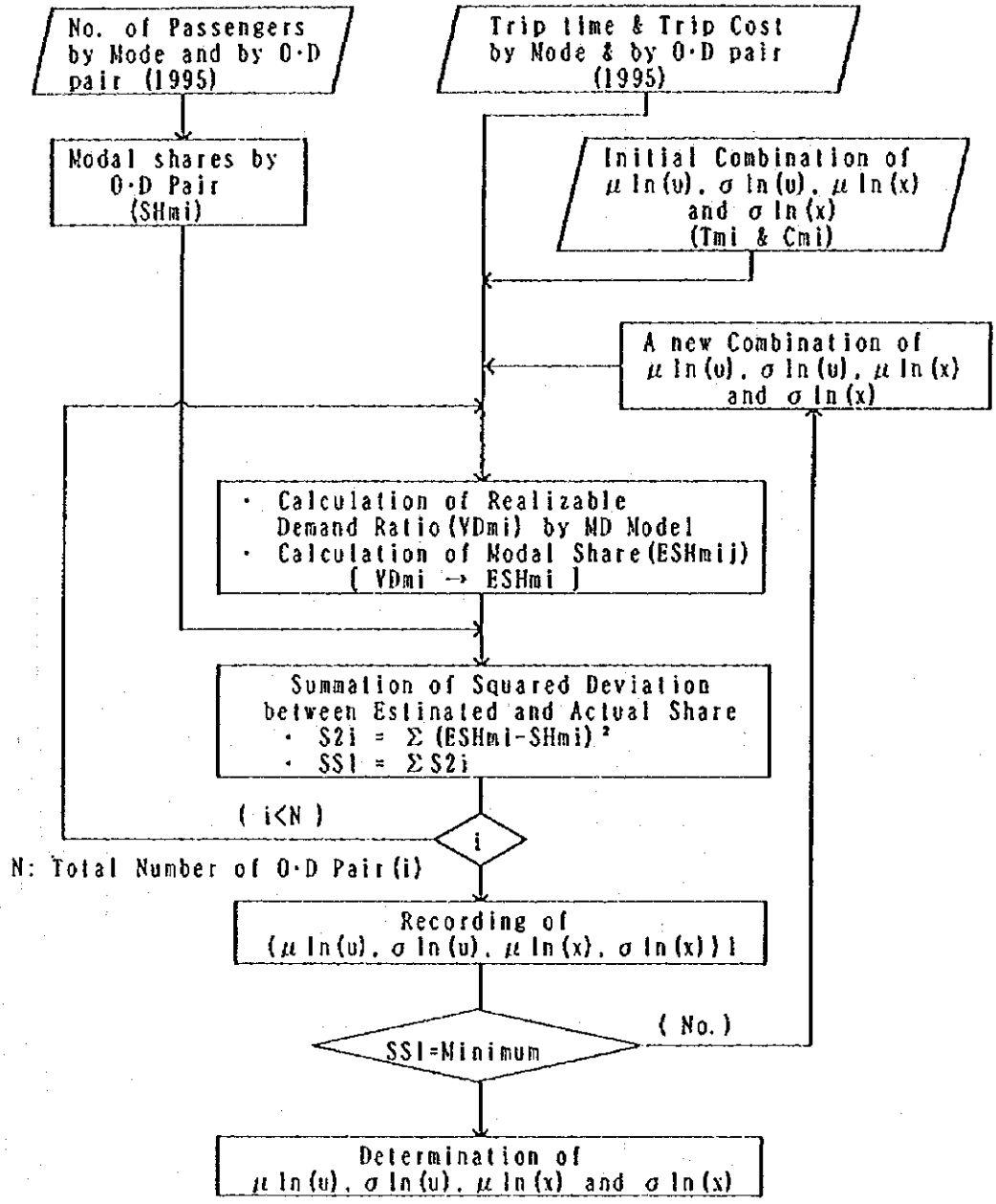

Figure 4 Indiffrence Curve for Competitive Modes

In the above figure, the curve formed connecting mode 1, 2, 7, 10, and 11 means "indifference curve" on which curve consumer's expenditure or productivity is equal to travel on this presumed origin-destination.
However, as clear from the figure mode (4) is located outside of the curve which means consumers expenditures is bigger than any other mode.
In RMD Model such mode as mode (4) is automatically excluded in accordance with the economic principles.

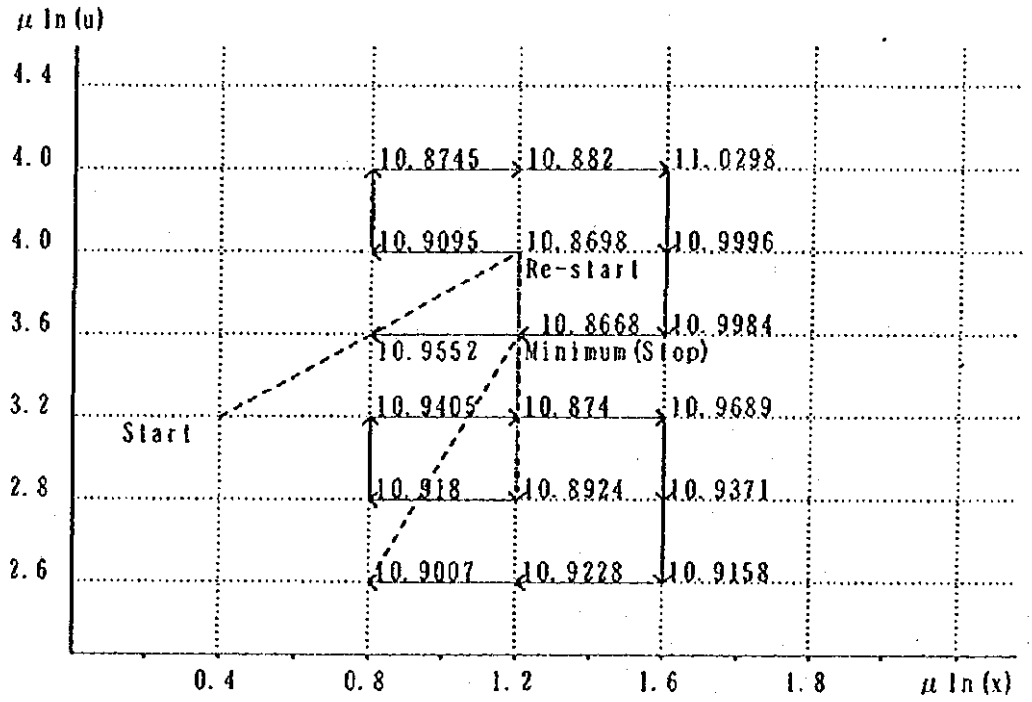
## Appendix-3.3.4 (20) Procedure of Traffic Demand Forecast by MD Model



## Appendix-3.3.4 (21) Procedure to Search Parameters of Simultaneous Probabilistic Normal Distribution



## Appendix-3.3.4 (22) Process of Searching an Optimum Combination of Parameters




Note: Values are minimum value of summed squared deviations for all mode of all O·D Pair among those for combinations of four(4) parameters of simultaneous normal distribution(See the here-to-attached tables.

## Appendix-3.3.4 (23) Parameters of Simultaneous Normal Distribution and Assumed Time Values by Case for Target Years

| | 1995 | 2000 | 2005 | 2010 | 2020 |
|---|---|---|---|---|---|
| Parameters | | | | | |
| $\mu$ loge(1/V) : Low Case | 1.20 | 1.13 | 1.01 | 0.84 | 0.52 |
| $\mu$ loge(1/V) : Medium Case | 1.20 | 1.10 | 0.94 | 0.73 | 0.32 |
| $\mu$ loge(1/V) : High Case | 1.20 | 1.07 | 0.86 | 0.60 | 0.11 |
| $\sigma$ loge(1/V) | 3.62 | 3.62 | 3.62 | 3.62 | 3.62 |
| $\mu$ loge(U) | 2.42 | 2.42 | 2.42 | 2.42 | 2.42 |
| $\sigma$ loge(U) | 3.42 | 3.42 | 3.42 | 3.42 | 3.42 |
| Annual GDP Growth Rate(%) | 1995-2000 | 2000-2005 | 2005-2010 | 2010-2020 | |
| in Kazakhstan: Low Case | 4.59 | 5.23 | 4.87 | 4.29 | |
| : Medium Case | 5.09 | 5.73 | 5.37 | 4.79 | |
| : High Case | 5.49 | 6.13 | 5.88 | 5.30 | |
| Index of GDP Growth(GDPID) | | | | | |
| (GDPID) (1995=1) Low Case | 1.000000 | 1.251558 | 1.614911 | 2.048354 | 3.117681 |
| (GDPID) (1995=1) Medium Case | 1.000000 | 1.281761 | 1.693550 | 2.199799 | 3.512218 |
| (GDPID) (1995=1) High Case | 1.000000 | 1.306341 | 1.758925 | 2.340545 | 3.922841 |
| Time Value(V) (100 tenge) | | | | | |
| Vt = V95*(GDPID)^k | | | | | |
| Low Case: Time Vaue(V) | 0.30 | 0.32 | 0.36 | 0.43 | 0.60 |
| k (1995-2000) : 0.30 | | | | | |
| k (2000-2005) : 0.40 | | | | | |
| k (2005-2010) : 0.50 | | | | | |
| k (2010-2020) : 0.60 | | | | | |
| Loge(1/V) | 1.20 | 1.13 | 1.01 | 0.84 | 0.52 |
| Medium Case: Time Value(V) | 0.30 | 0.33 | 0.39 | 0.48 | 0.73 |
| k (1995-2000) : 0.40 | | | | | |
| k (2000-2005) : 0.50 | | | | | |
| k (2005-2010) : 0.60 | | | | | |
| k (2010-2020) : 0.70 | | | | | |
| Loge(1/V) | 1.20 | 1.10 | 0.94 | 0.73 | 0.32 |
| High Case: Time Value(V) | 0.30 | 0.34 | 0.42 | 0.55 | 0.90 |
| k (1995-2000) : 0.50 | | | | | |
| k (2000-2005) : 0.60 | | | | | |
| k (2005-2010) : 0.70 | | | | | |
| k (2010-2020) : 0.80 | | | | | |
| Loge(1/V) | 1.20 | 1.07 | 0.86 | 0.60 | 0.11 |

## Appendix-3.3.4 (24) Total Number of Passenger and Modal Shares by OD Pair

| Zone (I) | Zone (J) | Item | Rail | | Air | | Auto | | Total | Total Pax. |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1 | Actual (A) | 0.3198 | 0 | 0.0000 | 0 | 0.6802 | 0 | 1.0000 | 1850.8 |
| 1 | 1 | Estimate (B) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | |
| 1 | 1 | (A)-(B) (C) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | - | |
| 2 | 1 | Actual (A) | 0.1498 | 0 | 0.0041 | 0 | 0.8471 | 0 | 1.0000 | 389.2 |
| 2 | 1 | Estimate (B) | 0.1468 | 0 | 0.0081 | 0 | 0.8452 | 0 | 1.0000 | |
| 2 | 1 | (A)-(B) (C) | 0.0020 | 0 | -0.0039 | 0 | 0.0020 | 0 | - | |
| 3 | 1 | Actual (A) | 0.7182 | 0 | 0.2276 | 0 | 0.0542 | 0 | 1.0000 | 158.6 |
| 3 | 1 | Estimate (B) | 0.7164 | 0 | 0.2307 | 0 | 0.0529 | 0 | 1.0000 | |
| 3 | 1 | (A)-(B) (C) | 0.0018 | 0 | -0.0031 | 0 | 0.0013 | 0 | - | |
| 4 | 1 | Actual (A) | 0.8403 | 0 | 0.1110 | 0 | 0.0486 | 0 | 1.0000 | 744.1 |
| 4 | 1 | Estimate (B) | 0.8384 | 0 | 0.1149 | 0 | 0.0466 | 0 | 1.0000 | |
| 4 | 1 | (A)-(B) (C) | 0.0019 | 0 | -0.0039 | 0 | 0.0020 | 0 | - | |
| 5 | 1 | Actual (A) | 0.8296 | 0 | 0.1197 | 0 | 0.0507 | 0 | 1.0000 | 244.7 |
| 5 | 1 | Estimate (B) | 0.8276 | 0 | 0.1237 | 0 | 0.0487 | 0 | 1.0000 | |
| 5 | 1 | (A)-(B) (C) | 0.0020 | 0 | -0.0040 | 0 | 0.0020 | 0 | - | |
| 6 | 1 | Actual (A) | 0.6958 | 0 | 0.2482 | 0 | 0.0559 | 0 | 1.0000 | 126.9 |
| 6 | 1 | Estimate (B) | 0.6940 | 0 | 0.2519 | 0 | 0.0542 | 0 | 1.0000 | |
| 6 | 1 | (A)-(B) (C) | 0.0018 | 0 | -0.0036 | 0 | 0.0018 | 0 | - | |
| 7 | 1 | Actual (A) | 0.7348 | 0 | 0.0788 | 0 | 0.1872 | 0 | 1.0000 | 288.5 |
| 7 | 1 | Estimate (B) | 0.7320 | 0 | 0.0821 | 0 | 0.1859 | 0 | 1.0000 | |
| 7 | 1 | (A)-(B) (C) | 0.0020 | 0 | -0.0033 | 0 | 0.0013 | 0 | - | |
| 8 | 1 | Actual (A) | 0.4666 | 0 | 0.1681 | 0 | 0.3653 | 0 | 1.0000 | 685.4 |
| 8 | 1 | Estimate (B) | 0.4646 | 0 | 0.1714 | 0 | 0.3640 | 0 | 1.0000 | |
| 8 | 1 | (A)-(B) (C) | 0.0020 | 0 | -0.0034 | 0 | 0.0014 | 0 | - | |
| 9 | 1 | Actual (A) | 0.3759 | 0 | 0.0440 | 0 | 0.5802 | 0 | 1.0000 | 584.5 |
| 9 | 1 | Estimate (B) | 0.3739 | 0 | 0.0476 | 0 | 0.5786 | 0 | 1.0000 | |
| 9 | 1 | (A)-(B) (C) | 0.0020 | 0 | -0.0036 | 0 | 0.0016 | 0 | - | |
| 10 | 1 | Actual (A) | 0.7936 | 0 | 0.1512 | 0 | 0.0552 | 0 | 1.0000 | 402.1 |
| 10 | 1 | Estimate (B) | 0.7922 | 0 | 0.1546 | 0 | 0.0532 | 0 | 1.0000 | |
| 10 | 1 | (A)-(B) (C) | 0.0014 | 0 | -0.0034 | 0 | 0.0020 | 0 | - | |
| 11 | 1 | Actual (A) | 0.6639 | 0 | 0.1951 | 0 | 0.1410 | 0 | 1.0000 | 251.7 |
| 11 | 1 | Estimate (B) | 0.6619 | 0 | 0.1985 | 0 | 0.1396 | 0 | 1.0000 | |
| 11 | 1 | (A)-(B) (C) | 0.0020 | 0 | -0.0035 | 0 | 0.0015 | 0 | - | |
| 12 | 1 | Actual (A) | 0.7895 | 0 | 0.1238 | 0 | 0.0867 | 0 | 1.0000 | 161.5 |
| 12 | 1 | Estimate (B) | 0.7876 | 0 | 0.1277 | 0 | 0.0847 | 0 | 1.0000 | |
| 12 | 1 | (A)-(B) (C) | 0.0018 | 0 | -0.0038 | 0 | 0.0020 | 0 | - | |
| 13 | 1 | Actual (A) | 0.8912 | 0 | 0.0713 | 0 | 0.0375 | 0 | 1.0000 | 1242.6 |
| 13 | 1 | Estimate (B) | 0.8896 | 0 | 0.0728 | 0 | 0.0376 | 0 | 1.0000 | |
| 13 | 1 | (A)-(B) (C) | 0.0016 | 0 | -0.0015 | 0 | -0.0001 | 0 | - | |
| 14 | 1 | Actual (A) | 0.9092 | 0 | 0.0563 | 0 | 0.0344 | 0 | 1.0000 | 246.8 |
| 14 | 1 | Estimate (B) | 0.9073 | 0 | 0.0602 | 0 | 0.0324 | 0 | 1.0000 | |
| 14 | 1 | (A)-(B) (C) | 0.0019 | 0 | -0.0039 | 0 | 0.0020 | 0 | - | |
| 15 | 1 | Actual (A) | 0.2449 | 0 | 0.0780 | 0 | 0.6771 | 0 | 1.0000 | 569.3 |
| 15 | 1 | Estimate (B) | 0.2429 | 0 | 0.0809 | 0 | 0.6762 | 0 | 1.0000 | |
| 15 | 1 | (A)-(B) (C) | 0.0020 | 0 | -0.0030 | 0 | 0.0010 | 0 | - | |
| 16 | 1 | Actual (A) | 0.7267 | 0 | 0.2430 | 0 | 0.0303 | 0 | 1.0000 | 181.5 |
| 16 | 1 | Estimate (B) | 0.7256 | 0 | 0.2458 | 0 | 0.0286 | 0 | 1.0000 | |
| 16 | 1 | (A)-(B) (C) | 0.0011 | 0 | -0.0029 | 0 | 0.0017 | 0 | - | |
| 17 | 1 | Actual (A) | 0.7365 | 0 | 0.2407 | 0 | 0.0228 | 0 | 1.0000 | 70.2 |
| 17 | 1 | Estimate (B) | 0.7346 | 0 | 0.2445 | 0 | 0.0209 | 0 | 1.0000 | |
| 17 | 1 | (A)-(B) (C) | 0.0019 | 0 | -0.0037 | 0 | 0.0019 | 0 | - | |
| 18 | 1 | Actual (A) | 0.4485 | 0 | 0.1933 | 0 | 0.3582 | 0 | 1.0000 | 148.5 |
| 18 | 1 | Estimate (B) | 0.4465 | 0 | 0.1962 | 0 | 0.3573 | 0 | 1.0000 | |
| 18 | 1 | (A)-(B) (C) | 0.0019 | 0 | -0.0029 | 0 | 0.0010 | 0 | - | |
| 19 | 1 | Actual (A) | 0.0867 | 0 | 0.0000 | 0 | 0.9133 | 0 | 1.0000 | 2028.2 |
| 19 | 1 | Estimate (B) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | |
| 19 | 1 | (A)-(B) (C) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | - | |
| 20 | 1 | Actual (A) | 0.3986 | 0 | 0.5645 | 0 | 0.0369 | 0 | 1.0000 | 915.8 |
| 20 | 1 | Estimate (B) | 0.4003 | 0 | 0.5608 | 0 | 0.0389 | 0 | 1.0000 | |
| 20 | 1 | (A)-(B) (C) | -0.0018 | 0 | 0.0037 | 0 | -0.0019 | 0 | - | |
| 21 | 1 | Actual (A) | 0.8247 | 0 | 0.1180 | 0 | 0.0653 | 0 | 1.0000 | 370.8 |
| 21 | 1 | Estimate (B) | 0.8230 | 0 | 0.1136 | 0 | 0.0634 | 0 | 1.0000 | |
| 21 | 1 | (A)-(B) (C) | 0.0017 | 0 | -0.0036 | 0 | 0.0019 | 0 | - | |
| 22 | 1 | Actual (A) | 0.5793 | 0 | 0.2236 | 0 | 0.1971 | 0 | 1.0000 | 181.6 |
| 22 | 1 | Estimate (B) | 0.5773 | 0 | 0.2271 | 0 | 0.1956 | 0 | 1.0000 | |
| 22 | 1 | (A)-(B) (C) | 0.0020 | 0 | -0.0035 | 0 | 0.0015 | 0 | - | |
| 23 | 1 | Actual (A) | 0.8927 | 0 | 0.0676 | 0 | 0.0397 | 0 | 1.0000 | 68.4 |
| 23 | 1 | Estimate (B) | 0.8938 | 0 | 0.0648 | 0 | 0.0414 | 0 | 1.0000 | |
| 23 | 1 | (A)-(B) (C) | -0.0011 | 0 | 0.0027 | 0 | -0.0017 | 0 | - | |
| 24 | 1 | Actual (A) | 0.0000 | 0 | 0.9149 | 0 | 0.0851 | 0 | 1.0000 | 9.4 |
| 24 | 1 | Estimate (B) | 0.0000 | 0 | 0.9129 | 0 | 0.0871 | 0 | 1.0000 | |
| 24 | 1 | (A)-(B) (C) | 0.0000 | 0 | 0.0020 | 0 | -0.0020 | 0 | - | |
| 2 | 2 | Actual (A) | 0.0132 | 0 | 0.0000 | 0 | 0.9868 | 0 | 1.0000 | 8859.5 |
| 2 | 2 | Estimate (B) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | |
| 2 | 2 | (A)-(B) (C) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | - | |

## Total Number of Passenger and Modal Shares by OD Pair

| Zone (i) | Zone (j) | Item | Rail | | Air | | Auto | | Total | Total Pax. |
|---|---|---|---|---|---|---|---|---|---|---|
| 3 | 2 | Actual (A) | 0.0434 | 0 | 0.0081 | 0 | 0.9565 | 0 | 1.0000 | 1617.3 |
| 3 | 2 | Estimate (B) | 0.0415 | 0 | 0.0034 | 0 | 0.9551 | 0 | 1.0000 | |
| 3 | 2 | (A)-(B) (C) | 0.0019 | 0 | -0.0034 | 0 | 0.0014 | 0 | - | |
| 4 | 2 | Actual (A) | 0.1583 | 0 | 0.0000 | 0 | 0.8417 | 0 | 1.0000 | 432.7 |
| 4 | 2 | Estimate (B) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | |
| 4 | 2 | (A)-(B) (C) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | - | |
| 5 | 2 | Actual (A) | 0.1121 | 0 | 0.0000 | 0 | 0.8879 | 0 | 1.0000 | 490.8 |
| 5 | 2 | Estimate (B) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | |
| 5 | 2 | (A)-(B) (C) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | - | |
| 6 | 2 | Actual (A) | 0.0329 | 0 | 0.0056 | 0 | 0.9615 | 0 | 1.0000 | 906.0 |
| 6 | 2 | Estimate (B) | 0.0310 | 0 | 0.0095 | 0 | 0.9595 | 0 | 1.0000 | |
| 6 | 2 | (A)-(B) (C) | 0.0019 | 0 | -0.0039 | 0 | 0.0020 | 0 | - | |
| 7 | 2 | Actual (A) | 0.1419 | 0 | 0.2116 | 0 | 0.6465 | 0 | 1.0000 | 152.2 |
| 7 | 2 | Estimate (B) | 0.1407 | 0 | 0.2148 | 0 | 0.6445 | 0 | 1.0000 | |
| 7 | 2 | (A)-(B) (C) | 0.0013 | 0 | -0.0033 | 0 | 0.0020 | 0 | - | |
| 8 | 2 | Actual (A) | 0.1091 | 0 | 0.0000 | 0 | 0.8909 | 0 | 1.0000 | 310.8 |
| 8 | 2 | Estimate (B) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | |
| 8 | 2 | (A)-(B) (C) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | - | |
| 9 | 2 | Actual (A) | 0.1118 | 0 | 0.0000 | 0 | 0.8882 | 0 | 1.0000 | 155.6 |
| 9 | 2 | Estimate (B) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | |
| 9 | 2 | (A)-(B) (C) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | - | |
| 10 | 2 | Actual (A) | 0.1838 | 0 | 0.0000 | 0 | 0.8162 | 0 | 1.0000 | 217.1 |
| 10 | 2 | Estimate (B) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | |
| 10 | 2 | (A)-(B) (C) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | - | |
| 11 | 2 | Actual (A) | 0.1623 | 0 | 0.0000 | 0 | 0.8377 | 0 | 1.0000 | 88.1 |
| 11 | 2 | Estimate (B) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | |
| 11 | 2 | (A)-(B) (C) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | - | |
| 12 | 2 | Actual (A) | 0.1559 | 0 | 0.0000 | 0 | 0.8441 | 0 | 1.0000 | 121.0 |
| 12 | 2 | Estimate (B) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | |
| 12 | 2 | (A)-(B) (C) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | - | |
| 13 | 2 | Actual (A) | 0.4396 | 0 | 0.0000 | 0 | 0.5604 | 0 | 1.0000 | 285.5 |
| 13 | 2 | Estimate (B) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | |
| 13 | 2 | (A)-(B) (C) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | - | |
| 14 | 2 | Actual (A) | 0.2183 | 0 | 0.0000 | 0 | 0.7817 | 0 | 1.0000 | 146.1 |
| 14 | 2 | Estimate (B) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | |
| 14 | 2 | (A)-(B) (C) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | - | |
| 15 | 2 | Actual (A) | 0.1259 | 0 | 0.0000 | 0 | 0.8741 | 0 | 1.0000 | 234.4 |
| 15 | 2 | Estimate (B) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | |
| 15 | 2 | (A)-(B) (C) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | - | |
| 16 | 2 | Actual (A) | 0.1103 | 0 | 0.0000 | 0 | 0.8897 | 0 | 1.0000 | 135.1 |
| 16 | 2 | Estimate (B) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | |
| 16 | 2 | (A)-(B) (C) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | - | |
| 17 | 2 | Actual (A) | 0.1565 | 0 | 0.0000 | 0 | 0.8435 | 0 | 1.0000 | 55.6 |
| 17 | 2 | Estimate (B) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | |
| 17 | 2 | (A)-(B) (C) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | - | |
| 18 | 2 | Actual (A) | 0.0839 | 0 | 0.0585 | 0 | 0.8576 | 0 | 1.0000 | 220.9 |
| 18 | 2 | Estimate (B) | 0.0820 | 0 | 0.0622 | 0 | 0.8558 | 0 | 1.0000 | |
| 18 | 2 | (A)-(B) (C) | 0.0019 | 0 | -0.0037 | 0 | 0.0018 | 0 | - | |
| 19 | 2 | Actual (A) | 0.1312 | 0 | 0.0000 | 0 | 0.8688 | 0 | 1.0000 | 58.7 |
| 19 | 2 | Estimate (B) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | |
| 19 | 2 | (A)-(B) (C) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | - | |
| 20 | 2 | Actual (A) | 0.0660 | 0 | 0.0012 | 0 | 0.9328 | 0 | 1.0000 | 2816.0 |
| 20 | 2 | Estimate (B) | 0.0641 | 0 | 0.0044 | 0 | 0.9315 | 0 | 1.0000 | |
| 20 | 2 | (A)-(B) (C) | 0.0019 | 0 | -0.0032 | 0 | 0.0013 | 0 | - | |
| 21 | 2 | Actual (A) | 0.0986 | 0 | 0.0006 | 0 | 0.9007 | 0 | 1.0000 | 1241.2 |
| 21 | 2 | Estimate (B) | 0.0971 | 0 | 0.0036 | 0 | 0.8994 | 0 | 1.0000 | |
| 21 | 2 | (A)-(B) (C) | 0.0016 | 0 | -0.0029 | 0 | 0.0014 | 0 | - | |
| 22 | 2 | Actual (A) | 0.1019 | 0 | 0.0035 | 0 | 0.8946 | 0 | 1.0000 | 113.8 |
| 22 | 2 | Estimate (B) | 0.1007 | 0 | 0.0068 | 0 | 0.8926 | 0 | 1.0000 | |
| 22 | 2 | (A)-(B) (C) | 0.0013 | 0 | -0.0032 | 0 | 0.0020 | 0 | - | |
| 23 | 2 | Actual (A) | 0.2069 | 0 | 0.1724 | 0 | 0.6207 | 0 | 1.0000 | 5.8 |
| 23 | 2 | Estimate (B) | 0.2089 | 0 | 0.1687 | 0 | 0.6224 | 0 | 1.0000 | |
| 23 | 2 | (A)-(B) (C) | -0.0020 | 0 | 0.0037 | 0 | -0.0017 | 0 | - | |
| 24 | 2 | Actual (A) | 0.0000 | 0 | 0.0588 | 0 | 0.9412 | 0 | 1.0000 | 3.4 |
| 24 | 2 | Estimate (B) | 0.0000 | 0 | 0.0607 | 0 | 0.9393 | 0 | 1.0000 | |
| 24 | 2 | (A)-(B) (C) | 0.0000 | 0 | -0.0018 | 0 | 0.0018 | 0 | - | |
| 3 | 3 | Actual (A) | 0.6849 | 0 | 0.0000 | 0 | 0.3151 | 0 | 1.0000 | 407.5 |
| 3 | 3 | Estimate (B) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | |
| 3 | 3 | (A)-(B) (C) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | - | |
| 4 | 3 | Actual (A) | 0.9144 | 0 | 0.0190 | 0 | 0.0667 | 0 | 1.0000 | 153.0 |
| 4 | 3 | Estimate (B) | 0.9125 | 0 | 0.0228 | 0 | 0.0647 | 0 | 1.0000 | |
| 4 | 3 | (A)-(B) (C) | 0.0019 | 0 | -0.0038 | 0 | 0.0020 | 0 | - | |
| 5 | 3 | Actual (A) | 0.8357 | 0 | 0.0000 | 0 | 0.1643 | 0 | 1.0000 | 166.2 |
| 5 | 3 | Estimate (B) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | |
| 5 | 3 | (A)-(B) (C) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | - | |

## Total Number of Passenger and Modal Shares by OD Pair

| Zone (i) | Zone (j) | Item | Rail | | Air | | Auto | | Total | Total Pax. |
|---|---|---|---|---|---|---|---|---|---|---|
| 6 | 3 | Actual (A) | 0.7065 | 0 | 0.0027 | 0 | 0.2888 | 0 | 1.0000 | 118.8 |
| 6 | 3 | Estimate (B) | 0.7065 | 0 | 0.0061 | 0 | 0.2874 | 0 | 1.0000 | |
| 6 | 3 | (A)-(B) (C) | 0.0020 | 0 | -0.0034 | 0 | 0.0014 | 0 | - | |
| 7 | 3 | Actual (A) | 0.9284 | 0 | 0.0000 | 0 | 0.0716 | 0 | 1.0000 | 44.7 |
| 7 | 3 | Estimate (B) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | |
| 7 | 3 | (A)-(B) (C) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | - | |
| 8 | 3 | Actual (A) | 0.7705 | 0 | 0.0054 | 0 | 0.2241 | 0 | 1.0000 | 92.8 |
| 8 | 3 | Estimate (B) | 0.7698 | 0 | 0.0080 | 0 | 0.2222 | 0 | 1.0000 | |
| 8 | 3 | (A)-(B) (C) | 0.0007 | 0 | -0.0026 | 0 | 0.0019 | 0 | - | |
| 9 | 3 | Actual (A) | 0.7297 | 0 | 0.0000 | 0 | 0.2703 | 0 | 1.0000 | 49.2 |
| 9 | 3 | Estimate (B) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | |
| 9 | 3 | (A)-(B) (C) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | - | |
| 10 | 3 | Actual (A) | 0.9046 | 0 | 0.0108 | 0 | 0.0846 | 0 | 1.0000 | 92.2 |
| 10 | 3 | Estimate (B) | 0.9027 | 0 | 0.0147 | 0 | 0.0826 | 0 | 1.0000 | |
| 10 | 3 | (A)-(B) (C) | 0.0019 | 0 | -0.0038 | 0 | 0.0020 | 0 | - | |
| 11 | 3 | Actual (A) | 0.8754 | 0 | 0.0000 | 0 | 0.1246 | 0 | 1.0000 | 31.3 |
| 11 | 3 | Estimate (B) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | |
| 11 | 3 | (A)-(B) (C) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | - | |
| 12 | 3 | Actual (A) | 0.8356 | 0 | 0.0000 | 0 | 0.1644 | 0 | 1.0000 | 50.5 |
| 12 | 3 | Estimate (B) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | |
| 12 | 3 | (A)-(B) (C) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | - | |
| 13 | 3 | Actual (A) | 0.9578 | 0 | 0.0043 | 0 | 0.0379 | 0 | 1.0000 | 255.8 |
| 13 | 3 | Estimate (B) | 0.9564 | 0 | 0.0076 | 0 | 0.0360 | 0 | 1.0000 | |
| 13 | 3 | (A)-(B) (C) | 0.0013 | 0 | -0.0033 | 0 | 0.0019 | 0 | - | |
| 14 | 3 | Actual (A) | 0.9077 | 0 | 0.0000 | 0 | 0.0923 | 0 | 1.0000 | 72.6 |
| 14 | 3 | Estimate (B) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | |
| 14 | 3 | (A)-(B) (C) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | - | |
| 15 | 3 | Actual (A) | 0.3444 | 0 | 0.0000 | 0 | 0.6556 | 0 | 1.0000 | 165.2 |
| 15 | 3 | Estimate (B) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | |
| 15 | 3 | (A)-(B) (C) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | - | |
| 16 | 3 | Actual (A) | 0.8818 | 0 | 0.0030 | 0 | 0.1152 | 0 | 1.0000 | 33.0 |
| 16 | 3 | Estimate (B) | 0.8798 | 0 | 0.0056 | 0 | 0.1145 | 0 | 1.0000 | |
| 16 | 3 | (A)-(B) (C) | 0.0020 | 0 | -0.0026 | 0 | 0.0006 | 0 | - | |
| 17 | 3 | Actual (A) | 0.8423 | 0 | 0.0225 | 0 | 0.1351 | 0 | 1.0000 | 22.2 |
| 17 | 3 | Estimate (B) | 0.8404 | 0 | 0.0264 | 0 | 0.1332 | 0 | 1.0000 | |
| 17 | 3 | (A)-(B) (C) | 0.0020 | 0 | -0.0039 | 0 | 0.0019 | 0 | - | |
| 18 | 3 | Actual (A) | 0.3099 | 0 | 0.0578 | 0 | 0.6323 | 0 | 1.0000 | 134.9 |
| 18 | 3 | Estimate (B) | 0.3079 | 0 | 0.0614 | 0 | 0.6307 | 0 | 1.0000 | |
| 18 | 3 | (A)-(B) (C) | 0.0019 | 0 | -0.0035 | 0 | 0.0016 | 0 | - | |
| 19 | 3 | Actual (A) | 0.6107 | 0 | 0.0000 | 0 | 0.3893 | 0 | 1.0000 | 24.4 |
| 19 | 3 | Estimate (B) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | |
| 19 | 3 | (A)-(B) (C) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | - | |
| 20 | 3 | Actual (A) | 0.5425 | 0 | 0.0357 | 0 | 0.4218 | 0 | 1.0000 | 364.6 |
| 20 | 3 | Estimate (B) | 0.5408 | 0 | 0.0393 | 0 | 0.4199 | 0 | 1.0000 | |
| 20 | 3 | (A)-(B) (C) | 0.0017 | 0 | -0.0036 | 0 | 0.0020 | 0 | - | |
| 21 | 3 | Actual (A) | 0.5758 | 0 | 0.0019 | 0 | 0.4223 | 0 | 1.0000 | 312.6 |
| 21 | 3 | Estimate (B) | 0.5740 | 0 | 0.0057 | 0 | 0.4203 | 0 | 1.0000 | |
| 21 | 3 | (A)-(B) (C) | 0.0018 | 0 | -0.0038 | 0 | 0.0020 | 0 | - | |
| 22 | 3 | Actual (A) | 0.5604 | 0 | 0.0110 | 0 | 0.4286 | 0 | 1.0000 | 36.4 |
| 22 | 3 | Estimate (B) | 0.5588 | 0 | 0.0146 | 0 | 0.4267 | 0 | 1.0000 | |
| 22 | 3 | (A)-(B) (C) | 0.0017 | 0 | -0.0036 | 0 | 0.0019 | 0 | - | |
| 23 | 3 | Actual (A) | 0.4000 | 0 | 0.4000 | 0 | 0.2000 | 0 | 1.0000 | 2.0 |
| 23 | 3 | Estimate (B) | 0.3980 | 0 | 0.4040 | 0 | 0.1980 | 0 | 1.0000 | |
| 23 | 3 | (A)-(B) (C) | 0.0020 | 0 | -0.0040 | 0 | 0.0020 | 0 | - | |
| 24 | 3 | Actual (A) | 0.0000 | 0 | 0.3333 | 0 | 0.6667 | 0 | 1.0000 | 0.6 |
| 24 | 3 | Estimate (B) | 0.0000 | 0 | 0.3345 | 0 | 0.6655 | 0 | 1.0000 | |
| 24 | 3 | (A)-(B) (C) | 0.0000 | 0 | -0.0012 | 0 | 0.0012 | 0 | - | |
| 4 | 4 | Actual (A) | 0.6645 | 0 | 0.0000 | 0 | 0.3355 | 0 | 1.0000 | 1530.1 |
| 4 | 4 | Estimate (B) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | |
| 4 | 4 | (A)-(B) (C) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | - | |
| 5 | 4 | Actual (A) | 0.9440 | 0 | 0.0000 | 0 | 0.0560 | 0 | 1.0000 | 364.6 |
| 5 | 4 | Estimate (B) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | |
| 5 | 4 | (A)-(B) (C) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | - | |
| 6 | 4 | Actual (A) | 0.8909 | 0 | 0.0541 | 0 | 0.0550 | 0 | 1.0000 | 107.2 |
| 6 | 4 | Estimate (B) | 0.8892 | 0 | 0.0578 | 0 | 0.0531 | 0 | 1.0000 | |
| 6 | 4 | (A)-(B) (C) | 0.0017 | 0 | -0.0037 | 0 | 0.0020 | 0 | - | |
| 7 | 4 | Actual (A) | 0.8272 | 0 | 0.0152 | 0 | 0.1576 | 0 | 1.0000 | 262.7 |
| 7 | 4 | Estimate (B) | 0.8252 | 0 | 0.0188 | 0 | 0.1561 | 0 | 1.0000 | |
| 7 | 4 | (A)-(B) (C) | 0.0020 | 0 | -0.0035 | 0 | 0.0015 | 0 | - | |
| 8 | 4 | Actual (A) | 0.8215 | 0 | 0.0231 | 0 | 0.1555 | 0 | 1.0000 | 351.2 |
| 8 | 4 | Estimate (B) | 0.8197 | 0 | 0.0268 | 0 | 0.1535 | 0 | 1.0000 | |
| 8 | 4 | (A)-(B) (C) | 0.0018 | 0 | -0.0037 | 0 | 0.0020 | 0 | - | |
| 9 | 4 | Actual (A) | 0.7344 | 0 | 0.0000 | 0 | 0.2656 | 0 | 1.0000 | 250.4 |
| 9 | 4 | Estimate (B) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | |
| 9 | 4 | (A)-(B) (C) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | - | |

## Total Number of Passenger and Modal Shares by OD Pair

| Zone (i) | Zone (j) | Item | Rail | | Air | | Auto | | Total | Total Pax. |
|---|---|---|---|---|---|---|---|---|---|---|
| 10 | 4 | Actual (A) | 0.7836 | 0 | 0.0000 | 0 | 0.2164 | 0 | 1.0000 | 1459.8 |
| 10 | 4 | Estimate (B) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | |
| 10 | 4 | (A)-(B) (C) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | - | |
| 11 | 4 | Actual (A) | 0.6735 | 0 | 0.0085 | 0 | 0.3260 | 0 | 1.0000 | 219.0 |
| 11 | 4 | Estimate (B) | 0.6715 | 0 | 0.0037 | 0 | 0.3247 | 0 | 1.0000 | |
| 11 | 4 | (A)-(B) (C) | 0.0020 | 0 | -0.0033 | 0 | 0.0013 | 0 | - | |
| 12 | 4 | Actual (A) | 0.8011 | 0 | 0.0000 | 0 | 0.1989 | 0 | 1.0000 | 339.4 |
| 12 | 4 | Estimate (B) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | |
| 12 | 4 | (A)-(B) (C) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | - | |
| 13 | 4 | Actual (A) | 0.8576 | 0 | 0.0000 | 0 | 0.1424 | 0 | 1.0000 | 2030.8 |
| 13 | 4 | Estimate (B) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | |
| 13 | 4 | (A)-(B) (C) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | - | |
| 14 | 4 | Actual (A) | 0.9285 | 0 | 0.0000 | 0 | 0.0715 | 0 | 1.0000 | 411.0 |
| 14 | 4 | Estimate (B) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | |
| 14 | 4 | (A)-(B) (C) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | - | |
| 15 | 4 | Actual (A) | 0.2471 | 0 | 0.0007 | 0 | 0.7522 | 0 | 1.0000 | 536.3 |
| 15 | 4 | Estimate (B) | 0.2451 | 0 | 0.0044 | 0 | 0.7505 | 0 | 1.0000 | |
| 15 | 4 | (A)-(B) (C) | 0.0020 | 0 | -0.0036 | 0 | 0.0017 | 0 | - | |
| 16 | 4 | Actual (A) | 0.9222 | 0 | 0.0000 | 0 | 0.0778 | 0 | 1.0000 | 304.8 |
| 16 | 4 | Estimate (B) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | |
| 16 | 4 | (A)-(B) (C) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | - | |
| 17 | 4 | Actual (A) | 0.8855 | 0 | 0.0000 | 0 | 0.1145 | 0 | 1.0000 | 98.8 |
| 17 | 4 | Estimate (B) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | |
| 17 | 4 | (A)-(B) (C) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | - | |
| 18 | 4 | Actual (A) | 0.6102 | 0 | 0.0000 | 0 | 0.3898 | 0 | 1.0000 | 115.2 |
| 18 | 4 | Estimate (B) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | |
| 18 | 4 | (A)-(B) (C) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | - | |
| 19 | 4 | Actual (A) | 0.4490 | 0 | 0.0000 | 0 | 0.5510 | 0 | 1.0000 | 161.7 |
| 19 | 4 | Estimate (B) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | |
| 19 | 4 | (A)-(B) (C) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | - | |
| 20 | 4 | Actual (A) | 0.7398 | 0 | 0.1898 | 0 | 0.0705 | 0 | 1.0000 | 488.0 |
| 20 | 4 | Estimate (B) | 0.7416 | 0 | 0.1861 | 0 | 0.0723 | 0 | 1.0000 | |
| 20 | 4 | (A)-(B) (C) | -0.0019 | 0 | 0.0036 | 0 | -0.0018 | 0 | - | |
| 21 | 4 | Actual (A) | 0.9130 | 0 | 0.0158 | 0 | 0.0712 | 0 | 1.0000 | 317.4 |
| 21 | 4 | Estimate (B) | 0.9111 | 0 | 0.0195 | 0 | 0.0694 | 0 | 1.0000 | |
| 21 | 4 | (A)-(B) (C) | 0.0019 | 0 | -0.0037 | 0 | 0.0018 | 0 | - | |
| 22 | 4 | Actual (A) | 0.8495 | 0 | 0.0332 | 0 | 0.1173 | 0 | 1.0000 | 78.4 |
| 22 | 4 | Estimate (B) | 0.8476 | 0 | 0.0370 | 0 | 0.1155 | 0 | 1.0000 | |
| 22 | 4 | (A)-(B) (C) | 0.0020 | 0 | -0.0038 | 0 | 0.0018 | 0 | - | |
| 23 | 4 | Actual (A) | 0.3273 | 0 | 0.6000 | 0 | 0.0727 | 0 | 1.0000 | 11.0 |
| 23 | 4 | Estimate (B) | 0.3281 | 0 | 0.5972 | 0 | 0.0747 | 0 | 1.0000 | |
| 23 | 4 | (A)-(B) (C) | -0.0008 | 0 | 0.0028 | 0 | -0.0020 | 0 | - | 1.4 |
| 24 | 4 | Actual (A) | 0.8000 | 0 | 0.7143 | 0 | 0.2857 | 0 | 1.0000 | |
| 24 | 4 | Estimate (B) | 0.0000 | 0 | 0.7123 | 0 | 0.2877 | 0 | 1.0000 | |
| 24 | 4 | (A)-(B) (C) | 0.8000 | 0 | 0.0020 | 0 | -0.0020 | 0 | - | |
| 5 | 5 | Actual (A) | 0.5017 | 0 | 0.0000 | 0 | 0.4983 | 0 | 1.0000 | 807.4 |
| 5 | 5 | Estimate (B) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | |
| 5 | 5 | (A)-(B) (C) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | - | |
| 6 | 5 | Actual (A) | 0.8773 | 0 | 0.0082 | 0 | 0.1145 | 0 | 1.0000 | 85.6 |
| 6 | 5 | Estimate (B) | 0.8759 | 0 | 0.0116 | 0 | 0.1125 | 0 | 1.0000 | |
| 6 | 5 | (A)-(B) (C) | 0.0014 | 0 | -0.0034 | 0 | 0.0020 | 0 | - | |
| 7 | 5 | Actual (A) | 0.9033 | 0 | 0.0122 | 0 | 0.0845 | 0 | 1.0000 | 98.2 |
| 7 | 5 | Estimate (B) | 0.9016 | 0 | 0.0159 | 0 | 0.0825 | 0 | 1.0000 | |
| 7 | 5 | (A)-(B) (C) | 0.0017 | 0 | -0.0037 | 0 | 0.0020 | 0 | - | |
| 8 | 5 | Actual (A) | 0.7892 | 0 | 0.0000 | 0 | 0.2108 | 0 | 1.0000 | 116.7 |
| 8 | 5 | Estimate (B) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | |
| 8 | 5 | (A)-(B) (C) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | - | |
| 9 | 5 | Actual (A) | 0.6315 | 0 | 0.0147 | 0 | 0.3538 | 0 | 1.0000 | 74.9 |
| 9 | 5 | Estimate (B) | 0.6295 | 0 | 0.0179 | 0 | 0.3526 | 0 | 1.0000 | |
| 9 | 5 | (A)-(B) (C) | 0.0020 | 0 | -0.0032 | 0 | 0.0012 | 0 | - | |
| 10 | 5 | Actual (A) | 0.8688 | 0 | 0.0000 | 0 | 0.1312 | 0 | 1.0000 | 256.1 |
| 10 | 5 | Estimate (B) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | |
| 10 | 5 | (A)-(B) (C) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | - | |
| 11 | 5 | Actual (A) | 0.8865 | 0 | 0.0000 | 0 | 0.1135 | 0 | 1.0000 | 65.2 |
| 11 | 5 | Estimate (B) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | |
| 11 | 5 | (A)-(B) (C) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | - | |
| 12 | 5 | Actual (A) | 0.7142 | 0 | 0.0000 | 0 | 0.2858 | 0 | 1.0000 | 223.2 |
| 12 | 5 | Estimate (B) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | |
| 12 | 5 | (A)-(B) (C) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | - | |
| 13 | 5 | Actual (A) | 0.9581 | 0 | 0.0000 | 0 | 0.0419 | 0 | 1.0000 | 689.8 |
| 13 | 5 | Estimate (B) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | |
| 13 | 5 | (A)-(B) (C) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | - | |
| 14 | 5 | Actual (A) | 0.8212 | 0 | 0.0000 | 0 | 0.1788 | 0 | 1.0000 | 249.4 |
| 14 | 5 | Estimate (B) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | |
| 14 | 5 | (A)-(B) (C) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | - | |

## Total Number of Passenger and Modal Shares by OD Pair

| Zone (I) | Zone (J) | Item | Rail | | Air | | Auto | | Total | Total Pax. |
|---|---|---|---|---|---|---|---|---|---|---|
| 15 | 5 | Actual (A) | 0.3532 | 0 | 0.0060 | 0 | 0.6408 | 0 | 1.0000 | 214.9 |
| 15 | 5 | Estimate (B) | 0.3512 | 0 | 0.0098 | 0 | 0.6390 | 0 | 1.0000 | |
| 15 | 5 | (A)-(B) (C) | 0.0020 | 0 | -0.0037 | 0 | 0.0017 | 0 | - | |
| 16 | 5 | Actual (A) | 0.8238 | 0 | 0.0000 | 0 | 0.1762 | 0 | 1.0000 | 76.6 |
| 16 | 5 | Estimate (B) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | |
| 16 | 5 | (A)-(B) (C) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | - | |
| 17 | 5 | Actual (A) | 0.8248 | 0 | 0.0000 | 0 | 0.1752 | 0 | 1.0000 | 62.8 |
| 17 | 5 | Estimate (B) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | |
| 17 | 5 | (A)-(B) (C) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | - | |
| 18 | 5 | Actual (A) | 0.4715 | 0 | 0.0570 | 0 | 0.4715 | 0 | 1.0000 | 103.5 |
| 18 | 5 | Estimate (B) | 0.4697 | 0 | 0.0607 | 0 | 0.4695 | 0 | 1.0000 | |
| 18 | 5 | (A)-(B) (C) | 0.0017 | 0 | -0.0037 | 0 | 0.0020 | 0 | - | |
| 19 | 5 | Actual (A) | 0.6478 | 0 | 0.0000 | 0 | 0.3522 | 0 | 1.0000 | 40.6 |
| 19 | 5 | Estimate (B) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | |
| 19 | 5 | (A)-(B) (C) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | - | |
| 20 | 5 | Actual (A) | 0.6470 | 0 | 0.0543 | 0 | 0.2987 | 0 | 1.0000 | 387.0 |
| 20 | 5 | Estimate (B) | 0.6451 | 0 | 0.0581 | 0 | 0.2967 | 0 | 1.0000 | |
| 20 | 5 | (A)-(B) (C) | 0.0019 | 0 | -0.0039 | 0 | 0.0020 | 0 | - | |
| 21 | 5 | Actual (A) | 0.7319 | 0 | 0.0148 | 0 | 0.2533 | 0 | 1.0000 | 256.6 |
| 21 | 5 | Estimate (B) | 0.7302 | 0 | 0.0179 | 0 | 0.2519 | 0 | 1.0000 | |
| 21 | 5 | (A)-(B) (C) | 0.0017 | 0 | -0.0031 | 0 | 0.0014 | 0 | - | |
| 22 | 5 | Actual (A) | 0.5604 | 0 | 0.1159 | 0 | 0.3237 | 0 | 1.0000 | 41.4 |
| 22 | 5 | Estimate (B) | 0.5584 | 0 | 0.1197 | 0 | 0.3219 | 0 | 1.0000 | |
| 22 | 5 | (A)-(B) (C) | 0.0020 | 0 | -0.0038 | 0 | 0.0018 | 0 | - | |
| 23 | 5 | Actual (A) | 0.1818 | 0 | 0.7273 | 0 | 0.0909 | 0 | 1.0000 | 6.6 |
| 23 | 5 | Estimate (B) | 0.1836 | 0 | 0.7247 | 0 | 0.0916 | 0 | 1.0000 | |
| 23 | 5 | (A)-(B) (C) | -0.0018 | 0 | 0.0025 | 0 | -0.0007 | 0 | - | |
| 24 | 5 | Actual (A) | 0.0000 | 0 | 0.6667 | 0 | 0.3333 | 0 | 1.0000 | 1.2 |
| 24 | 5 | Estimate (B) | 0.0000 | 0 | 0.6647 | 0 | 0.3353 | 0 | 1.0000 | |
| 24 | 5 | (A)-(B) (C) | 0.0000 | 0 | 0.0020 | 0 | -0.0020 | 0 | - | |
| 6 | 6 | Actual (A) | 0.3946 | 0 | 0.0000 | 0 | 0.6054 | 0 | 1.0000 | 369.7 |
| 6 | 6 | Estimate (B) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | |
| 6 | 6 | (A)-(B) (C) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | - | |
| 7 | 6 | Actual (A) | 0.9294 | 0 | 0.0200 | 0 | 0.0706 | 0 | 1.0000 | 34.0 |
| 7 | 6 | Estimate (B) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | |
| 7 | 6 | (A)-(B) (C) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | - | |
| 8 | 6 | Actual (A) | 0.7579 | 0 | 0.0759 | 0 | 0.1662 | 0 | 1.0000 | 69.8 |
| 8 | 6 | Estimate (B) | 0.7560 | 0 | 0.0795 | 0 | 0.1645 | 0 | 1.0000 | |
| 8 | 6 | (A)-(B) (C) | 0.0019 | 0 | -0.0036 | 0 | 0.0017 | 0 | - | |
| 9 | 6 | Actual (A) | 0.7884 | 0 | 0.0000 | 0 | 0.2116 | 0 | 1.0000 | 34.5 |
| 9 | 6 | Estimate (B) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | |
| 9 | 6 | (A)-(B) (C) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | - | |
| 10 | 6 | Actual (A) | 0.8731 | 0 | 0.0558 | 0 | 0.0711 | 0 | 1.0000 | 59.1 |
| 10 | 6 | Estimate (B) | 0.8714 | 0 | 0.0595 | 0 | 0.0691 | 0 | 1.0000 | |
| 10 | 6 | (A)-(B) (C) | 0.0017 | 0 | -0.0037 | 0 | 0.0020 | 0 | - | |
| 11 | 6 | Actual (A) | 0.9063 | 0 | 0.0000 | 0 | 0.0938 | 0 | 1.0000 | 22.4 |
| 11 | 6 | Estimate (B) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | |
| 11 | 6 | (A)-(B) (C) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | - | |
| 12 | 6 | Actual (A) | 0.8601 | 0 | 0.0171 | 0 | 0.1229 | 0 | 1.0000 | 29.3 |
| 12 | 6 | Estimate (B) | 0.8582 | 0 | 0.0208 | 0 | 0.1210 | 0 | 1.0000 | |
| 12 | 6 | (A)-(B) (C) | 0.0019 | 0 | -0.0037 | 0 | 0.0018 | 0 | - | |
| 13 | 6 | Actual (A) | 0.9633 | 0 | 0.0000 | 0 | 0.0367 | 0 | 1.0000 | 144.5 |
| 13 | 6 | Estimate (B) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | |
| 13 | 6 | (A)-(B) (C) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | - | |
| 14 | 6 | Actual (A) | 0.9082 | 0 | 0.0169 | 0 | 0.0749 | 0 | 1.0000 | 41.4 |
| 14 | 6 | Estimate (B) | 0.9063 | 0 | 0.0208 | 0 | 0.0729 | 0 | 1.0000 | |
| 14 | 6 | (A)-(B) (C) | 0.0019 | 0 | -0.0039 | 0 | 0.0020 | 0 | - | |
| 15 | 6 | Actual (A) | 0.4892 | 0 | 0.0000 | 0 | 0.5108 | 0 | 1.0000 | 83.6 |
| 15 | 6 | Estimate (B) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | |
| 15 | 6 | (A)-(B) (C) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | - | |
| 16 | 6 | Actual (A) | 0.8300 | 0 | 0.0553 | 0 | 0.1146 | 0 | 1.0000 | 25.3 |
| 16 | 6 | Estimate (B) | 0.8281 | 0 | 0.0591 | 0 | 0.1128 | 0 | 1.0000 | |
| 16 | 6 | (A)-(B) (C) | 0.0020 | 0 | -0.0038 | 0 | 0.0018 | 0 | - | |
| 17 | 6 | Actual (A) | 0.8966 | 0 | 0.0000 | 0 | 0.1034 | 0 | 1.0000 | 11.6 |
| 17 | 6 | Estimate (B) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | |
| 17 | 6 | (A)-(B) (C) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | - | |
| 18 | 6 | Actual (A) | 0.2233 | 0 | 0.2788 | 0 | 0.4979 | 0 | 1.0000 | 190.8 |
| 18 | 6 | Estimate (B) | 0.2213 | 0 | 0.2820 | 0 | 0.4967 | 0 | 1.0000 | |
| 18 | 6 | (A)-(B) (C) | 0.0020 | 0 | -0.0031 | 0 | 0.0012 | 0 | - | |
| 19 | 6 | Actual (A) | 0.6959 | 0 | 0.0000 | 0 | 0.3041 | 0 | 1.0000 | 17.1 |
| 19 | 6 | Estimate (B) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | |
| 19 | 6 | (A)-(B) (C) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | - | |
| 20 | 6 | Actual (A) | 0.3994 | 0 | 0.1502 | 0 | 0.4505 | 0 | 1.0000 | 266.4 |
| 20 | 6 | Estimate (B) | 0.3985 | 0 | 0.1527 | 0 | 0.4488 | 0 | 1.0000 | |
| 20 | 6 | (A)-(B) (C) | 0.0009 | 0 | -0.0025 | 0 | 0.0017 | 0 | - | |

## Total Number of Passenger and Modal Shares by OD Pair

| Zone (i) | Zone (j) | Item | Rail | | Air | | Auto | | Total | Total Pax. |
|---|---|---|---|---|---|---|---|---|---|---|
| 21 | 6 | Actual (A) | 0.5234 | 0 | 0.0139 | 0 | 0.4626 | 0 | 1.0000 | 157.8 |
| 21 | 6 | Estimate (B) | 0.5216 | 0 | 0.0178 | 0 | 0.4607 | 0 | 1.0000 | |
| 21 | 6 | (A)-(B) (C) | 0.0019 | 0 | -0.0038 | 0 | 0.0020 | 0 | - | |
| 22 | 6 | Actual (A) | 0.4234 | 0 | 0.0438 | 0 | 0.5328 | 0 | 1.0000 | 27.4 |
| 22 | 6 | Estimate (B) | 0.4214 | 0 | 0.0475 | 0 | 0.5311 | 0 | 1.0000 | |
| 22 | 6 | (A)-(B) (C) | 0.0020 | 0 | -0.0037 | 0 | 0.0017 | 0 | - | |
| 23 | 6 | Actual (A) | 0.1111 | 0 | 0.7778 | 0 | 0.1111 | 0 | 1.0000 | 3.6 |
| 23 | 6 | Estimate (B) | 0.1129 | 0 | 0.7758 | 0 | 0.1113 | 0 | 1.0000 | |
| 23 | 6 | (A)-(B) (C) | -0.0018 | 0 | 0.0020 | 0 | -0.0002 | 0 | - | |
| 24 | 6 | Actual (A) | 0.0000 | 0 | 0.5000 | 0 | 0.5000 | 0 | 1.0000 | 0.8 |
| 24 | 6 | Estimate (B) | 0.0000 | 0 | 0.5010 | 0 | 0.4990 | 0 | 1.0000 | |
| 24 | 6 | (A)-(B) (C) | 0.0000 | 0 | -0.0010 | 0 | 0.0010 | 0 | - | |
| 7 | 7 | Actual (A) | 0.2530 | 0 | 0.0086 | 0 | 0.7384 | 0 | 1.0000 | 955.4 |
| 7 | 7 | Estimate (B) | 0.2546 | 0 | 0.0089 | 0 | 0.7365 | 0 | 1.0000 | |
| 7 | 7 | (A)-(B) (C) | -0.0017 | 0 | -0.0003 | 0 | 0.0020 | 0 | - | |
| 8 | 7 | Actual (A) | 0.6687 | 0 | 0.0479 | 0 | 0.2834 | 0 | 1.0000 | 98.1 |
| 8 | 7 | Estimate (B) | 0.6670 | 0 | 0.0516 | 0 | 0.2814 | 0 | 1.0000 | |
| 8 | 7 | (A)-(B) (C) | 0.0017 | 0 | -0.0037 | 0 | 0.0020 | 0 | - | |
| 9 | 7 | Actual (A) | 0.5975 | 0 | 0.0000 | 0 | 0.4025 | 0 | 1.0000 | 64.6 |
| 9 | 7 | Estimate (B) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | |
| 9 | 7 | (A)-(B) (C) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | - | |
| 10 | 7 | Actual (A) | 0.8977 | 0 | 0.0025 | 0 | 0.1098 | 0 | 1.0000 | 161.2 |
| 10 | 7 | Estimate (B) | 0.8957 | 0 | 0.0064 | 0 | 0.1078 | 0 | 1.0000 | |
| 10 | 7 | (A)-(B) (C) | 0.0020 | 0 | -0.0040 | 0 | 0.0020 | 0 | - | |
| 11 | 7 | Actual (A) | 0.4550 | 0 | 0.0000 | 0 | 0.5450 | 0 | 1.0000 | 399.3 |
| 11 | 7 | Estimate (B) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | |
| 11 | 7 | (A)-(B) (C) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | - | |
| 12 | 7 | Actual (A) | 0.8650 | 0 | 0.0000 | 0 | 0.1350 | 0 | 1.0000 | 63.7 |
| 12 | 7 | Estimate (B) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | |
| 12 | 7 | (A)-(B) (C) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | - | |
| 13 | 7 | Actual (A) | 0.9009 | 0 | 0.0004 | 0 | 0.0988 | 0 | 1.0000 | 1133.1 |
| 13 | 7 | Estimate (B) | 0.8989 | 0 | 0.0043 | 0 | 0.0968 | 0 | 1.0000 | |
| 13 | 7 | (A)-(B) (C) | 0.0020 | 0 | -0.0040 | 0 | 0.0020 | 0 | - | |
| 14 | 7 | Actual (A) | 0.9396 | 0 | 0.0000 | 0 | 0.0604 | 0 | 1.0000 | 97.7 |
| 14 | 7 | Estimate (B) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | |
| 14 | 7 | (A)-(B) (C) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | - | |
| 15 | 7 | Actual (A) | 0.3799 | 0 | 0.0000 | 0 | 0.6201 | 0 | 1.0000 | 109.5 |
| 15 | 7 | Estimate (B) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | |
| 15 | 7 | (A)-(B) (C) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | - | |
| 16 | 7 | Actual (A) | 0.8760 | 0 | 0.0000 | 0 | 0.1240 | 0 | 1.0000 | 48.4 |
| 16 | 7 | Estimate (B) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | |
| 16 | 7 | (A)-(B) (C) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | - | |
| 17 | 7 | Actual (A) | 0.9633 | 0 | 0.0000 | 0 | 0.0367 | 0 | 1.0000 | 21.8 |
| 17 | 7 | Estimate (B) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | |
| 17 | 7 | (A)-(B) (C) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | - | |
| 18 | 7 | Actual (A) | 0.2693 | 0 | 0.5609 | 0 | 0.1698 | 0 | 1.0000 | 89.5 |
| 18 | 7 | Estimate (B) | 0.2697 | 0 | 0.5585 | 0 | 0.1718 | 0 | 1.0000 | |
| 18 | 7 | (A)-(B) (C) | -0.0005 | 0 | 0.0024 | 0 | -0.0020 | 0 | - | |
| 19 | 7 | Actual (A) | 0.2532 | 0 | 0.0000 | 0 | 0.7468 | 0 | 1.0000 | 131.9 |
| 19 | 7 | Estimate (B) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | |
| 19 | 7 | (A)-(B) (C) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | - | |
| 20 | 7 | Actual (A) | 0.7082 | 0 | 0.0589 | 0 | 0.2329 | 0 | 1.0000 | 231.0 |
| 20 | 7 | Estimate (B) | 0.7064 | 0 | 0.0626 | 0 | 0.2310 | 0 | 1.0000 | |
| 20 | 7 | (A)-(B) (C) | 0.0018 | 0 | -0.0037 | 0 | 0.0019 | 0 | - | |
| 21 | 7 | Actual (A) | 0.7669 | 0 | 0.0180 | 0 | 0.2151 | 0 | 1.0000 | 177.6 |
| 21 | 7 | Estimate (B) | 0.7651 | 0 | 0.0218 | 0 | 0.2131 | 0 | 1.0000 | |
| 21 | 7 | (A)-(B) (C) | 0.0018 | 0 | -0.0037 | 0 | 0.0020 | 0 | - | |
| 22 | 7 | Actual (A) | 0.5556 | 0 | 0.0356 | 0 | 0.4089 | 0 | 1.0000 | 45.0 |
| 22 | 7 | Estimate (B) | 0.5536 | 0 | 0.0392 | 0 | 0.4072 | 0 | 1.0000 | |
| 22 | 7 | (A)-(B) (C) | 0.0020 | 0 | -0.0037 | 0 | 0.0017 | 0 | - | |
| 23 | 7 | Actual (A) | 0.2558 | 0 | 0.4884 | 0 | 0.2558 | 0 | 1.0000 | 8.6 |
| 23 | 7 | Estimate (B) | 0.2539 | 0 | 0.4923 | 0 | 0.2538 | 0 | 1.0000 | |
| 23 | 7 | (A)-(B) (C) | 0.0020 | 0 | -0.0039 | 0 | 0.0020 | 0 | - | |
| 24 | 7 | Actual (A) | 0.0008 | 0 | 0.3750 | 0 | 0.6250 | 0 | 1.0000 | 1.6 |
| 24 | 7 | Estimate (B) | 0.0000 | 0 | 0.3762 | 0 | 0.6238 | 0 | 1.0000 | |
| 24 | 7 | (A)-(B) (C) | 0.0000 | 0 | -0.0012 | 0 | 0.0012 | 0 | - | |
| 8 | 8 | Actual (A) | 0.0995 | 0 | 0.0000 | 0 | 0.9005 | 0 | 1.0000 | 2785.7 |
| 8 | 8 | Estimate (B) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | |
| 8 | 8 | (A)-(B) (C) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | - | |
| 9 | 8 | Actual (A) | 0.1089 | 0 | 0.0000 | 0 | 0.8911 | 0 | 1.0000 | 2103.3 |
| 9 | 8 | Estimate (B) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | |
| 9 | 8 | (A)-(B) (C) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | - | |
| 10 | 8 | Actual (A) | 0.8526 | 0 | 0.0063 | 0 | 0.1412 | 0 | 1.0000 | 175.7 |
| 10 | 8 | Estimate (B) | 0.8511 | 0 | 0.0097 | 0 | 0.1392 | 0 | 1.0000 | |
| 10 | 8 | (A)-(B) (C) | 0.0015 | 0 | -0.0035 | 0 | 0.0020 | 0 | - | |

## Total Number of Passenger and Modal Shares by OD Pair

| Zone (I) | Zone (J) | Item | Rail | | Air | | Auto | | Total | Total Pax. |
|---|---|---|---|---|---|---|---|---|---|---|
| 11 | 8 | Actual (A) | 0.7357 | 0 | 0.0000 | 0 | 0.2643 | 0 | 1.0000 | 66.6 |
| 11 | 8 | Estimate (B) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | |
| 11 | 8 | (A)-(B) (C) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | - | |
| 12 | 8 | Actual (A) | 0.8499 | 0 | 0.0042 | 0 | 0.1459 | 0 | 1.0000 | 70.6 |
| 12 | 8 | Estimate (B) | 0.8480 | 0 | 0.0081 | 0 | 0.1440 | 0 | 1.0000 | |
| 12 | 8 | (A)-(B) (C) | 0.0019 | 0 | -0.0038 | 0 | 0.0019 | 0 | - | |
| 13 | 8 | Actual (A) | 0.9368 | 0 | 0.0072 | 0 | 0.0567 | 0 | 1.0000 | 567.6 |
| 13 | 8 | Estimate (B) | 0.9341 | 0 | 0.0111 | 0 | 0.0547 | 0 | 1.0000 | |
| 13 | 8 | (A)-(B) (C) | 0.0019 | 0 | -0.0039 | 0 | 0.0020 | 0 | - | |
| 14 | 8 | Actual (A) | 0.8740 | 0 | 0.0426 | 0 | 0.0835 | 0 | 1.0000 | 122.2 |
| 14 | 8 | Estimate (B) | 0.8721 | 0 | 0.0460 | 0 | 0.0819 | 0 | 1.0000 | |
| 14 | 8 | (A)-(B) (C) | 0.0019 | 0 | -0.0035 | 0 | 0.0016 | 0 | - | |
| 15 | 8 | Actual (A) | 0.0350 | 0 | 0.0000 | 0 | 0.9650 | 0 | 1.0000 | 1158.8 |
| 15 | 8 | Estimate (B) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | |
| 15 | 8 | (A)-(B) (C) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | - | |
| 16 | 8 | Actual (A) | 0.5669 | 0 | 0.0000 | 0 | 0.4331 | 0 | 1.0000 | 91.9 |
| 16 | 8 | Estimate (B) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | |
| 16 | 8 | (A)-(B) (C) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | - | |
| 17 | 8 | Actual (A) | 0.7300 | 0 | 0.0890 | 0 | 0.1810 | 0 | 1.0000 | 33.7 |
| 17 | 8 | Estimate (B) | 0.7288 | 0 | 0.0916 | 0 | 0.1804 | 0 | 1.0000 | |
| 17 | 8 | (A)-(B) (C) | 0.0020 | 0 | -0.0026 | 0 | 0.0006 | 0 | - | |
| 18 | 8 | Actual (A) | 0.4211 | 0 | 0.0644 | 0 | 0.5144 | 0 | 1.0000 | 90.0 |
| 18 | 8 | Estimate (B) | 0.4191 | 0 | 0.0681 | 0 | 0.5128 | 0 | 1.0000 | |
| 18 | 8 | (A)-(B) (C) | 0.0020 | 0 | -0.0037 | 0 | 0.0017 | 0 | - | |
| 19 | 8 | Actual (A) | 0.2141 | 0 | 0.0000 | 0 | 0.7859 | 0 | 1.0000 | 151.3 |
| 19 | 8 | Estimate (B) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | |
| 19 | 8 | (A)-(B) (C) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | - | |
| 20 | 8 | Actual (A) | 0.4998 | 0 | 0.0765 | 0 | 0.4237 | 0 | 1.0000 | 475.8 |
| 20 | 8 | Estimate (B) | 0.4979 | 0 | 0.0803 | 0 | 0.4217 | 0 | 1.0000 | |
| 20 | 8 | (A)-(B) (C) | 0.0018 | 0 | -0.0038 | 0 | 0.0020 | 0 | - | |
| 21 | 8 | Actual (A) | 0.5819 | 0 | 0.0042 | 0 | 0.4139 | 0 | 1.0000 | 333.4 |
| 21 | 8 | Estimate (B) | 0.5801 | 0 | 0.0080 | 0 | 0.4119 | 0 | 1.0000 | |
| 21 | 8 | (A)-(B) (C) | 0.0018 | 0 | -0.0038 | 0 | 0.0020 | 0 | - | |
| 22 | 8 | Actual (A) | 0.1265 | 0 | 0.0008 | 0 | 0.8726 | 0 | 1.0000 | 957.4 |
| 22 | 8 | Estimate (B) | 0.1246 | 0 | 0.0043 | 0 | 0.8711 | 0 | 1.0000 | |
| 22 | 8 | (A)-(B) (C) | 0.0019 | 0 | -0.0035 | 0 | 0.0015 | 0 | - | |
| 23 | 8 | Actual (A) | 0.1486 | 0 | 0.1216 | 0 | 0.7297 | 0 | 1.0000 | 14.8 |
| 23 | 8 | Estimate (B) | 0.1468 | 0 | 0.1255 | 0 | 0.7277 | 0 | 1.0000 | |
| 23 | 8 | (A)-(B) (C) | 0.0019 | 0 | -0.0039 | 0 | 0.0020 | 0 | - | |
| 24 | 8 | Actual (A) | 0.0000 | 0 | 0.1053 | 0 | 0.8947 | 0 | 1.0000 | 3.8 |
| 24 | 8 | Estimate (B) | 0.0000 | 0 | 0.1071 | 0 | 0.8929 | 0 | 1.0000 | |
| 24 | 8 | (A)-(B) (C) | 0.0000 | 0 | -0.0019 | 0 | 0.0019 | 0 | - | |
| 9 | 9 | Actual (A) | 0.1354 | 0 | 0.0003 | 0 | 0.8643 | 0 | 1.0000 | 1221.9 |
| 9 | 9 | Estimate (B) | 0.1374 | 0 | 0.0000 | 0 | 0.8626 | 0 | 1.0000 | |
| 9 | 9 | (A)-(B) (C) | -0.0020 | 0 | 0.0000 | 0 | 0.0017 | 0 | - | |
| 10 | 9 | Actual (A) | 0.7944 | 0 | 0.0000 | 0 | 0.2056 | 0 | 1.0000 | 117.2 |
| 10 | 9 | Estimate (B) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | |
| 10 | 9 | (A)-(B) (C) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | - | |
| 11 | 9 | Actual (A) | 0.6519 | 0 | 0.0000 | 0 | 0.3481 | 0 | 1.0000 | 45.1 |
| 11 | 9 | Estimate (B) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | |
| 11 | 9 | (A)-(B) (C) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | - | |
| 12 | 9 | Actual (A) | 0.7845 | 0 | 0.0000 | 0 | 0.2155 | 0 | 1.0000 | 46.4 |
| 12 | 9 | Estimate (B) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | |
| 12 | 9 | (A)-(B) (C) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | - | |
| 13 | 9 | Actual (A) | 0.9101 | 0 | 0.0000 | 0 | 0.0899 | 0 | 1.0000 | 351.6 |
| 13 | 9 | Estimate (B) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | |
| 13 | 9 | (A)-(B) (C) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | - | |
| 14 | 9 | Actual (A) | 0.8895 | 0 | 0.0000 | 0 | 0.1105 | 0 | 1.0000 | 72.4 |
| 14 | 9 | Estimate (B) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | |
| 14 | 9 | (A)-(B) (C) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | - | |
| 15 | 9 | Actual (A) | 0.1140 | 0 | 0.0000 | 0 | 0.8860 | 0 | 1.0000 | 444.9 |
| 15 | 9 | Estimate (B) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | |
| 15 | 9 | (A)-(B) (C) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | - | |
| 16 | 9 | Actual (A) | 0.5597 | 0 | 0.0125 | 0 | 0.4278 | 0 | 1.0000 | 56.1 |
| 16 | 9 | Estimate (B) | 0.5579 | 0 | 0.0163 | 0 | 0.4258 | 0 | 1.0000 | |
| 16 | 9 | (A)-(B) (C) | 0.0019 | 0 | -0.0039 | 0 | 0.0020 | 0 | - | |
| 17 | 9 | Actual (A) | 0.7946 | 0 | 0.0000 | 0 | 0.2054 | 0 | 1.0000 | 18.5 |
| 17 | 9 | Estimate (B) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | |
| 17 | 9 | (A)-(B) (C) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | - | |
| 18 | 9 | Actual (A) | 0.4381 | 0 | 0.0000 | 0 | 0.5619 | 0 | 1.0000 | 45.2 |
| 18 | 9 | Estimate (B) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | |
| 18 | 9 | (A)-(B) (C) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | - | |
| 19 | 9 | Actual (A) | 0.1563 | 0 | 0.0000 | 0 | 0.8437 | 0 | 1.0000 | 130.5 |
| 19 | 9 | Estimate (B) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | |
| 19 | 9 | (A)-(B) (C) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | - | |

## Total Number of Passenger and Modal Shares by OD Pair

| Zone (i) | Zone (j) | Item | Rail | | Air | | Auto | | Total | Total Pax. |
|---|---|---|---|---|---|---|---|---|---|---|
| 20 | 9 | Actual (A) | 0.4451 | 0 | 0.0300 | 0 | 0.5250 | 0 | 1.0000 | 320.4 |
| 20 | 9 | Estimate (B) | 0.4431 | 0 | 0.0338 | 0 | 0.5231 | 0 | 1.0000 | |
| 20 | 9 | (A)-(B) (C) | 0.0020 | 0 | -0.0039 | 0 | 0.0019 | 0 | - | |
| 21 | 9 | Actual (A) | 0.4962 | 0 | 0.0093 | 0 | 0.4945 | 0 | 1.0000 | 236.2 |
| 21 | 9 | Estimate (B) | 0.4942 | 0 | 0.0132 | 0 | 0.4925 | 0 | 1.0000 | |
| 21 | 9 | (A)-(B) (C) | 0.0019 | 0 | -0.0039 | 0 | 0.0020 | 0 | - | |
| 22 | 9 | Actual (A) | 0.1209 | 0 | 0.0025 | 0 | 0.8766 | 0 | 1.0000 | 489.6 |
| 22 | 9 | Estimate (B) | 0.1189 | 0 | 0.0063 | 0 | 0.8748 | 0 | 1.0000 | |
| 22 | 9 | (A)-(B) (C) | 0.0020 | 0 | -0.0038 | 0 | 0.0018 | 0 | - | |
| 23 | 9 | Actual (A) | 0.1522 | 0 | 0.3043 | 0 | 0.5435 | 0 | 1.0000 | 9.2 |
| 23 | 9 | Estimate (B) | 0.1504 | 0 | 0.3081 | 0 | 0.5415 | 0 | 1.0000 | |
| 23 | 9 | (A)-(B) (C) | 0.0017 | 0 | -0.0037 | 0 | 0.0020 | 0 | - | |
| 24 | 9 | Actual (A) | 0.0000 | 0 | 0.1429 | 0 | 0.8571 | 0 | 1.0000 | 2.8 |
| 24 | 9 | Estimate (B) | 0.0000 | 0 | 0.1446 | 0 | 0.8554 | 0 | 1.0000 | |
| 24 | 9 | (A)-(B) (C) | 0.0000 | 0 | -0.0018 | 0 | 0.0018 | 0 | - | |
| 10 | 10 | Actual (A) | 0.6197 | 0 | 0.0000 | 0 | 0.3803 | 0 | 1.0000 | 1004.4 |
| 10 | 10 | Estimate (B) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | |
| 10 | 10 | (A)-(B) (C) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | - | |
| 11 | 10 | Actual (A) | 0.8000 | 0 | 0.0000 | 0 | 0.2000 | 0 | 1.0000 | 121.5 |
| 11 | 10 | Estimate (B) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | |
| 11 | 10 | (A)-(B) (C) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | - | |
| 12 | 10 | Actual (A) | 0.6830 | 0 | 0.0000 | 0 | 0.3170 | 0 | 1.0000 | 304.7 |
| 12 | 10 | Estimate (B) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | |
| 12 | 10 | (A)-(B) (C) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | - | |
| 13 | 10 | Actual (A) | 0.8992 | 0 | 0.0000 | 0 | 0.1008 | 0 | 1.0000 | 1100.9 |
| 13 | 10 | Estimate (B) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | |
| 13 | 10 | (A)-(B) (C) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | - | |
| 14 | 10 | Actual (A) | 0.8710 | 0 | 0.0000 | 0 | 0.1290 | 0 | 1.0000 | 269.7 |
| 14 | 10 | Estimate (B) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | |
| 14 | 10 | (A)-(B) (C) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | - | |
| 15 | 10 | Actual (A) | 0.3342 | 0 | 0.0000 | 0 | 0.6658 | 0 | 1.0000 | 186.4 |
| 15 | 10 | Estimate (B) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | |
| 15 | 10 | (A)-(B) (C) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | - | |
| 16 | 10 | Actual (A) | 0.9018 | 0 | 0.0039 | 0 | 0.0943 | 0 | 1.0000 | 128.3 |
| 16 | 10 | Estimate (B) | 0.8999 | 0 | 0.0078 | 0 | 0.0923 | 0 | 1.0000 | |
| 16 | 10 | (A)-(B) (C) | 0.0019 | 0 | -0.0039 | 0 | 0.0020 | 0 | - | |
| 17 | 10 | Actual (A) | 0.8374 | 0 | 0.0000 | 0 | 0.1626 | 0 | 1.0000 | 28.9 |
| 17 | 10 | Estimate (B) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | |
| 17 | 10 | (A)-(B) (C) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | - | |
| 18 | 10 | Actual (A) | 0.6194 | 0 | 0.0000 | 0 | 0.3806 | 0 | 1.0000 | 60.7 |
| 18 | 10 | Estimate (B) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | |
| 18 | 10 | (A)-(B) (C) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | - | |
| 19 | 10 | Actual (A) | 0.5807 | 0 | 0.0000 | 0 | 0.4193 | 0 | 1.0000 | 67.5 |
| 19 | 10 | Estimate (B) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | |
| 19 | 10 | (A)-(B) (C) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | - | |
| 20 | 10 | Actual (A) | 0.6397 | 0 | 0.1365 | 0 | 0.2239 | 0 | 1.0000 | 281.4 |
| 20 | 10 | Estimate (B) | 0.6382 | 0 | 0.1374 | 0 | 0.2244 | 0 | 1.0000 | |
| 20 | 10 | (A)-(B) (C) | 0.0014 | 0 | -0.0009 | 0 | -0.0005 | 0 | - | |
| 21 | 10 | Actual (A) | 0.7585 | 0 | 0.0287 | 0 | 0.2128 | 0 | 1.0000 | 188.8 |
| 21 | 10 | Estimate (B) | 0.7566 | 0 | 0.0325 | 0 | 0.2109 | 0 | 1.0000 | |
| 21 | 10 | (A)-(B) (C) | 0.0019 | 0 | -0.0038 | 0 | 0.0019 | 0 | - | |
| 22 | 10 | Actual (A) | 0.6347 | 0 | 0.0639 | 0 | 0.3014 | 0 | 1.0000 | 43.8 |
| 22 | 10 | Estimate (B) | 0.6327 | 0 | 0.0677 | 0 | 0.2996 | 0 | 1.0000 | |
| 22 | 10 | (A)-(B) (C) | 0.0020 | 0 | -0.0038 | 0 | 0.0018 | 0 | - | |
| 23 | 10 | Actual (A) | 0.1633 | 0 | 0.7143 | 0 | 0.1224 | 0 | 1.0000 | 9.8 |
| 23 | 10 | Estimate (B) | 0.1638 | 0 | 0.7118 | 0 | 0.1244 | 0 | 1.0000 | |
| 23 | 10 | (A)-(B) (C) | -0.0005 | 0 | 0.0025 | 0 | -0.0020 | 0 | - | |
| 24 | 10 | Actual (A) | 0.0000 | 0 | 0.6667 | 0 | 0.3333 | 0 | 1.0000 | 1.8 |
| 24 | 10 | Estimate (B) | 0.0000 | 0 | 0.6647 | 0 | 0.3353 | 0 | 1.0000 | |
| 24 | 10 | (A)-(B) (C) | 0.0000 | 0 | 0.0020 | 0 | -0.0020 | 0 | - | |
| 11 | 11 | Actual (A) | 0.4334 | 0 | 0.0089 | 0 | 0.5577 | 0 | 1.0000 | 460.3 |
| 11 | 11 | Estimate (B) | 0.4353 | 0 | 0.0089 | 0 | 0.5557 | 0 | 1.0000 | |
| 11 | 11 | (A)-(B) (C) | -0.0019 | 0 | 0.0000 | 0 | 0.0020 | 0 | - | |
| 12 | 11 | Actual (A) | 0.7918 | 0 | 0.0000 | 0 | 0.2082 | 0 | 1.0000 | 46.6 |
| 12 | 11 | Estimate (B) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | |
| 12 | 11 | (A)-(B) (C) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | - | |
| 13 | 11 | Actual (A) | 0.7151 | 0 | 0.0000 | 0 | 0.2849 | 0 | 1.0000 | 891.9 |
| 13 | 11 | Estimate (B) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | |
| 13 | 11 | (A)-(B) (C) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | - | |
| 14 | 11 | Actual (A) | 0.9013 | 0 | 0.0000 | 0 | 0.0987 | 0 | 1.0000 | 66.9 |
| 14 | 11 | Estimate (B) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | |
| 14 | 11 | (A)-(B) (C) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | - | |
| 15 | 11 | Actual (A) | 0.2835 | 0 | 0.0035 | 0 | 0.7129 | 0 | 1.0000 | 85.0 |
| 15 | 11 | Estimate (B) | 0.2815 | 0 | 0.0073 | 0 | 0.7112 | 0 | 1.0000 | |
| 15 | 11 | (A)-(B) (C) | 0.0020 | 0 | -0.0038 | 0 | 0.0018 | 0 | - | |

## Total Number of Passenger and Modal Shares by OD Pair

| Zone (i) | Zone (j) | Item | Rail | | Air | | Auto | | Total | Total Pax. |
|---|---|---|---|---|---|---|---|---|---|---|
| 16 | 11 | Actual (A) | 0.7696 | 0 | 0.0163 | 0 | 0.2141 | 0 | 1.0000 | 36.9 |
| 16 | 11 | Estimate (B) | 0.7678 | 0 | 0.0201 | 0 | 0.2121 | 0 | 1.0000 | |
| 16 | 11 | (A)-(B) (C) | 0.0019 | 0 | -0.0039 | 0 | 0.0020 | 0 | - | |
| 17 | 11 | Actual (A) | 0.8182 | 0 | 0.0000 | 0 | 0.1818 | 0 | 1.0000 | 12.1 |
| 17 | 11 | Estimate (B) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | |
| 17 | 11 | (A)-(B) (C) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | - | |
| 18 | 11 | Actual (A) | 0.5548 | 0 | 0.0000 | 0 | 0.4452 | 0 | 1.0000 | 28.3 |
| 18 | 11 | Estimate (B) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | |
| 18 | 11 | (A)-(B) (C) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | - | |
| 19 | 11 | Actual (A) | 0.3155 | 0 | 0.0000 | 0 | 0.6845 | 0 | 1.0000 | 89.7 |
| 19 | 11 | Estimate (B) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | |
| 19 | 11 | (A)-(B) (C) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | - | |
| 20 | 11 | Actual (A) | 0.6011 | 0 | 0.0677 | 0 | 0.3312 | 0 | 1.0000 | 189.0 |
| 20 | 11 | Estimate (B) | 0.5991 | 0 | 0.0714 | 0 | 0.3295 | 0 | 1.0000 | |
| 20 | 11 | (A)-(B) (C) | 0.0020 | 0 | -0.0036 | 0 | 0.0017 | 0 | - | |
| 21 | 11 | Actual (A) | 0.6831 | 0 | 0.0014 | 0 | 0.3155 | 0 | 1.0000 | 138.2 |
| 21 | 11 | Estimate (B) | 0.6811 | 0 | 0.0054 | 0 | 0.3135 | 0 | 1.0000 | |
| 21 | 11 | (A)-(B) (C) | 0.0020 | 0 | -0.0040 | 0 | 0.0020 | 0 | - | |
| 22 | 11 | Actual (A) | 0.5307 | 0 | 0.0056 | 0 | 0.4637 | 0 | 1.0000 | 35.8 |
| 22 | 11 | Estimate (B) | 0.5287 | 0 | 0.0094 | 0 | 0.4619 | 0 | 1.0000 | |
| 22 | 11 | (A)-(B) (C) | 0.0020 | 0 | -0.0038 | 0 | 0.0018 | 0 | - | |
| 23 | 11 | Actual (A) | 0.3333 | 0 | 0.0741 | 0 | 0.5926 | 0 | 1.0000 | 5.4 |
| 23 | 11 | Estimate (B) | 0.3314 | 0 | 0.0778 | 0 | 0.5908 | 0 | 1.0000 | |
| 23 | 11 | (A)-(B) (C) | 0.0019 | 0 | -0.0037 | 0 | 0.0018 | 0 | - | |
| 24 | 11 | Actual (A) | 0.0000 | 0 | 0.0000 | 0 | 1.0000 | 0 | 1.0000 | 1.2 |
| 24 | 11 | Estimate (B) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | |
| 24 | 11 | (A)-(B) (C) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | - | |
| 12 | 12 | Actual (A) | 0.4769 | 0 | 0.0000 | 0 | 0.5231 | 0 | 1.0000 | 439.9 |
| 12 | 12 | Estimate (B) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | |
| 12 | 12 | (A)-(B) (C) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | - | |
| 13 | 12 | Actual (A) | 0.9031 | 0 | 0.0000 | 0 | 0.0969 | 0 | 1.0000 | 337.3 |
| 13 | 12 | Estimate (B) | 0.2000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | |
| 13 | 12 | (A)-(B) (C) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | - | |
| 14 | 12 | Actual (A) | 0.6190 | 0 | 0.0000 | 0 | 0.3810 | 0 | 1.0000 | 378.5 |
| 14 | 12 | Estimate (B) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | |
| 14 | 12 | (A)-(B) (C) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | - | |
| 15 | 12 | Actual (A) | 0.3974 | 0 | 0.0000 | 0 | 0.6026 | 0 | 1.0000 | 69.2 |
| 15 | 12 | Estimate (B) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | |
| 15 | 12 | (A)-(B) (C) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | - | |
| 16 | 12 | Actual (A) | 0.8622 | 0 | 0.0042 | 0 | 0.1336 | 0 | 1.0000 | 47.9 |
| 16 | 12 | Estimate (B) | 0.8603 | 0 | 0.0081 | 0 | 0.1316 | 0 | 1.0000 | |
| 16 | 12 | (A)-(B) (C) | 0.0019 | 0 | -0.0039 | 0 | 0.0020 | 0 | - | |
| 17 | 12 | Actual (A) | 0.5954 | 0 | 0.0000 | 0 | 0.4046 | 0 | 1.0000 | 18.4 |
| 17 | 12 | Estimate (B) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | |
| 17 | 12 | (A)-(B) (C) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | - | |
| 18 | 12 | Actual (A) | 0.3664 | 0 | 0.3198 | 0 | 0.3138 | 0 | 1.0000 | 49.4 |
| 18 | 12 | Estimate (B) | 0.3644 | 0 | 0.3236 | 0 | 0.3120 | 0 | 1.0000 | |
| 18 | 12 | (A)-(B) (C) | 0.0020 | 0 | -0.0038 | 0 | 0.0018 | 0 | - | |
| 19 | 12 | Actual (A) | 0.6231 | 0 | 0.0000 | 0 | 0.3769 | 0 | 1.0000 | 26.0 |
| 19 | 12 | Estimate (B) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | |
| 19 | 12 | (A)-(B) (C) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | - | |
| 20 | 12 | Actual (A) | 0.5080 | 0 | 0.0250 | 0 | 0.4670 | 0 | 1.0000 | 200.0 |
| 20 | 12 | Estimate (B) | 0.5067 | 0 | 0.0277 | 0 | 0.4656 | 0 | 1.0000 | |
| 20 | 12 | (A)-(B) (C) | 0.0013 | 0 | -0.0027 | 0 | 0.0014 | 0 | - | |
| 21 | 12 | Actual (A) | 0.5769 | 0 | 0.0088 | 0 | 0.4143 | 0 | 1.0000 | 136.6 |
| 21 | 12 | Estimate (B) | 0.5751 | 0 | 0.0126 | 0 | 0.4124 | 0 | 1.0000 | |
| 21 | 12 | (A)-(B) (C) | 0.0018 | 0 | -0.0038 | 0 | 0.0020 | 0 | - | |
| 22 | 12 | Actual (A) | 0.5081 | 0 | 0.0242 | 0 | 0.4677 | 0 | 1.0000 | 24.8 |
| 22 | 12 | Estimate (B) | 0.5061 | 0 | 0.0282 | 0 | 0.4658 | 0 | 1.0000 | |
| 22 | 12 | (A)-(B) (C) | 0.0020 | 0 | -0.0040 | 0 | 0.0020 | 0 | - | |
| 23 | 12 | Actual (A) | 0.2000 | 0 | 0.4667 | 0 | 0.3333 | 0 | 1.0000 | 3.0 |
| 23 | 12 | Estimate (B) | 0.2009 | 0 | 0.4638 | 0 | 0.3353 | 0 | 1.0000 | |
| 23 | 12 | (A)-(B) (C) | -0.0009 | 0 | 0.0029 | 0 | -0.0020 | 0 | - | |
| 24 | 12 | Actual (A) | 0.0000 | 0 | 0.2500 | 0 | 0.7500 | 0 | 1.0000 | 0.8 |
| 24 | 12 | Estimate (B) | 0.0000 | 0 | 0.2514 | 0 | 0.7486 | 0 | 1.0000 | |
| 24 | 12 | (A)-(B) (C) | 0.0000 | 0 | -0.0014 | 0 | 0.0014 | 0 | - | |
| 13 | 13 | Actual (A) | 0.6709 | 0 | 0.0000 | 0 | 0.3291 | 0 | 1.0000 | 3846.5 |
| 13 | 13 | Estimate (B) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | |
| 13 | 13 | (A)-(B) (C) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | - | |
| 14 | 13 | Actual (A) | 0.8947 | 0 | 0.0000 | 0 | 0.1053 | 0 | 1.0000 | 388.4 |
| 14 | 13 | Estimate (B) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | |
| 14 | 13 | (A)-(B) (C) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | - | |
| 15 | 13 | Actual (A) | 0.5891 | 0 | 0.0108 | 0 | 0.4001 | 0 | 1.0000 | 323.7 |
| 15 | 13 | Estimate (B) | 0.5872 | 0 | 0.0147 | 0 | 0.3981 | 0 | 1.0000 | |
| 15 | 13 | (A)-(B) (C) | 0.0019 | 0 | -0.0039 | 0 | 0.0020 | 0 | - | |

## Total Number of Passenger and Modal Shares by OD Pair

| Zone (i) | Zone (j) | Item | Rail | | Air | | Auto | | Total | Total Pax. |
|---|---|---|---|---|---|---|---|---|---|---|
| 16 | 13 | Actual (A) | 0.9313 | 0 | 0.0000 | 0 | 0.0687 | 0 | 1.0000 | 338.2 |
| 16 | 13 | Estimate (B) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | |
| 16 | 13 | (A)-(B) (C) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | - | |
| 17 | 13 | Actual (A) | 0.9216 | 0 | 0.0000 | 0 | 0.0784 | 0 | 1.0000 | 56.1 |
| 17 | 13 | Estimate (B) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | |
| 17 | 13 | (A)-(B) (C) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | - | |
| 18 | 13 | Actual (A) | 0.8117 | 0 | 0.0000 | 0 | 0.1883 | 0 | 1.0000 | 133.3 |
| 18 | 13 | Estimate (B) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | |
| 18 | 13 | (A)-(B) (C) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | - | |
| 19 | 13 | Actual (A) | 0.7489 | 0 | 0.0000 | 0 | 0.2511 | 0 | 1.0000 | 244.5 |
| 19 | 13 | Estimate (B) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | |
| 19 | 13 | (A)-(B) (C) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | - | |
| 20 | 13 | Actual (A) | 0.4765 | 0 | 0.1041 | 0 | 0.4194 | 0 | 1.0000 | 420.6 |
| 20 | 13 | Estimate (B) | 0.4745 | 0 | 0.1081 | 0 | 0.4175 | 0 | 1.0000 | |
| 20 | 13 | (A)-(B) (C) | 0.0020 | 0 | -0.0039 | 0 | 0.0019 | 0 | - | |
| 21 | 13 | Actual (A) | 0.5845 | 0 | 0.0043 | 0 | 0.4112 | 0 | 1.0000 | 279.2 |
| 21 | 13 | Estimate (B) | 0.5826 | 0 | 0.0082 | 0 | 0.4092 | 0 | 1.0000 | |
| 21 | 13 | (A)-(B) (C) | 0.0020 | 0 | -0.0039 | 0 | 0.0019 | 0 | - | |
| 22 | 13 | Actual (A) | 0.4337 | 0 | 0.0753 | 0 | 0.4910 | 0 | 1.0000 | 66.4 |
| 22 | 13 | Estimate (B) | 0.4318 | 0 | 0.0772 | 0 | 0.4910 | 0 | 1.0000 | |
| 22 | 13 | (A)-(B) (C) | 0.0020 | 0 | -0.0019 | 0 | -0.0001 | 0 | - | |
| 23 | 13 | Actual (A) | 0.2564 | 0 | 0.2051 | 0 | 0.5385 | 0 | 1.0000 | 7.8 |
| 23 | 13 | Estimate (B) | 0.2545 | 0 | 0.2090 | 0 | 0.5365 | 0 | 1.0000 | |
| 23 | 13 | (A)-(B) (C) | 0.0020 | 0 | -0.0039 | 0 | 0.0019 | 0 | - | |
| 24 | 13 | Actual (A) | 0.0000 | 0 | 0.0909 | 0 | 0.9091 | 0 | 1.0000 | 2.2 |
| 24 | 13 | Estimate (B) | 0.0000 | 0 | 0.0927 | 0 | 0.9073 | 0 | 1.0000 | |
| 24 | 13 | (A)-(B) (C) | 0.0000 | 0 | -0.0018 | 0 | 0.0018 | 0 | - | |
| 14 | 14 | Actual (A) | 0.5196 | 0 | 0.0000 | 0 | 0.4804 | 0 | 1.0000 | 586.8 |
| 14 | 14 | Estimate (B) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | |
| 14 | 14 | (A)-(B) (C) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | - | |
| 15 | 14 | Actual (A) | 0.4568 | 0 | 0.0000 | 0 | 0.5432 | 0 | 1.0000 | 98.2 |
| 15 | 14 | Estimate (B) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | |
| 15 | 14 | (A)-(B) (C) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | - | |
| 16 | 14 | Actual (A) | 0.9252 | 0 | 0.0000 | 0 | 0.0748 | 0 | 1.0000 | 79.9 |
| 16 | 14 | Estimate (B) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | |
| 16 | 14 | (A)-(B) (C) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | - | |
| 17 | 14 | Actual (A) | 0.8063 | 0 | 0.0000 | 0 | 0.1938 | 0 | 1.0000 | 16.8 |
| 17 | 14 | Estimate (B) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | |
| 17 | 14 | (A)-(B) (C) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | - | |
| 18 | 14 | Actual (A) | 0.6335 | 0 | 0.0000 | 0 | 0.3665 | 0 | 1.0000 | 44.2 |
| 18 | 14 | Estimate (B) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | |
| 18 | 14 | (A)-(B) (C) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | - | |
| 19 | 14 | Actual (A) | 0.7443 | 0 | 0.0000 | 0 | 0.2557 | 0 | 1.0000 | 39.5 |
| 19 | 14 | Estimate (B) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | |
| 19 | 14 | (A)-(B) (C) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | - | |
| 20 | 14 | Actual (A) | 0.6237 | 0 | 0.0021 | 0 | 0.3742 | 0 | 1.0000 | 189.2 |
| 20 | 14 | Estimate (B) | 0.6220 | 0 | 0.0057 | 0 | 0.3723 | 0 | 1.0000 | |
| 20 | 14 | (A)-(B) (C) | 0.0017 | 0 | -0.0036 | 0 | 0.0019 | 0 | - | |
| 21 | 14 | Actual (A) | 0.6844 | 0 | 0.0000 | 0 | 0.3156 | 0 | 1.0000 | 131.8 |
| 21 | 14 | Estimate (B) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | |
| 21 | 14 | (A)-(B) (C) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | - | |
| 22 | 14 | Actual (A) | 0.6095 | 0 | 0.0000 | 0 | 0.3905 | 0 | 1.0000 | 21.8 |
| 22 | 14 | Estimate (B) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | |
| 22 | 14 | (A)-(B) (C) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | - | |
| 23 | 14 | Actual (A) | 0.5000 | 0 | 0.1250 | 0 | 0.3750 | 0 | 1.0000 | 1.6 |
| 23 | 14 | Estimate (B) | 0.4980 | 0 | 0.1290 | 0 | 0.3730 | 0 | 1.0000 | |
| 23 | 14 | (A)-(B) (C) | 0.0020 | 0 | -0.0040 | 0 | 0.0020 | 0 | - | |
| 24 | 14 | Actual (A) | 0.0000 | 0 | 0.0000 | 0 | 1.0000 | 0 | 1.0000 | 8.4 |
| 24 | 14 | Estimate (B) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | |
| 24 | 14 | (A)-(B) (C) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | - | |
| 15 | 15 | Actual (A) | 0.0712 | 0 | 0.0000 | 0 | 0.9288 | 0 | 1.0000 | 2726.2 |
| 15 | 15 | Estimate (B) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | |
| 15 | 15 | (A)-(B) (C) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | - | |
| 16 | 15 | Actual (A) | 0.0481 | 0 | 0.0025 | 0 | 0.9494 | 0 | 1.0000 | 560.8 |
| 16 | 15 | Estimate (B) | 0.0491 | 0 | 0.0033 | 0 | 0.9476 | 0 | 1.0000 | |
| 16 | 15 | (A)-(B) (C) | -0.0010 | 0 | -0.0008 | 0 | 0.0018 | 0 | - | |
| 17 | 15 | Actual (A) | 0.2085 | 0 | 0.0000 | 0 | 0.7915 | 0 | 1.0000 | 58.5 |
| 17 | 15 | Estimate (B) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | |
| 17 | 15 | (A)-(B) (C) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | - | |
| 18 | 15 | Actual (A) | 0.3564 | 0 | 0.0000 | 0 | 0.6436 | 0 | 1.0000 | 75.2 |
| 18 | 15 | Estimate (B) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | |
| 18 | 15 | (A)-(B) (C) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | - | |
| 19 | 15 | Actual (A) | 0.1920 | 0 | 0.0000 | 0 | 0.8080 | 0 | 1.0000 | 98.1 |
| 19 | 15 | Estimate (B) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | |
| 19 | 15 | (A)-(B) (C) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | - | |

# Total Number of Passenger and Modal Shares by OD Pair

| Zone (I) | Zone (J) | Item | Rail | | Air | | Auto | | Total | Total Pax. |
|---|---|---|---|---|---|---|---|---|---|---|
| 20 | 15 | Actual (A) | 0.0959 | 0 | 0.0021 | 0 | 0.9019 | 0 | 1.0000 | 1309.2 |
| 20 | 15 | Estimate (B) | 0.0942 | 0 | 0.0059 | 0 | 0.8999 | 0 | 1.0000 | |
| 20 | 15 | (A)-(B) (C) | 0.0017 | 0 | -0.0037 | 0 | 0.0020 | 0 | - | |
| 21 | 15 | Actual (A) | 0.1215 | 0 | 0.0007 | 0 | 0.8778 | 0 | 1.0000 | 878.8 |
| 21 | 15 | Estimate (B) | 0.1197 | 0 | 0.0046 | 0 | 0.8758 | 0 | 1.0000 | |
| 21 | 15 | (A)-(B) (C) | 0.0019 | 0 | -0.0039 | 0 | 0.0020 | 0 | - | |
| 22 | 15 | Actual (A) | 0.0114 | 0 | 0.0004 | 0 | 0.9882 | 0 | 1.0000 | 1139.6 |
| 22 | 15 | Estimate (B) | 0.0128 | 0 | 0.0009 | 0 | 0.9863 | 0 | 1.0000 | |
| 22 | 15 | (A)-(B) (C) | -0.0014 | 0 | -0.0006 | 0 | 0.0019 | 0 | - | |
| 23 | 15 | Actual (A) | 0.0500 | 0 | 0.0500 | 0 | 0.9000 | 0 | 1.0000 | 18.0 |
| 23 | 15 | Estimate (B) | 0.0485 | 0 | 0.0535 | 0 | 0.8980 | 0 | 1.0000 | |
| 23 | 15 | (A)-(B) (C) | 0.0015 | 0 | -0.0035 | 0 | 0.0020 | 0 | - | |
| 24 | 15 | Actual (A) | 0.0000 | 0 | 0.0208 | 0 | 0.9792 | 0 | 1.0000 | 9.6 |
| 24 | 15 | Estimate (B) | 0.0000 | 0 | 0.0228 | 0 | 0.9772 | 0 | 1.0000 | |
| 24 | 15 | (A)-(B) (C) | 0.0000 | 0 | -0.0020 | 0 | 0.0020 | 0 | - | |
| 16 | 16 | Actual (A) | 0.8638 | 0 | 0.0508 | 0 | 0.0854 | 0 | 1.0000 | 248.2 |
| 16 | 16 | Estimate (B) | 0.8620 | 0 | 0.0544 | 0 | 0.0836 | 0 | 1.0000 | |
| 16 | 16 | (A)-(B) (C) | 0.0018 | 0 | -0.0037 | 0 | 0.0018 | 0 | - | |
| 17 | 16 | Actual (A) | 0.5514 | 0 | 0.0000 | 0 | 0.4486 | 0 | 1.0000 | 18.5 |
| 17 | 16 | Estimate (B) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | |
| 17 | 16 | (A)-(B) (C) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | - | |
| 18 | 16 | Actual (A) | 0.4420 | 0 | 0.0000 | 0 | 0.5580 | 0 | 1.0000 | 36.2 |
| 18 | 16 | Estimate (B) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | |
| 18 | 16 | (A)-(B) (C) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | - | |
| 19 | 16 | Actual (A) | 0.5282 | 0 | 0.0000 | 0 | 0.4718 | 0 | 1.0000 | 38.1 |
| 19 | 16 | Estimate (B) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | |
| 19 | 16 | (A)-(B) (C) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | - | |
| 20 | 16 | Actual (A) | 0.7826 | 0 | 0.1220 | 0 | 0.0954 | 0 | 1.0000 | 142.6 |
| 20 | 16 | Estimate (B) | 0.7806 | 0 | 0.1259 | 0 | 0.0935 | 0 | 1.0000 | |
| 20 | 16 | (A)-(B) (C) | 0.0020 | 0 | -0.0039 | 0 | 0.0019 | 0 | - | |
| 21 | 16 | Actual (A) | 0.9002 | 0 | 0.0157 | 0 | 0.0841 | 0 | 1.0000 | 102.2 |
| 21 | 16 | Estimate (B) | 0.8982 | 0 | 0.0196 | 0 | 0.0822 | 0 | 1.0000 | |
| 21 | 16 | (A)-(B) (C) | 0.0020 | 0 | -0.0040 | 0 | 0.0020 | 0 | - | |
| 22 | 16 | Actual (A) | 0.7323 | 0 | 0.0315 | 0 | 0.2362 | 0 | 1.0000 | 25.4 |
| 22 | 16 | Estimate (B) | 0.7303 | 0 | 0.0350 | 0 | 0.2347 | 0 | 1.0000 | |
| 22 | 16 | (A)-(B) (C) | 0.0020 | 0 | -0.0035 | 0 | 0.0015 | 0 | - | |
| 23 | 16 | Actual (A) | 0.2941 | 0 | 0.6471 | 0 | 0.0588 | 0 | 1.0000 | 3.4 |
| 23 | 16 | Estimate (B) | 0.2959 | 0 | 0.6441 | 0 | 0.0600 | 0 | 1.0000 | |
| 23 | 16 | (A)-(B) (C) | -0.0018 | 0 | 0.0029 | 0 | -0.0012 | 0 | - | |
| 24 | 16 | Actual (A) | 0.0000 | 0 | 0.6667 | 0 | 0.3333 | 0 | 1.0000 | 8.6 |
| 24 | 16 | Estimate (B) | 0.0000 | 0 | 0.6647 | 0 | 0.3353 | 0 | 1.0000 | |
| 24 | 16 | (A)-(B) (C) | 0.0000 | 0 | 0.0020 | 0 | -0.0020 | 0 | - | |
| 17 | 17 | Actual (A) | 0.8849 | 0 | 0.0000 | 0 | 0.1151 | 0 | 1.0000 | 66.9 |
| 17 | 17 | Estimate (B) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | |
| 17 | 17 | (A)-(B) (C) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | - | |
| 18 | 17 | Actual (A) | 0.6552 | 0 | 0.0000 | 0 | 0.3448 | 0 | 1.0000 | 11.6 |
| 18 | 17 | Estimate (B) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | |
| 18 | 17 | (A)-(B) (C) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | - | |
| 19 | 17 | Actual (A) | 0.7263 | 0 | 0.0000 | 0 | 0.2737 | 0 | 1.0000 | 9.5 |
| 19 | 17 | Estimate (B) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | |
| 19 | 17 | (A)-(B) (C) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | - | |
| 20 | 17 | Actual (A) | 0.7200 | 0 | 0.0080 | 0 | 0.2720 | 0 | 1.0000 | 59.8 |
| 20 | 17 | Estimate (B) | 0.7180 | 0 | 0.0120 | 0 | 0.2700 | 0 | 1.0000 | |
| 20 | 17 | (A)-(B) (C) | 0.0020 | 0 | -0.0040 | 0 | 0.0020 | 0 | - | |
| 21 | 17 | Actual (A) | 0.7717 | 0 | 0.0000 | 0 | 0.2283 | 0 | 1.0000 | 36.8 |
| 21 | 17 | Estimate (B) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | |
| 21 | 17 | (A)-(B) (C) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | - | |
| 22 | 17 | Actual (A) | 0.5526 | 0 | 0.0000 | 0 | 0.4474 | 0 | 1.0000 | 7.6 |
| 22 | 17 | Estimate (B) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | |
| 22 | 17 | (A)-(B) (C) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | - | |
| 23 | 17 | Actual (A) | 0.5000 | 0 | 0.0000 | 0 | 0.5000 | 0 | 1.0000 | 0.4 |
| 23 | 17 | Estimate (B) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | |
| 23 | 17 | (A)-(B) (C) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | - | |
| 24 | 17 | Actual (A) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0.0 |
| 24 | 17 | Estimate (B) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | |
| 24 | 17 | (A)-(B) (C) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | - | |
| 18 | 18 | Actual (A) | 0.8560 | 0 | 0.0000 | 0 | 0.9420 | 0 | 1.0000 | 1957.8 |
| 18 | 18 | Estimate (B) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | |
| 18 | 18 | (A)-(B) (C) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | - | |
| 19 | 18 | Actual (A) | 0.4360 | 0 | 0.0000 | 0 | 0.5640 | 0 | 1.0000 | 21.1 |
| 19 | 18 | Estimate (B) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | |
| 19 | 18 | (A)-(B) (C) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | - | |
| 20 | 18 | Actual (A) | 0.0751 | 0 | 0.0469 | 0 | 0.8780 | 0 | 1.0000 | 1139.4 |
| 20 | 18 | Estimate (B) | 0.0732 | 0 | 0.0506 | 0 | 0.8762 | 0 | 1.0000 | |
| 20 | 18 | (A)-(B) (C) | 0.0019 | 0 | -0.0037 | 0 | 0.0018 | 0 | - | |

## Total Number of Passenger and Modal Shares by OD Pair

| Zone (I) | Zone (J) | Item | Rail | | Air | | Auto | | Total | Total Pax. |
|---|---|---|---|---|---|---|---|---|---|---|
| 21 | 18 | Actual (A) | 0.0945 | 0 | 0.0063 | 0 | 0.8992 | 0 | 1.0000 | 728.0 |
| 21 | 18 | Estimate (B) | 0.0926 | 0 | 0.0102 | 0 | 0.8972 | 0 | 1.0000 | |
| 21 | 18 | (A)-(B) (C) | 0.0019 | 0 | -0.0039 | 0 | 0.0020 | 0 | - | |
| 22 | 18 | Actual (A) | 0.0704 | 0 | 0.0180 | 0 | 0.9117 | 0 | 1.0000 | 133.6 |
| 22 | 18 | Estimate (B) | 0.0684 | 0 | 0.0219 | 0 | 0.9097 | 0 | 1.0000 | |
| 22 | 18 | (A)-(B) (C) | 0.0020 | 0 | -0.0040 | 0 | 0.0020 | 0 | - | |
| 23 | 18 | Actual (A) | 0.0385 | 0 | 0.5769 | 0 | 0.3846 | 0 | 1.0000 | 10.4 |
| 23 | 18 | Estimate (B) | 0.0404 | 0 | 0.5740 | 0 | 0.3855 | 0 | 1.0000 | |
| 23 | 18 | (A)-(B) (C) | -0.0020 | 0 | 0.0029 | 0 | -0.0009 | 0 | - | |
| 24 | 18 | Actual (A) | 0.0000 | 0 | 0.1923 | 0 | 0.8077 | 0 | 1.0000 | 5.2 |
| 24 | 18 | Estimate (B) | 0.0000 | 0 | 0.1939 | 0 | 0.8061 | 0 | 1.0000 | |
| 24 | 18 | (A)-(B) (C) | 0.0000 | 0 | -0.0016 | 0 | 0.0016 | 0 | - | |
| 19 | 19 | Actual (A) | 0.0522 | 0 | 0.0000 | 0 | 0.9478 | 0 | 1.0000 | 1306.6 |
| 19 | 19 | Estimate (B) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | |
| 19 | 19 | (A)-(B) (C) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | - | |
| 20 | 19 | Actual (A) | 0.2567 | 0 | 0.0000 | 0 | 0.7433 | 0 | 1.0000 | 298.4 |
| 20 | 19 | Estimate (B) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | |
| 20 | 19 | (A)-(B) (C) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | - | |
| 21 | 19 | Actual (A) | 0.2872 | 0 | 0.0000 | 0 | 0.7128 | 0 | 1.0000 | 225.6 |
| 21 | 19 | Estimate (B) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | |
| 21 | 19 | (A)-(B) (C) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | - | |
| 22 | 19 | Actual (A) | 0.0960 | 0 | 0.0000 | 0 | 0.9040 | 0 | 1.0000 | 198.0 |
| 22 | 19 | Estimate (B) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | |
| 22 | 19 | (A)-(B) (C) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | - | |
| 23 | 19 | Actual (A) | 0.0534 | 0 | 0.0000 | 0 | 0.9466 | 0 | 1.0000 | 26.2 |
| 23 | 19 | Estimate (B) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | |
| 23 | 19 | (A)-(B) (C) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | - | |
| 24 | 19 | Actual (A) | 0.0000 | 0 | 0.0000 | 0 | 1.0000 | 0 | 1.0000 | 6.2 |
| 24 | 19 | Estimate (B) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | |
| 24 | 19 | (A)-(B) (C) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | - | |
| 20 | 20 | Actual (A) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | - |
| 20 | 20 | Estimate (B) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | |
| 20 | 20 | (A)-(B) (C) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | - | |
| 21 | 20 | Actual (A) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | - |
| 21 | 20 | Estimate (B) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | |
| 21 | 20 | (A)-(B) (C) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | - | |
| 22 | 20 | Actual (A) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | - |
| 22 | 20 | Estimate (B) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | |
| 22 | 20 | (A)-(B) (C) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | - | |
| 23 | 20 | Actual (A) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | - |
| 23 | 20 | Estimate (B) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | |
| 23 | 20 | (A)-(B) (C) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | - | |
| 24 | 20 | Actual (A) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | - |
| 24 | 20 | Estimate (B) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | |
| 24 | 20 | (A)-(B) (C) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | - | |
| 21 | 21 | Actual (A) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | - |
| 21 | 21 | Estimate (B) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | |
| 21 | 21 | (A)-(B) (C) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | - | |
| 22 | 21 | Actual (A) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | - |
| 22 | 21 | Estimate (B) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | |
| 22 | 21 | (A)-(B) (C) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | - | |
| 23 | 21 | Actual (A) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | - |
| 23 | 21 | Estimate (B) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | |
| 23 | 21 | (A)-(B) (C) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | - | |
| 24 | 21 | Actual (A) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | - |
| 24 | 21 | Estimate (B) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | |
| 24 | 21 | (A)-(B) (C) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | - | |
| 22 | 22 | Actual (A) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | - |
| 22 | 22 | Estimate (B) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | |
| 22 | 22 | (A)-(B) (C) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | - | |
| 23 | 22 | Actual (A) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | - |
| 23 | 22 | Estimate (B) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | |
| 23 | 22 | (A)-(B) (C) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | - | |
| 24 | 22 | Actual (A) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | - |
| 24 | 22 | Estimate (B) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | |
| 24 | 22 | (A)-(B) (C) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | - | |
| 23 | 23 | Actual (A) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | - |
| 23 | 23 | Estimate (B) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | |
| 23 | 23 | (A)-(B) (C) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | - | |
| 24 | 23 | Actual (A) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | - |
| 24 | 23 | Estimate (B) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | |
| 24 | 23 | (A)-(B) (C) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | - | |
| 24 | 24 | Actual (A) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | - |
| 24 | 24 | Estimate (B) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | |
| 24 | 24 | (A)-(B) (C) | 0.0000 | 0 | 0.0000 | 0 | 0.0000 | 0 | - | |

## Appendix-3.3.4 (25) Regression Analysis on International Passengers and GDPs

(1) Regression analysis

| Regression output for Asia (1) | | |
|---|---|---|
| Constant | | 0.030198 |
| Std Err of Y Est | | 0.146185 |
| R Squared | | 0.620188 |
| No. of Observation | | 39 |
| Degree of Freedom | | 37 |
| R | | 0.787520 |
| X Coefficient | 0.915070 | |
| Std Err of Coef. | 0.117727 | |
| Y = exp(0.030198)*X^0.915070 | | |
| Exp(0.030198)= | | 1.030658584 |

| Regression output for a group in America and Europe (2) | | |
|---|---|---|
| Constant | | 0.083975 |
| Std Err of Y Est | | 0.143010 |
| R Squared | | 0.720035 |
| No. of Observation | | 18 |
| Degree of Freedom | | 16 |
| R | | 0.853249 |
| X Coefficient | 2.615364 | |
| Std Err of Coef. | 0.399825 | |
| Y = exp(0.083975)*X^2.615364 | | |
| Exp(0.083975)= | | 1.087601703 |

| Regression output for a group in America and Europe (3) | | |
|---|---|---|
| Constant | | 0.022933 |
| Std Err of Y Est | | 0.080606 |
| R Squared | | 0.605485 |
| No. of Observation | | 18 |
| Degree of Freedom | | 16 |
| R | | 0.778129 |
| X Coefficient | 1.102713996 | |
| Std Err of Coef. | 0.222527816 | |
| Y = exp(0.022933)*X^1.102714 | | |
| Exp(0.022933)= | | 1.023197983 |

## Regression Analysis on International Passengers and GDPs

(1) DATA

| | Year | Index of Intn'l Pax (Y) | GDP Index (X) | Index of Intn'l Pax ln(Y) | GDP Index ln(X) |
|---|---|---|---|---|---|
| Japan | 1985 | 1.000000 | 1.000000 | 0.000000 | 0.000000 |
| | 1991 | 1.590744 | 1.303099 | 0.464202 | 0.264745 |
| | 1992 | 1.774286 | 1.320801 | 0.573398 | 0.278238 |
| Israil | 1985 | 1.000000 | 1.000000 | 0.000000 | 0.000000 |
| | 1991 | 1.141341 | 1.296502 | 0.132204 | 0.259670 |
| | 1992 | 1.261612 | 1.381979 | 0.232398 | 0.323517 |
| India | 1985 | 1.000000 | 1.000000 | 0.000000 | 0.000000 |
| | 1991 | 1.011585 | 1.366714 | 0.011518 | 0.312409 |
| | 1992 | 1.149698 | 1.429649 | 0.139499 | 0.357429 |
| Indonesia | 1985 | 1.000000 | 1.000000 | 0.000000 | 0.000000 |
| | 1991 | 1.795021 | 1.448307 | 0.585016 | 0.370395 |
| | 1992 | 2.260389 | 1.541862 | 0.815537 | 0.432991 |
| Oman | 1985 | 1.000000 | 1.000000 | 0.000000 | 0.000000 |
| | 1991 | 1.346185 | 1.276529 | 0.297274 | 0.244145 |
| | 1992 | 1.543775 | 1.363049 | 0.434231 | 0.309724 |
| Qatar | 1985 | 1.000000 | 1.000000 | 0.000000 | 0.000000 |
| | 1991 | 1.346185 | 1.118671 | 0.297274 | 0.112142 |
| | 1992 | 1.543775 | 1.214483 | 0.434231 | 0.194319 |
| Korea | 1985 | 1.000000 | 1.000000 | 0.000000 | 0.000000 |
| | 1991 | 1.530631 | 1.759957 | 0.425580 | 0.565289 |
| | 1992 | 1.723181 | 1.849097 | 0.544172 | 0.614698 |
| Saudi Arabia | 1985 | 1.000000 | 1.000000 | 0.000000 | 0.000000 |
| | 1991 | 1.005084 | 1.361932 | 0.005071 | 0.308904 |
| | 1992 | 1.196471 | 1.375867 | 0.179377 | 0.319084 |
| Singapore | 1985 | 1.000000 | 1.000000 | 0.000000 | 0.000000 |
| | 1991 | 1.538660 | 1.569248 | 0.430912 | 0.450591 |
| | 1992 | 1.703923 | 1.664850 | 0.532934 | 0.509255 |
| Thai | 1985 | 1.000000 | 1.000000 | 0.000000 | 0.000000 |
| | 1991 | 1.624853 | 1.772115 | 0.485417 | 0.572174 |
| | 1992 | 1.827248 | 1.906002 | 0.602811 | 0.645008 |
| Pakistan | 1985 | 1.000000 | 1.000000 | 0.000000 | 0.000000 |
| | 1991 | 1.260282 | 1.397628 | 0.231335 | 0.334777 |
| | 1992 | 1.422347 | 1.507814 | 0.352309 | 0.410130 |
| Bangladesh | 1985 | 1.000000 | 1.000000 | 0.000000 | 0.000000 |
| | 1991 | 1.340140 | 1.266208 | 0.292774 | 0.236027 |
| | 1992 | 1.413529 | 1.319736 | 0.346089 | 0.277431 |
| Philippine | 1985 | 1.000000 | 1.000000 | 0.000000 | 0.000000 |
| | 1991 | 1.317899 | 1.252925 | 0.276039 | 0.225481 |
| | 1992 | 1.546021 | 1.257136 | 0.435685 | 0.228836 |
| U.S.A | 1985 | 1.000000 | 1.000000 | 0.000000 | 0.000000 |
| | 1991 | 1.766566 | 1.126468 | 0.569038 | 0.119087 |
| | 1992 | 1.996948 | 1.163451 | 0.691620 | 0.151390 |
| United Kingdom | 1985 | 1.000000 | 1.000000 | 0.000000 | 0.000000 |
| | 1991 | 1.578480 | 1.154336 | 0.455194 | 0.143525 |
| | 1992 | 1.829386 | 1.148226 | 0.603981 | 0.138218 |
| Netherlands | 1985 | 1.000000 | 1.000000 | 0.000000 | 0.000000 |
| | 1991 | 1.506557 | 1.202367 | 0.409827 | 0.184292 |
| | 1992 | 1.742868 | 1.223537 | 0.555532 | 0.201746 |
| Denmark | 1985 | 1.000000 | 1.000000 | 0.000000 | 0.000000 |
| | 1991 | 1.364815 | 1.086980 | 0.311019 | 0.083403 |
| | 1992 | 1.325556 | 1.095373 | 0.281832 | 0.091643 |
| Finland | 1985 | 1.000000 | 1.000000 | 0.000000 | 0.000000 |
| | 1991 | 1.692924 | 1.097992 | 0.526457 | 0.093483 |
| | 1992 | 1.671117 | 1.059802 | 0.513492 | 0.057326 |
| Portugal | 1985 | 1.000000 | 1.000000 | 0.000000 | 0.000000 |
| | 1991 | 1.723077 | 1.270793 | 0.544112 | 0.239641 |
| | 1992 | 1.891738 | 1.284687 | 0.637496 | 0.250515 |
| Canada | 1985 | 1.000000 | 1.000000 | 0.000000 | 0.000000 |
| | 1991 | 1.296893 | 1.134078 | 0.259972 | 0.125820 |
| | 1992 | 1.421511 | 1.142754 | 0.351720 | 0.133441 |
| Mexico | 1985 | 1.000000 | 1.000000 | 0.000000 | 0.000000 |
| | 1991 | 1.109003 | 1.110214 | 0.103461 | 0.104553 |
| | 1992 | 1.161212 | 1.141362 | 0.149465 | 0.132222 |
| Switzerland | 1985 | 1.000000 | 1.000000 | 0.000000 | 0.000000 |
| | 1991 | 1.218155 | 1.147295 | 0.197748 | 0.137407 |
| | 1992 | 1.302318 | 1.143640 | 0.264146 | 0.134216 |
| Spain | 1985 | 1.000000 | 1.000000 | 0.000000 | 0.000000 |
| | 1991 | 1.185302 | 1.273637 | 0.170119 | 0.241877 |
| | 1992 | 1.359874 | 1.282481 | 0.306804 | 0.248797 |
| France | 1985 | 1.000000 | 1.000000 | 0.000000 | 0.000000 |
| | 1991 | 1.166853 | 1.179780 | 0.153624 | 0.165328 |
| | 1992 | 1.319676 | 1.195659 | 0.277386 | 0.178697 |
| Austria | 1985 | 1.000000 | 1.000000 | 0.000000 | 0.000000 |
| | 1991 | 1.166853 | 1.192629 | 0.153624 | 0.176160 |
| | 1992 | 1.319676 | 1.214690 | 0.277386 | 0.194489 |

Note: Data are made based on "1995 Yearbook of IMF" and "1983/4 Statistical Yearbook of United Nations".

## Appendix-3.3.5 (1) Air Passenger Movement (Arrival + Departure) by Region (Capital Replacement, Low Case)

(Thousands)

| | Code No. (i) | Code No. (j) | 1995 | 2000 | 2005 | 2010 | 2020 |
|---|---|---|---|---|---|---|---|
| Almaty to/from | | | | | | | |
| Almaty | 1 | 1 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| West Kasak. | 1 | 2 | 1.60 | 2.13 | 3.01 | 4.46 | 8.65 |
| Aktyubinsk | 1 | 3 | 36.10 | 43.14 | 51.89 | 63.71 | 91.14 |
| Karaganda | 1 | 4 | 82.60 | 98.90 | 121.29 | 151.70 | 226.05 |
| Kustanay | 1 | 5 | 29.30 | 34.49 | 41.89 | 52.13 | 76.53 |
| Atyrau | 1 | 6 | 31.50 | 37.69 | 46.02 | 56.42 | 81.77 |
| East Kazak. | 1 | 7 | 22.10 | 26.51 | 32.77 | 41.34 | 62.71 |
| South Kazak. | 1 | 8 | 115.20 | 135.91 | 164.63 | 201.91 | 290.95 |
| Zhambul | 1 | 9 | 25.70 | 31.33 | 39.46 | 52.18 | 84.59 |
| Akmola | 1 | 10 | 60.80 | 73.92 | 94.83 | 122.45 | 180.52 |
| Semipalatin. | 1 | 11 | 49.10 | 58.42 | 71.46 | 87.68 | 127.58 |
| Kokchetav | 1 | 12 | 20.00 | 23.58 | 29.03 | 36.01 | 53.42 |
| Pavloder | 1 | 13 | 88.60 | 105.91 | 130.85 | 164.64 | 249.18 |
| North Kazak. | 1 | 14 | 13.90 | 16.62 | 20.78 | 26.58 | 41.37 |
| Kzyl-Orda | 1 | 15 | 44.40 | 54.90 | 70.23 | 88.56 | 138.99 |
| Zhezkazgan | 1 | 16 | 44.10 | 52.82 | 64.34 | 78.37 | 112.61 |
| Turgai | 1 | 17 | 16.90 | 19.37 | 23.14 | 28.20 | 39.76 |
| Mangistau | 1 | 18 | 28.70 | 33.48 | 41.09 | 50.70 | 74.42 |
| Taldykorgan | 1 | 19 | 0.00 | 14.00 | 18.04 | 24.18 | 41.11 |
| Subtotal | | | 710.60 | 863.09 | 1064.75 | 1331.22 | 1981.37 |
| Russia | 1 | 20 | 517.90 | 601.63 | 702.11 | 818.86 | 1067.82 |
| East Europe | 1 | 21 | 40.90 | 48.56 | 58.99 | 72.89 | 105.51 |
| Central Asia | 1 | 22 | 40.60 | 48.04 | 57.68 | 69.98 | 98.11 |
| China | 1 | 23 | 52.40 | 63.75 | 76.49 | 90.84 | 123.49 |
| Mongolia | 1 | 24 | 8.60 | 9.88 | 11.27 | 12.74 | 15.74 |
| East Asia | 1 | 25 | 11.03 | 12.99 | 15.00 | 17.00 | 20.88 |
| Western Asia | 1 | 26 | 103.81 | 128.56 | 155.64 | 184.83 | 245.66 |
| Other Asia | 1 | 27 | 8.54 | 10.68 | 13.07 | 15.69 | 21.39 |
| West Europe | 1 | 28 | 106.00 | 124.04 | 142.71 | 161.66 | 199.59 |
| North America | 1 | 29 | 13.01 | 15.43 | 17.95 | 20.56 | 25.94 |
| Oceania, etc. | 1 | 30 | 2.04 | 2.44 | 2.86 | 3.29 | 4.19 |
| Africa | 1 | 31 | 0.24 | 0.29 | 0.35 | 0.41 | 0.52 |
| Others | 1 | 32 | 0.08 | 0.09 | 0.11 | 0.13 | 0.16 |
| Subtotal | | | 904.16 | 1066.37 | 1254.22 | 1468.86 | 1928.99 |
| Total | | | 1614.76 | 1929.47 | 2318.96 | 2800.09 | 3910.36 |
| West Kasak. to/from | | | | | | | |
| Almaty | 2 | 1 | 1.60 | 2.13 | 3.01 | 4.46 | 8.65 |
| West Kasak. | 2 | 2 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Aktyubinsk | 2 | 3 | 0.10 | 0.65 | 1.89 | 4.35 | 12.25 |
| Karaganda | 2 | 4 | 0.00 | 2.06 | 2.69 | 3.72 | 6.67 |
| Kustanay | 2 | 5 | 0.00 | 0.58 | 0.76 | 1.07 | 2.00 |
| Atyrau | 2 | 6 | 5.10 | 6.64 | 9.31 | 13.68 | 26.75 |
| East Kazak. | 2 | 7 | 32.20 | 38.05 | 46.17 | 57.02 | 83.52 |
| South Kazak. | 2 | 8 | 0.00 | 2.65 | 3.42 | 4.59 | 7.89 |
| Zhambul | 2 | 9 | 0.00 | 1.33 | 1.72 | 2.39 | 4.25 |
| Akmola | 2 | 10 | 0.00 | 2.03 | 2.76 | 3.90 | 6.81 |
| Semipalatin. | 2 | 11 | 0.00 | 0.72 | 0.95 | 1.28 | 2.25 |
| Kokchetav | 2 | 12 | 0.00 | 1.15 | 1.49 | 2.01 | 3.49 |
| Pavloder | 2 | 13 | 0.00 | 2.42 | 3.13 | 4.21 | 7.26 |
| North Kazak. | 2 | 14 | 0.00 | 1.38 | 1.78 | 2.41 | 4.20 |
| Kzyl-Orda | 2 | 15 | 0.00 | 2.27 | 3.04 | 4.10 | 7.31 |
| Zhezkazgan | 2 | 16 | 0.00 | 1.31 | 1.71 | 2.31 | 4.05 |
| Turgai | 2 | 17 | 0.00 | 0.06 | 0.08 | 0.11 | 0.21 |
| Mangistau | 2 | 18 | 13.40 | 15.90 | 20.22 | 26.33 | 42.81 |
| Taldykorgan | 2 | 19 | 0.00 | 10.87 | 13.22 | 16.42 | 24.28 |
| Subtotal | | | 52.40 | 92.19 | 117.36 | 154.37 | 254.67 |
| Russia | 2 | 20 | 3.40 | 5.01 | 8.11 | 13.65 | 30.27 |
| East Europe | 2 | 21 | 0.00 | 1.32 | 2.37 | 4.30 | 10.10 |
| Central Asia | 2 | 22 | 0.40 | 0.52 | 0.74 | 1.09 | 2.11 |
| China | 2 | 23 | 1.00 | 1.26 | 1.60 | 2.07 | 3.32 |
| Mongolia | 2 | 24 | 0.20 | 0.24 | 0.30 | 0.38 | 0.59 |
| East Asia | 2 | 25 | 0.22 | 0.25 | 0.30 | 0.34 | 0.44 |
| Western Asia | 2 | 26 | 2.04 | 2.52 | 3.08 | 3.72 | 5.15 |
| Other Asia | 2 | 27 | 0.17 | 0.21 | 0.26 | 0.32 | 0.45 |
| West Europe | 2 | 28 | 2.08 | 2.43 | 2.82 | 3.26 | 4.18 |
| North America | 2 | 29 | 0.26 | 0.30 | 0.35 | 0.41 | 0.54 |
| Oceania, etc. | 2 | 30 | 0.04 | 0.05 | 0.06 | 0.07 | 0.09 |
| Africa | 2 | 31 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 |
| Others | 2 | 32 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Subtotal | | | 10.60 | 14.12 | 19.99 | 29.62 | 57.25 |
| Total | | | 63.00 | 106.30 | 137.34 | 183.99 | 311.92 |

## Air Passenger Movement (Arrival + Departure) by Region
## (Capital Replacement, Low Case)

(Thousands)

| | Code No. (i) | Code No. (j) | 1995 | 2000 | 2005 | 2010 | 2020 |
|---|---|---|---|---|---|---|---|
| Aktyubinsk to/from | | | | | | | |
| Almaty | 3 | 1 | 36.10 | 43.14 | 51.89 | 63.71 | 91.14 |
| West Kasak. | 3 | 2 | 0.18 | 0.65 | 1.89 | 4.35 | 12.25 |
| Aktyubinsk | 3 | 3 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Karaganda | 3 | 4 | 2.90 | 3.54 | 4.54 | 6.10 | 10.28 |
| Kustanay | 3 | 5 | 0.00 | 0.89 | 1.14 | 1.55 | 2.71 |
| Atyrau | 3 | 6 | 0.30 | 0.41 | 0.60 | 0.93 | 1.93 |
| East Kazak. | 3 | 7 | 0.00 | 0.37 | 0.48 | 0.65 | 1.10 |
| South Kazak. | 3 | 8 | 0.50 | 0.62 | 0.83 | 1.18 | 2.15 |
| Zhambul | 3 | 9 | 0.00 | 0.45 | 0.58 | 0.80 | 1.41 |
| Akmola | 3 | 10 | 1.00 | 1.26 | 1.75 | 2.52 | 4.47 |
| Semipalatin. | 3 | 11 | 0.00 | 0.27 | 0.35 | 0.47 | 0.02 |
| Kokchetau | 3 | 12 | 0.00 | 0.06 | 0.08 | 0.11 | 0.20 |
| Pavlodar | 3 | 13 | 1.10 | 1.40 | 1.93 | 2.82 | 5.34 |
| North Kazak. | 3 | 14 | 0.00 | 0.08 | 0.11 | 0.16 | 0.29 |
| Kzyl-Orda | 3 | 15 | 0.00 | 0.21 | 0.29 | 0.41 | 0.78 |
| Zhezkazgan | 3 | 16 | 0.10 | 0.13 | 0.19 | 0.28 | 0.55 |
| Turgai | 3 | 17 | 0.50 | 0.59 | 0.75 | 1.00 | 1.66 |
| Mangistau | 3 | 18 | 7.80 | 9.19 | 11.59 | 15.08 | 24.22 |
| Taldykorgan | 3 | 19 | 0.00 | 0.20 | 0.26 | 0.35 | 0.59 |
| Subtotal | | | 50.40 | 63.49 | 79.23 | 102.44 | 161.92 |
| Russia | 3 | 20 | 13.00 | 15.67 | 19.59 | 25.52 | 40.56 |
| East Europe | 3 | 21 | 0.60 | 0.83 | 1.26 | 2.02 | 4.19 |
| Central Asia | 3 | 22 | 0.40 | 0.49 | 0.64 | 0.88 | 1.51 |
| China | 3 | 23 | 0.80 | 0.98 | 1.21 | 1.52 | 2.26 |
| Mongolia | 3 | 24 | 0.20 | 0.23 | 0.28 | 0.33 | 0.46 |
| East Asia | 3 | 25 | 0.16 | 0.19 | 0.22 | 0.25 | 0.32 |
| Western Asia | 3 | 26 | 1.74 | 2.13 | 2.57 | 3.10 | 4.21 |
| Other Asia | 3 | 27 | 0.13 | 0.16 | 0.19 | 0.23 | 0.33 |
| West Europe | 3 | 28 | 1.58 | 1.83 | 2.09 | 2.41 | 3.04 |
| North America | 3 | 29 | 0.19 | 0.23 | 0.26 | 0.31 | 0.40 |
| Oceania, etc. | 3 | 30 | 0.03 | 0.04 | 0.04 | 0.05 | 0.06 |
| Africa | 3 | 31 | 0.00 | 0.00 | 0.01 | 0.01 | 0.01 |
| Others | 3 | 32 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Subtotal | | | 18.84 | 22.78 | 28.37 | 36.62 | 57.35 |
| Total | | | 69.24 | 86.27 | 107.60 | 139.07 | 219.27 |
| Karaganda to/from | | | | | | | |
| Almaty | 4 | 1 | 82.60 | 98.99 | 121.29 | 151.70 | 226.05 |
| West Kasak. | 4 | 2 | 0.00 | 2.06 | 2.69 | 3.72 | 6.67 |
| Aktyubinsk | 4 | 3 | 2.90 | 3.54 | 4.54 | 6.10 | 10.28 |
| Karaganda | 4 | 4 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Kustanay | 4 | 5 | 0.00 | 1.65 | 2.12 | 2.89 | 5.03 |
| Atyrau | 4 | 6 | 5.80 | 6.97 | 8.82 | 11.42 | 18.35 |
| East Kazak. | 4 | 7 | 4.00 | 4.85 | 6.27 | 8.43 | 14.33 |
| South Kazak. | 4 | 8 | 8.10 | 9.68 | 12.30 | 16.21 | 26.59 |
| Zhambul | 4 | 9 | 0.00 | 0.30 | 0.40 | 0.57 | 1.07 |
| Akmola | 4 | 10 | 0.00 | 11.82 | 16.86 | 22.63 | 39.41 |
| Semipalatin. | 4 | 11 | 0.10 | 0.19 | 0.38 | 0.73 | 1.84 |
| Kokchetau | 4 | 12 | 0.00 | 1.96 | 2.55 | 3.45 | 6.03 |
| Pavlodar | 4 | 13 | 0.00 | 12.66 | 16.35 | 22.05 | 38.15 |
| North Kazak. | 4 | 14 | 0.00 | 2.09 | 2.72 | 3.70 | 6.51 |
| Kzyl-Orda | 4 | 15 | 0.40 | 0.68 | 1.29 | 2.34 | 5.76 |
| Zhezkazgan | 4 | 16 | 0.00 | 1.19 | 2.34 | 3.18 | 5.63 |
| Turgai | 4 | 17 | 0.00 | 0.49 | 0.63 | 0.86 | 1.50 |
| Mangistau | 4 | 18 | 0.00 | 0.94 | 1.22 | 1.65 | 2.88 |
| Taldykorgan | 4 | 19 | 0.00 | 0.78 | 1.01 | 1.37 | 2.38 |
| Subtotal | | | 103.90 | 161.35 | 202.98 | 262.99 | 418.46 |
| Russia | 4 | 20 | 92.60 | 107.90 | 129.61 | 158.45 | 226.25 |
| East Europe | 4 | 21 | 5.00 | 6.04 | 7.72 | 10.26 | 16.92 |
| Central Asia | 4 | 22 | 2.60 | 3.11 | 3.91 | 5.07 | 8.06 |
| China | 4 | 23 | 6.60 | 7.98 | 9.72 | 11.87 | 17.01 |
| Mongolia | 4 | 24 | 1.00 | 1.14 | 1.31 | 1.52 | 1.95 |
| East Asia | 4 | 25 | 1.37 | 1.58 | 1.82 | 2.07 | 2.58 |
| Western Asia | 4 | 26 | 12.92 | 15.63 | 18.88 | 22.54 | 30.41 |
| Other Asia | 4 | 27 | 1.06 | 1.30 | 1.58 | 1.91 | 2.65 |
| West Europe | 4 | 28 | 13.19 | 15.08 | 17.31 | 19.71 | 24.71 |
| North America | 4 | 29 | 1.62 | 1.88 | 2.18 | 2.51 | 3.21 |
| Oceania, etc. | 4 | 30 | 0.25 | 0.30 | 0.35 | 0.40 | 0.52 |
| Africa | 4 | 31 | 0.03 | 0.04 | 0.04 | 0.05 | 0.06 |
| Others | 4 | 32 | 0.01 | 0.01 | 0.01 | 0.01 | 0.02 |
| Subtotal | | | 138.26 | 161.98 | 194.44 | 236.38 | 334.34 |
| Total | | | 242.16 | 323.33 | 397.42 | 499.37 | 752.80 |

## Air Passenger Movement (Arrival + Departure) by Region
## (Capital Replacement, Low Case)

(Thousands)

| | Code No. (i) | Code No. (j) | 1995 | 2000 | 2005 | 2010 | 2020 |
|---|---|---|---|---|---|---|---|
| Kustanay to/from | | | | | | | |
| Almaty | 5 | 1 | 29.30 | 34.49 | 41.89 | 52.13 | 76.53 |
| West Kazak. | 5 | 2 | 0.00 | 0.58 | 0.76 | 1.07 | 2.00 |
| Aktyubinsk | 5 | 3 | 0.00 | 0.89 | 1.14 | 1.55 | 2.71 |
| Karaganda | 5 | 4 | 0.00 | 1.65 | 2.12 | 2.89 | 5.03 |
| Kustanay | 5 | 5 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Atyrau | 5 | 6 | 0.70 | 0.86 | 1.15 | 1.62 | 2.94 |
| East Kazak. | 5 | 7 | 1.20 | 1.44 | 1.86 | 2.53 | 4.32 |
| South Kazak. | 5 | 8 | 0.00 | 1.04 | 1.32 | 1.75 | 2.93 |
| Zhambul | 5 | 9 | 1.10 | 1.32 | 1.70 | 2.34 | 4.05 |
| Aknola | 5 | 10 | 0.00 | 1.37 | 1.86 | 2.63 | 4.60 |
| Semipalatin. | 5 | 11 | 0.00 | 0.07 | 0.09 | 0.13 | 0.24 |
| Kokchetau | 5 | 12 | 0.00 | 1.37 | 1.78 | 2.39 | 4.14 |
| Pavlodar | 5 | 13 | 0.00 | 0.83 | 1.08 | 1.50 | 2.72 |
| North Kazak. | 5 | 14 | 0.00 | 1.49 | 1.92 | 2.61 | 4.52 |
| Kzyl-Orda | 5 | 15 | 1.30 | 1.65 | 2.30 | 3.27 | 6.19 |
| Zhezkazgan | 5 | 16 | 0.00 | 0.38 | 0.49 | 0.67 | 1.18 |
| Turgai | 5 | 17 | 0.00 | 0.37 | 0.47 | 0.64 | 1.18 |
| Mangistau | 5 | 18 | 5.90 | 6.78 | 8.50 | 10.95 | 17.35 |
| Taldykorgan | 5 | 19 | 0.00 | 0.35 | 0.44 | 0.59 | 0.99 |
| Subtotal | | | 39.50 | 56.93 | 70.90 | 91.27 | 143.53 |
| Russia | 5 | 20 | 21.00 | 24.54 | 30.19 | 38.45 | 58.75 |
| East Europe | 5 | 21 | 3.80 | 4.52 | 5.73 | 7.60 | 12.44 |
| Central Asia | 5 | 22 | 4.80 | 5.55 | 6.71 | 8.33 | 12.18 |
| China | 5 | 23 | 4.80 | 5.68 | 6.92 | 8.22 | 11.43 |
| Mongolia | 5 | 24 | 0.80 | 0.90 | 1.03 | 1.20 | 1.54 |
| East Asia | 5 | 25 | 1.02 | 1.15 | 1.32 | 1.49 | 1.84 |
| Western Asia | 5 | 26 | 9.64 | 11.41 | 13.64 | 16.25 | 21.64 |
| Other Asia | 5 | 27 | 0.79 | 0.95 | 1.15 | 1.38 | 1.88 |
| West Europe | 5 | 28 | 9.84 | 11.01 | 12.51 | 14.21 | 17.58 |
| North America | 5 | 29 | 1.21 | 1.37 | 1.57 | 1.81 | 2.29 |
| Oceania, etc. | 5 | 30 | 0.19 | 0.22 | 0.25 | 0.29 | 0.37 |
| Africa | 5 | 31 | 0.02 | 0.03 | 0.03 | 0.04 | 0.05 |
| Others | 5 | 32 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 |
| Subtotal | | | 57.92 | 67.33 | 80.96 | 99.26 | 141.99 |
| Total | | | 97.42 | 124.26 | 151.86 | 190.53 | 285.53 |
| Atyrau to/from | | | | | | | |
| Almaty | 6 | 1 | 31.50 | 37.69 | 46.02 | 56.42 | 81.77 |
| West Kazak. | 6 | 2 | 5.10 | 6.64 | 9.31 | 13.68 | 26.75 |
| Aktyubinsk | 6 | 3 | 0.30 | 0.41 | 0.60 | 0.93 | 1.93 |
| Karaganda | 6 | 4 | 5.80 | 6.97 | 8.82 | 11.42 | 18.35 |
| Kustanay | 6 | 5 | 0.70 | 0.86 | 1.15 | 1.62 | 2.94 |
| Atyrau | 6 | 6 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| East Kazak. | 6 | 7 | 0.00 | 2.99 | 3.75 | 4.79 | 7.55 |
| South Kazak. | 6 | 8 | 5.30 | 6.28 | 7.86 | 9.99 | 15.59 |
| Zhambul | 6 | 9 | 0.00 | 0.30 | 0.39 | 0.55 | 0.98 |
| Aknola | 6 | 10 | 3.30 | 4.05 | 5.39 | 7.27 | 11.77 |
| Semipalatin. | 6 | 11 | 0.00 | 4.30 | 5.36 | 6.68 | 10.15 |
| Kokchetau | 6 | 12 | 0.50 | 0.61 | 0.80 | 1.07 | 1.86 |
| Pavlodar | 6 | 13 | 0.00 | 1.20 | 1.56 | 2.10 | 3.64 |
| North Kazak. | 6 | 14 | 0.70 | 0.85 | 1.12 | 1.51 | 2.64 |
| Kzyl-Orda | 6 | 15 | 0.00 | 0.81 | 1.08 | 1.46 | 2.63 |
| Zhezkazgan | 6 | 16 | 1.40 | 1.70 | 2.18 | 2.82 | 4.59 |
| Turgai | 6 | 17 | 0.00 | 0.01 | 0.02 | 0.02 | 0.04 |
| Mangistau | 6 | 18 | 53.20 | 61.43 | 75.81 | 93.54 | 139.04 |
| Taldykorgan | 6 | 19 | 0.00 | 3.20 | 3.92 | 4.86 | 7.24 |
| Subtotal | | | 107.80 | 140.30 | 175.13 | 220.74 | 339.45 |
| Russia | 6 | 20 | 40.00 | 47.32 | 58.13 | 72.28 | 107.37 |
| East Europe | 6 | 21 | 2.20 | 2.70 | 3.52 | 4.76 | 8.12 |
| Central Asia | 6 | 22 | 1.20 | 1.44 | 1.83 | 2.37 | 3.78 |
| China | 6 | 23 | 2.80 | 3.40 | 4.16 | 5.04 | 7.20 |
| Mongolia | 6 | 24 | 0.40 | 0.46 | 0.55 | 0.65 | 0.89 |
| East Asia | 6 | 25 | 0.58 | 0.68 | 0.80 | 0.92 | 1.19 |
| Western Asia | 6 | 26 | 5.45 | 6.70 | 8.28 | 10.00 | 13.95 |
| Other Asia | 6 | 27 | 0.45 | 0.56 | 0.70 | 0.85 | 1.22 |
| West Europe | 6 | 28 | 5.57 | 6.47 | 7.59 | 8.75 | 11.34 |
| North America | 6 | 29 | 0.68 | 0.80 | 0.95 | 1.11 | 1.47 |
| Oceania, etc. | 6 | 30 | 0.11 | 0.13 | 0.15 | 0.18 | 0.24 |
| Africa | 6 | 31 | 0.01 | 0.02 | 0.02 | 0.02 | 0.03 |
| Others | 6 | 32 | 0.00 | 0.00 | 0.01 | 0.01 | 0.01 |
| Subtotal | | | 59.46 | 70.69 | 86.68 | 106.93 | 156.81 |
| Total | | | 167.26 | 210.99 | 261.81 | 327.66 | 496.26 |

## Air Passenger Movement (Arrival + Departure) by Region
## (Capital Replacement, Low Case)

(Thousands)

| | Code No. (i) | Code No. (j) | 1995 | 2000 | 2005 | 2010 | 2020 |
|---|---|---|---|---|---|---|---|
| East Kazak. to from | | | | | | | |
| Almaty | 7 | 1 | 23.60 | 26.51 | 32.77 | 41.34 | 62.71 |
| West Kazak. | 7 | 2 | 34.38 | 39.05 | 46.17 | 57.02 | 83.52 |
| Aktyubinsk | 7 | 3 | 0.00 | 0.37 | 0.48 | 0.65 | 1.10 |
| Karaganda | 7 | 4 | 4.27 | 4.85 | 6.27 | 8.43 | 14.33 |
| Kustanay | 7 | 5 | 1.28 | 1.44 | 1.86 | 2.53 | 4.32 |
| Atyrau | 7 | 6 | 0.00 | 2.99 | 3.75 | 4.79 | 7.55 |
| East Kazak. | 7 | 7 | 8.76 | 9.91 | 12.80 | 17.24 | 29.67 |
| South Kazak. | 7 | 8 | 5.02 | 5.53 | 6.88 | 8.80 | 13.73 |
| Zhambul | 7 | 9 | 0.00 | 0.07 | 0.09 | 0.13 | 0.25 |
| Akmola | 7 | 10 | 0.43 | 0.55 | 0.86 | 1.40 | 2.90 |
| Semipalatin. | 7 | 11 | 0.00 | 2.40 | 3.14 | 4.25 | 7.46 |
| Kokchetau | 7 | 12 | 0.00 | 0.07 | 0.09 | 0.13 | 0.24 |
| Pavlodar | 7 | 13 | 0.43 | 0.89 | 1.95 | 3.91 | 9.93 |
| North Kazak. | 7 | 14 | 0.00 | 0.11 | 0.15 | 0.20 | 0.38 |
| Kzyl-Orda | 7 | 15 | 0.00 | 1.04 | 1.37 | 1.83 | 3.20 |
| Zhezkazgan | 7 | 16 | 0.00 | 0.05 | 0.07 | 0.10 | 0.19 |
| Turgai | 7 | 17 | 0.00 | 0.02 | 0.03 | 0.04 | 0.08 |
| Mangistau | 7 | 18 | 53.60 | 56.38 | 66.98 | 79.23 | 108.31 |
| Taldykorgan | 7 | 19 | 0.00 | 0.65 | 0.84 | 1.13 | 1.96 |
| Subtotal | | | 131.76 | 151.88 | 186.55 | 233.15 | 351.83 |
| Russia | 7 | 20 | 13.60 | 16.07 | 19.85 | 25.16 | 38.42 |
| East Europe | 7 | 21 | 3.20 | 3.84 | 4.88 | 6.44 | 10.48 |
| Central Asia | 7 | 22 | 1.60 | 1.91 | 2.39 | 3.08 | 4.85 |
| China | 7 | 23 | 4.20 | 5.08 | 6.24 | 7.87 | 11.15 |
| Mongolia | 7 | 24 | 0.60 | 0.69 | 0.81 | 0.97 | 1.32 |
| East Asia | 7 | 25 | 0.88 | 1.00 | 1.16 | 1.31 | 1.63 |
| Western Asia | 7 | 26 | 8.24 | 9.93 | 11.99 | 14.27 | 19.17 |
| Other Asia | 7 | 27 | 0.68 | 0.82 | 1.01 | 1.21 | 1.67 |
| West Europe | 7 | 28 | 8.42 | 9.58 | 11.00 | 12.48 | 15.58 |
| North America | 7 | 29 | 1.03 | 1.19 | 1.38 | 1.59 | 2.03 |
| Oceania, etc. | 7 | 30 | 0.16 | 0.19 | 0.22 | 0.25 | 0.33 |
| Africa | 7 | 31 | 0.02 | 0.02 | 0.03 | 0.03 | 0.04 |
| Others | 7 | 32 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 |
| Subtotal | | | 42.63 | 50.34 | 60.96 | 74.46 | 106.68 |
| Total | | | 174.39 | 202.21 | 247.50 | 307.60 | 458.51 |
| South Kazak. to/from | | | | | | | |
| Almaty | 8 | 1 | 115.20 | 135.91 | 164.63 | 201.91 | 290.95 |
| West Kazak. | 8 | 2 | 0.00 | 2.65 | 3.42 | 4.59 | 7.89 |
| Aktyubinsk | 8 | 3 | 0.50 | 0.62 | 0.83 | 1.18 | 2.15 |
| Karaganda | 8 | 4 | 8.10 | 9.68 | 12.30 | 16.21 | 26.59 |
| Kustanay | 8 | 5 | 0.00 | 1.04 | 1.32 | 1.75 | 2.93 |
| Atyrau | 8 | 6 | 5.30 | 6.28 | 7.86 | 9.99 | 15.59 |
| East Kazak. | 8 | 7 | 4.10 | 5.53 | 6.88 | 8.80 | 13.73 |
| South Kazak. | 8 | 8 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Zhambul | 8 | 9 | 0.00 | 16.10 | 20.75 | 28.50 | 50.08 |
| Akmola | 8 | 10 | 1.10 | 1.39 | 1.97 | 2.90 | 5.31 |
| Semipalatin. | 8 | 11 | 0.00 | 0.62 | 0.80 | 1.07 | 1.82 |
| Kokchetau | 8 | 12 | 0.30 | 0.38 | 0.53 | 0.77 | 1.46 |
| Pavlodar | 8 | 13 | 4.10 | 5.04 | 6.73 | 9.37 | 16.75 |
| North Kazak. | 8 | 14 | 5.20 | 6.08 | 7.62 | 9.80 | 15.51 |
| Kzyl-Orda | 8 | 15 | 0.00 | 7.10 | 9.48 | 12.74 | 22.68 |
| Zhezkazgan | 8 | 16 | 0.00 | 0.47 | 0.61 | 0.83 | 1.45 |
| Turgai | 8 | 17 | 3.00 | 3.40 | 4.14 | 5.20 | 7.81 |
| Mangistau | 8 | 18 | 5.80 | 6.70 | 8.39 | 10.71 | 16.81 |
| Taldykorgan | 8 | 19 | 0.00 | 0.68 | 0.87 | 1.17 | 2.03 |
| Subtotal | | | 153.30 | 209.67 | 259.13 | 327.49 | 501.54 |
| Russia | 8 | 20 | 36.40 | 42.58 | 52.15 | 65.30 | 97.61 |
| East Europe | 8 | 21 | 1.40 | 1.77 | 2.43 | 3.51 | 6.47 |
| Central Asia | 8 | 22 | 0.80 | 1.27 | 2.22 | 3.94 | 9.03 |
| China | 8 | 23 | 1.80 | 2.22 | 2.82 | 3.64 | 5.82 |
| Mongolia | 8 | 24 | 0.40 | 0.47 | 0.57 | 0.70 | 1.03 |
| East Asia | 8 | 25 | 0.39 | 0.44 | 0.51 | 0.58 | 0.71 |
| Western Asia | 8 | 26 | 3.69 | 4.40 | 5.29 | 6.26 | 8.33 |
| Other Asia | 8 | 27 | 0.30 | 0.37 | 0.44 | 0.53 | 0.72 |
| West Europe | 8 | 28 | 3.76 | 4.25 | 4.85 | 5.48 | 6.77 |
| North America | 8 | 29 | 0.46 | 0.53 | 0.61 | 0.70 | 0.88 |
| Oceania, etc. | 8 | 30 | 0.07 | 0.08 | 0.10 | 0.11 | 0.14 |
| Africa | 8 | 31 | 0.01 | 0.01 | 0.01 | 0.01 | 0.02 |
| Others | 8 | 32 | 0.00 | 0.00 | 0.00 | 0.00 | 0.01 |
| Subtotal | | | 49.49 | 58.38 | 72.01 | 90.76 | 137.53 |
| Total | | | 202.79 | 268.05 | 331.14 | 418.25 | 639.07 |

## Air Passenger Movement (Arrival + Departure) by Region
## (Capital Replacement, Low Case)

(Thousands)

| | Code No. | | 1995 | 2000 | 2005 | 2010 | 2020 |
|---|---|---|---|---|---|---|---|
| | (I) | (J) | | | | | |
| Zhambul to/from | | | | | | | |
| Almaty | 9 | 1 | 26.16 | 31.33 | 39.46 | 52.18 | 84.59 |
| West Kazak. | 9 | 2 | 0.00 | 1.33 | 1.72 | 2.39 | 4.25 |
| Aktyubinsk | 9 | 3 | 0.00 | 0.45 | 0.58 | 0.80 | 1.41 |
| Karaganda | 9 | 4 | 0.00 | 0.30 | 0.40 | 0.57 | 1.07 |
| Kustanay | 9 | 5 | 1.12 | 1.32 | 1.70 | 2.34 | 4.06 |
| Atyrau | 9 | 6 | 0.00 | 0.30 | 0.39 | 0.55 | 0.98 |
| East Kazak. | 9 | 7 | 0.00 | 0.07 | 0.09 | 0.13 | 0.25 |
| South Kazak. | 9 | 8 | 0.00 | 16.10 | 20.75 | 28.50 | 50.08 |
| Zhambul | 9 | 9 | 0.41 | 0.00 | 0.00 | 0.00 | 0.00 |
| Akmola | 9 | 10 | 0.00 | 0.15 | 0.20 | 0.30 | 0.58 |
| Semipalatin. | 9 | 11 | 0.00 | 0.05 | 0.07 | 0.10 | 0.19 |
| Kokchetav | 9 | 12 | 0.00 | 0.05 | 0.07 | 0.10 | 0.18 |
| Pavlodar | 9 | 13 | 0.00 | 0.39 | 0.51 | 0.73 | 1.37 |
| North Kazak. | 9 | 14 | 0.00 | 0.66 | 0.85 | 1.16 | 2.04 |
| Kzyl-Orda | 9 | 15 | 0.00 | 2.55 | 3.42 | 4.74 | 8.78 |
| Zhezkazgan | 9 | 16 | 0.71 | 0.87 | 1.15 | 1.62 | 2.92 |
| Turgai | 9 | 17 | 0.00 | 0.02 | 0.03 | 0.04 | 0.08 |
| Mangistau | 9 | 18 | 0.00 | 0.38 | 0.50 | 0.69 | 1.23 |
| Taldykorgan | 9 | 19 | 0.00 | 0.65 | 0.85 | 1.17 | 2.09 |
| Subtotal | | | 28.40 | 56.97 | 72.75 | 98.11 | 166.15 |
| Russia | 9 | 20 | 9.68 | 11.54 | 14.56 | 19.38 | 31.74 |
| East Europe | 9 | 21 | 2.20 | 2.71 | 3.56 | 4.99 | 8.82 |
| Central Asia | 9 | 22 | 1.20 | 1.62 | 2.41 | 3.84 | 8.00 |
| China | 9 | 23 | 2.80 | 3.44 | 4.30 | 5.54 | 8.62 |
| Mongolia | 9 | 24 | 0.40 | 0.47 | 0.57 | 0.72 | 1.08 |
| East Asia | 9 | 25 | 0.61 | 0.70 | 0.82 | 0.96 | 1.24 |
| Western Asia | 9 | 26 | 5.73 | 6.97 | 8.45 | 18.43 | 14.59 |
| Other Asia | 9 | 27 | 0.47 | 0.58 | 0.71 | 0.89 | 1.27 |
| West Europe | 9 | 28 | 5.85 | 6.73 | 7.75 | 9.12 | 11.85 |
| North America | 9 | 29 | 0.72 | 0.84 | 0.97 | 1.16 | 1.54 |
| Oceania, etc. | 9 | 30 | 0.11 | 0.13 | 0.16 | 0.19 | 0.25 |
| Africa | 9 | 31 | 0.01 | 0.02 | 0.02 | 0.02 | 0.03 |
| Others | 9 | 32 | 0.00 | 0.00 | 0.01 | 0.01 | 0.01 |
| Subtotal | | | 29.71 | 35.77 | 44.29 | 57.24 | 89.03 |
| Total | | | 58.11 | 92.74 | 117.03 | 155.35 | 255.17 |
| Akmola to/from | | | | | | | |
| Almaty | 10 | 1 | 60.80 | 73.92 | 94.83 | 122.45 | 180.52 |
| West Kazak. | 10 | 2 | 0.00 | 2.03 | 2.76 | 3.90 | 6.81 |
| Aktyubinsk | 10 | 3 | 1.00 | 1.26 | 1.75 | 2.52 | 4.47 |
| Karaganda | 10 | 4 | 0.00 | 11.82 | 16.06 | 22.63 | 39.41 |
| Kustanay | 10 | 5 | 0.00 | 1.37 | 1.86 | 2.63 | 4.60 |
| Atyrau | 10 | 6 | 3.30 | 4.05 | 5.39 | 7.27 | 11.77 |
| East Kazak. | 10 | 7 | 0.40 | 0.55 | 0.86 | 1.40 | 2.90 |
| South Kazak. | 10 | 8 | 1.18 | 1.39 | 1.97 | 2.90 | 5.31 |
| Zhambul | 10 | 9 | 0.00 | 0.15 | 0.20 | 0.30 | 0.58 |
| Akmola | 10 | 10 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Semipalatin. | 10 | 11 | 0.00 | 0.64 | 0.88 | 1.25 | 2.23 |
| Kokchetav | 10 | 12 | 0.00 | 2.23 | 3.05 | 4.26 | 7.50 |
| Pavlodar | 10 | 13 | 0.00 | 6.79 | 9.24 | 13.02 | 22.74 |
| North Kazak. | 10 | 14 | 0.00 | 1.62 | 2.22 | 3.15 | 5.56 |
| Kzyl-Orda | 10 | 15 | 0.00 | 0.25 | 0.36 | 0.52 | 0.99 |
| Zhezkazgan | 10 | 16 | 0.50 | 0.67 | 1.01 | 1.56 | 3.11 |
| Turgai | 10 | 17 | 0.00 | 0.17 | 0.23 | 0.32 | 0.57 |
| Mangistau | 10 | 18 | 0.00 | 0.51 | 0.70 | 0.99 | 1.74 |
| Taldykorgan | 10 | 19 | 0.00 | 0.08 | 0.12 | 0.17 | 0.31 |
| Subtotal | | | 67.10 | 109.49 | 143.48 | 191.25 | 301.12 |
| Russia | 10 | 20 | 38.48 | 45.87 | 58.55 | 75.54 | 111.06 |
| East Europe | 10 | 21 | 5.40 | 6.58 | 8.69 | 11.77 | 18.81 |
| Central Asia | 10 | 22 | 2.80 | 3.38 | 4.40 | 5.83 | 8.99 |
| China | 10 | 23 | 7.00 | 8.59 | 10.96 | 13.82 | 19.62 |
| Mongolia | 10 | 24 | 1.20 | 1.40 | 1.71 | 2.07 | 2.71 |
| East Asia | 10 | 25 | 1.45 | 1.72 | 2.13 | 2.58 | 3.25 |
| Western Asia | 10 | 26 | 13.68 | 17.03 | 22.13 | 28.03 | 38.27 |
| Other Asia | 10 | 27 | 1.13 | 1.41 | 1.86 | 2.38 | 3.33 |
| West Europe | 10 | 28 | 13.98 | 16.43 | 20.29 | 24.51 | 31.09 |
| North America | 10 | 29 | 1.72 | 2.04 | 2.55 | 3.12 | 4.04 |
| Oceania, etc. | 10 | 30 | 0.27 | 0.32 | 0.41 | 0.50 | 0.65 |
| Africa | 10 | 31 | 0.03 | 0.04 | 0.05 | 0.06 | 0.08 |
| Others | 10 | 32 | 0.01 | 0.01 | 0.02 | 0.02 | 0.03 |
| Subtotal | | | 87.08 | 104.84 | 133.74 | 170.22 | 241.93 |
| Total | | | 154.18 | 214.33 | 277.22 | 361.47 | 543.06 |

## Air Passenger Movement (Arrival + Departure) by Region
## (Capital Replacement, Low Case)

(Thousands)

| | Code No. (i) | Code No. (j) | 1995 | 2000 | 2005 | 2010 | 2020 |
|---|---|---|---|---|---|---|---|
| Semipalatinsk to/from | | | | | | | |
| Almaty | 11 | 1 | 52.93 | 59.42 | 71.46 | 87.68 | 127.58 |
| West Kasak. | 11 | 2 | 0.00 | 0.72 | 0.95 | 1.28 | 2.25 |
| Aktyubinsk | 11 | 3 | 0.00 | 0.27 | 0.35 | 0.47 | 0.82 |
| Karaganda | 11 | 4 | 0.11 | 0.19 | 0.38 | 0.73 | 1.84 |
| Kustanay | 11 | 5 | 0.00 | 0.07 | 0.09 | 0.13 | 0.24 |
| Atyrau | 11 | 6 | 0.00 | 4.30 | 5.36 | 6.68 | 10.15 |
| East Kazak. | 11 | 7 | 0.00 | 2.40 | 3.14 | 4.25 | 7.46 |
| South Kazak. | 11 | 8 | 0.00 | 0.62 | 0.80 | 1.07 | 1.82 |
| Zhambul | 11 | 9 | 0.00 | 0.05 | 0.07 | 0.10 | 0.19 |
| Akmola | 11 | 10 | 0.00 | 0.64 | 0.88 | 1.25 | 2.23 |
| Semipalatin. | 11 | 11 | 4.42 | 4.99 | 6.56 | 8.84 | 15.53 |
| Kokchetau | 11 | 12 | 0.00 | 0.05 | 0.07 | 0.09 | 0.17 |
| Pavlodar | 11 | 13 | 0.00 | 6.04 | 7.88 | 10.61 | 18.50 |
| North Kazak. | 11 | 14 | 0.00 | 0.07 | 0.10 | 0.14 | 0.26 |
| Kzyl-Orda | 11 | 15 | 0.32 | 0.40 | 0.60 | 0.89 | 1.82 |
| Zhezkazgan | 11 | 16 | 0.65 | 0.74 | 0.98 | 1.32 | 2.29 |
| Turgai | 11 | 17 | 0.00 | 0.01 | 0.02 | 0.03 | 0.05 |
| Mangistau | 11 | 18 | 0.00 | 5.25 | 6.53 | 8.13 | 12.32 |
| Taldykorgan | 11 | 19 | 0.00 | 0.45 | 0.59 | 0.79 | 1.39 |
| Subtotal | | | 58.43 | 85.69 | 106.79 | 134.48 | 206.91 |
| Russia | 11 | 20 | 12.80 | 15.16 | 18.88 | 23.88 | 36.68 |
| East Europe | 11 | 21 | 0.20 | 0.29 | 0.46 | 0.77 | 1.66 |
| Central Asia | 11 | 22 | 0.20 | 0.26 | 0.35 | 0.49 | 0.91 |
| China | 11 | 23 | 0.40 | 0.50 | 0.65 | 0.86 | 1.45 |
| Mongolia | 11 | 24 | 0.00 | 0.80 | 0.94 | 1.10 | 1.46 |
| East Asia | 11 | 25 | 0.07 | 0.08 | 0.09 | 0.11 | 0.14 |
| Western Asia | 11 | 26 | 0.66 | 0.80 | 0.98 | 1.17 | 1.60 |
| Other Asia | 11 | 27 | 0.05 | 0.07 | 0.08 | 0.10 | 0.14 |
| West Europe | 11 | 28 | 0.67 | 0.77 | 0.90 | 1.02 | 1.30 |
| North America | 11 | 29 | 0.08 | 0.10 | 0.11 | 0.13 | 0.17 |
| Oceania, etc. | 11 | 30 | 0.01 | 0.02 | 0.02 | 0.02 | 0.03 |
| Africa | 11 | 31 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Others | 11 | 32 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Subtotal | | | 15.15 | 18.83 | 23.47 | 29.65 | 45.53 |
| Total | | | 73.58 | 104.52 | 130.26 | 164.13 | 252.44 |
| Kokchetau to/from | | | | | | | |
| Almaty | 12 | 1 | 20.08 | 23.58 | 29.03 | 36.01 | 53.42 |
| West Kasak. | 12 | 2 | 0.00 | 1.15 | 1.49 | 2.01 | 3.49 |
| Aktyubinsk | 12 | 3 | 0.00 | 0.06 | 0.08 | 0.11 | 0.20 |
| Karaganda | 12 | 4 | 0.00 | 1.86 | 2.55 | 3.45 | 6.03 |
| Kustanay | 12 | 5 | 0.00 | 1.37 | 1.78 | 2.39 | 4.14 |
| Atyrau | 12 | 6 | 0.50 | 0.61 | 0.80 | 1.07 | 1.86 |
| East Kazak. | 12 | 7 | 0.00 | 0.07 | 0.09 | 0.13 | 0.24 |
| South Kazak. | 12 | 8 | 0.30 | 0.38 | 0.53 | 0.77 | 1.46 |
| Zhambul | 12 | 9 | 0.00 | 0.05 | 0.07 | 0.10 | 0.18 |
| Akmola | 12 | 10 | 0.00 | 2.23 | 3.05 | 4.28 | 7.50 |
| Semipalatin. | 12 | 11 | 0.00 | 0.05 | 0.07 | 0.09 | 0.17 |
| Kokchetau | 12 | 12 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Pavlodar | 12 | 13 | 0.00 | 1.83 | 2.39 | 3.22 | 5.60 |
| North Kazak. | 12 | 14 | 0.00 | 2.98 | 3.88 | 5.22 | 9.08 |
| Kzyl-Orda | 12 | 15 | 0.00 | 0.08 | 0.11 | 0.16 | 0.30 |
| Zhezkazgan | 12 | 16 | 0.20 | 0.26 | 0.37 | 0.54 | 1.06 |
| Turgai | 12 | 17 | 0.00 | 0.11 | 0.14 | 0.19 | 0.34 |
| Mangistau | 12 | 18 | 15.80 | 17.75 | 21.62 | 26.21 | 37.76 |
| Taldykorgan | 12 | 19 | 0.00 | 0.03 | 0.04 | 0.05 | 0.09 |
| Subtotal | | | 36.88 | 54.53 | 68.07 | 86.01 | 132.94 |
| Russia | 12 | 20 | 5.00 | 5.91 | 7.51 | 9.77 | 15.74 |
| East Europe | 12 | 21 | 1.20 | 1.46 | 1.92 | 2.63 | 4.56 |
| Central Asia | 12 | 22 | 0.60 | 0.71 | 0.91 | 1.19 | 1.93 |
| China | 12 | 23 | 1.40 | 1.68 | 2.08 | 2.56 | 3.76 |
| Mongolia | 12 | 24 | 0.20 | 0.23 | 0.28 | 0.33 | 0.47 |
| East Asia | 12 | 25 | 0.30 | 0.34 | 0.39 | 0.45 | 0.56 |
| Western Asia | 12 | 26 | 2.02 | 3.35 | 4.08 | 4.85 | 6.57 |
| Other Asia | 12 | 27 | 0.23 | 0.28 | 0.34 | 0.41 | 0.57 |
| West Europe | 12 | 28 | 2.88 | 3.23 | 3.74 | 4.24 | 5.33 |
| North America | 12 | 29 | 0.35 | 0.40 | 0.47 | 0.54 | 0.69 |
| Oceania, etc. | 12 | 30 | 0.06 | 0.06 | 0.07 | 0.09 | 0.11 |
| Africa | 12 | 31 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 |
| Others | 12 | 32 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Subtotal | | | 15.85 | 17.66 | 21.81 | 27.06 | 40.32 |
| Total | | | 51.85 | 72.19 | 89.89 | 113.07 | 173.26 |

## Air Passenger Movement (Arrival + Departure) by Region (Capital Replacement, Low Case)

(Thousands)

| | Code No. (i) | (j) | 1995 | 2000 | 2005 | 2010 | 2020 |
|---|---|---|---|---|---|---|---|
| Pavlodar to/from | | | | | | | |
| Almaty | 13 | 1 | 88.60 | 105.91 | 130.85 | 164.64 | 249.18 |
| West Kazak. | 13 | 2 | 0.00 | 2.42 | 3.13 | 4.21 | 7.26 |
| Aktyubinsk | 13 | 3 | 1.10 | 1.40 | 1.93 | 2.82 | 5.34 |
| Karaganda | 13 | 4 | 0.00 | 12.66 | 16.35 | 22.05 | 38.15 |
| Kustanay | 13 | 5 | 0.00 | 0.83 | 1.08 | 1.58 | 2.72 |
| Atyrau | 13 | 6 | 0.00 | 1.20 | 1.56 | 2.18 | 3.64 |
| East Kazak. | 13 | 7 | 0.40 | 0.89 | 1.95 | 3.91 | 9.93 |
| South Kazak. | 13 | 8 | 4.10 | 5.04 | 6.73 | 9.37 | 16.75 |
| Zhambul | 13 | 9 | 0.00 | 0.39 | 0.51 | 0.73 | 1.37 |
| Akmola | 13 | 10 | 0.00 | 6.79 | 9.24 | 13.02 | 22.74 |
| Semipalatin. | 13 | 11 | 0.00 | 6.04 | 7.88 | 10.61 | 18.56 |
| Kokchetau | 13 | 12 | 0.00 | 1.83 | 2.39 | 3.22 | 5.60 |
| Pavlodar | 13 | 13 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| North Kazak. | 13 | 14 | 0.00 | 1.96 | 2.55 | 3.45 | 6.04 |
| Kzyl-Orda | 13 | 15 | 3.50 | 4.40 | 5.97 | 8.15 | 14.66 |
| Zhezkazgan | 13 | 16 | 0.00 | 0.41 | 0.55 | 0.76 | 1.41 |
| Turgai | 13 | 17 | 0.00 | 0.26 | 0.33 | 0.45 | 0.78 |
| Mangistau | 13 | 18 | 0.00 | 24.65 | 30.29 | 37.51 | 55.88 |
| Taldykorgan | 13 | 19 | 0.00 | 0.30 | 0.40 | 0.55 | 0.99 |
| Subtotal | | | 97.70 | 177.35 | 223.69 | 289.03 | 460.96 |
| Russia | 13 | 20 | 43.80 | 51.19 | 62.40 | 77.50 | 114.28 |
| East Europe | 13 | 21 | 1.28 | 1.52 | 2.10 | 3.03 | 5.61 |
| Central Asia | 13 | 22 | 5.00 | 5.86 | 7.19 | 9.01 | 13.51 |
| China | 13 | 23 | 1.60 | 1.96 | 2.46 | 3.13 | 4.85 |
| Mongolia | 13 | 24 | 0.20 | 0.23 | 0.29 | 0.36 | 0.53 |
| East Asia | 13 | 25 | 0.35 | 0.40 | 0.46 | 0.52 | 0.64 |
| Western Asia | 13 | 26 | 3.30 | 3.96 | 4.77 | 5.66 | 7.57 |
| Other Asia | 13 | 27 | 0.27 | 0.33 | 0.40 | 0.48 | 0.66 |
| West Europe | 13 | 28 | 3.37 | 3.82 | 4.38 | 4.95 | 6.15 |
| North America | 13 | 29 | 0.41 | 0.47 | 0.55 | 0.63 | 0.80 |
| Oceania, etc. | 13 | 30 | 0.07 | 0.08 | 0.09 | 0.10 | 0.13 |
| Africa | 13 | 31 | 0.01 | 0.01 | 0.01 | 0.01 | 0.02 |
| Others | 13 | 32 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Subtotal | | | 59.57 | 69.82 | 85.11 | 105.38 | 154.74 |
| Total | | | 157.27 | 247.18 | 308.79 | 394.41 | 615.70 |
| North Kazak. to/from | | | | | | | |
| Almaty | 14 | 1 | 13.90 | 16.62 | 20.78 | 26.58 | 41.37 |
| West Kazak. | 14 | 2 | 0.00 | 1.38 | 1.78 | 2.41 | 4.28 |
| Aktyubinsk | 14 | 3 | 0.00 | 0.08 | 0.11 | 0.16 | 0.29 |
| Karaganda | 14 | 4 | 0.00 | 2.09 | 2.72 | 3.70 | 6.51 |
| Kustanay | 14 | 5 | 0.00 | 1.49 | 1.92 | 2.61 | 4.52 |
| Atyrau | 14 | 6 | 0.70 | 0.85 | 1.12 | 1.51 | 2.64 |
| East Kazak. | 14 | 7 | 0.00 | 0.11 | 0.15 | 0.20 | 0.38 |
| South Kazak. | 14 | 8 | 5.20 | 6.08 | 7.62 | 9.80 | 15.51 |
| Zhambul | 14 | 9 | 0.00 | 0.66 | 0.85 | 1.16 | 2.04 |
| Akmola | 14 | 10 | 0.00 | 1.62 | 2.22 | 3.15 | 5.56 |
| Semipalatin. | 14 | 11 | 0.00 | 0.07 | 0.10 | 0.14 | 0.26 |
| Kokchetau | 14 | 12 | 0.00 | 2.98 | 3.88 | 5.22 | 9.08 |
| Pavlodar | 14 | 13 | 0.00 | 1.96 | 2.55 | 3.45 | 6.04 |
| North Kazak. | 14 | 14 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Kzyl-Orda | 14 | 15 | 0.00 | 0.86 | 1.14 | 1.53 | 2.69 |
| Zhezkazgan | 14 | 16 | 0.00 | 0.33 | 0.43 | 0.59 | 1.06 |
| Turgai | 14 | 17 | 0.00 | 0.08 | 0.11 | 0.15 | 0.26 |
| Mangistau | 14 | 18 | 0.00 | 0.36 | 0.47 | 0.63 | 1.11 |
| Taldykorgan | 14 | 19 | 0.00 | 0.35 | 0.45 | 0.60 | 1.02 |
| Subtotal | | | 19.80 | 37.97 | 48.40 | 63.60 | 104.53 |
| Russia | 14 | 20 | 0.48 | 0.64 | 0.81 | 1.26 | 2.60 |
| East Europe | 14 | 21 | 0.00 | 11.41 | 14.03 | 17.66 | 26.65 |
| Central Asia | 14 | 22 | 0.00 | 0.17 | 0.22 | 0.30 | 0.50 |
| China | 14 | 23 | 0.20 | 0.25 | 0.31 | 0.41 | 0.66 |
| Mongolia | 14 | 24 | 0.00 | 0.26 | 0.31 | 0.36 | 0.47 |
| East Asia | 14 | 25 | 0.02 | 0.02 | 0.03 | 0.03 | 0.04 |
| Western Asia | 14 | 26 | 0.21 | 0.25 | 0.30 | 0.36 | 0.49 |
| Other Asia | 14 | 27 | 0.02 | 0.02 | 0.03 | 0.03 | 0.04 |
| West Europe | 14 | 28 | 0.21 | 0.24 | 0.28 | 0.32 | 0.40 |
| North America | 14 | 29 | 0.03 | 0.03 | 0.03 | 0.04 | 0.05 |
| Oceania, etc. | 14 | 30 | 0.00 | 0.00 | 0.81 | 0.01 | 0.01 |
| Africa | 14 | 31 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Others | 14 | 32 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Subtotal | | | 1.09 | 13.20 | 16.35 | 20.78 | 31.91 |
| Total | | | 20.89 | 51.17 | 64.75 | 84.38 | 136.44 |

## Air Passenger Movement (Arrival + Departure) by Region
## (Capital Replacement, Low Case)

(Thousands)

| | Code No. (i) | Code No. (j) | 1995 | 2000 | 2005 | 2010 | 2020 |
|---|---|---|---|---|---|---|---|
| Kzyl-Orda to/from | | | | | | | |
| Almaty | 15 | 1 | 44.40 | 54.90 | 70.23 | 88.56 | 138.99 |
| West Kazak. | 15 | 2 | 0.00 | 2.27 | 3.04 | 4.10 | 7.31 |
| Aktyubinsk | 15 | 3 | 0.00 | 0.21 | 0.29 | 0.41 | 0.78 |
| Karaganda | 15 | 4 | 0.40 | 0.68 | 1.29 | 2.34 | 5.76 |
| Kustanay | 15 | 5 | 1.30 | 1.65 | 2.30 | 3.27 | 6.19 |
| Atyrau | 15 | 6 | 0.00 | 0.81 | 1.08 | 1.46 | 2.63 |
| East Kazak. | 15 | 7 | 0.00 | 1.04 | 1.37 | 1.83 | 3.20 |
| South Kazak. | 15 | 8 | 0.00 | 7.10 | 9.48 | 12.74 | 22.68 |
| Zhambul | 15 | 9 | 0.00 | 2.55 | 3.42 | 4.74 | 8.78 |
| Akmola | 15 | 10 | 0.00 | 0.25 | 0.36 | 0.52 | 0.99 |
| Semipalatin. | 15 | 11 | 0.30 | 0.40 | 0.60 | 0.89 | 1.82 |
| Kokchetav | 15 | 12 | 0.00 | 0.08 | 0.11 | 0.16 | 0.30 |
| Pavlodar | 15 | 13 | 3.50 | 4.40 | 5.97 | 8.15 | 14.66 |
| North Kazak. | 15 | 14 | 0.00 | 0.86 | 1.14 | 1.53 | 2.69 |
| Kzyl-Orda | 15 | 15 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Zhezkazgan | 15 | 16 | 1.40 | 1.73 | 2.26 | 2.89 | 4.67 |
| Turgai | 15 | 17 | 0.00 | 0.07 | 0.10 | 0.13 | 0.25 |
| Mangistau | 15 | 18 | 0.00 | 0.71 | 0.95 | 1.28 | 2.30 |
| Taldykorgan | 15 | 19 | 0.00 | 0.10 | 0.14 | 0.20 | 0.37 |
| Subtotal | | | 51.30 | 79.82 | 104.15 | 135.19 | 224.36 |
| Russia | 15 | 20 | 2.00 | 3.91 | 6.05 | 9.45 | 19.92 |
| East Europe | 15 | 21 | 0.60 | 1.05 | 2.01 | 3.67 | 8.85 |
| Central Asia | 15 | 22 | 0.40 | 0.53 | 0.78 | 1.14 | 2.18 |
| China | 15 | 23 | 0.80 | 1.03 | 1.39 | 1.85 | 3.23 |
| Mongolia | 15 | 24 | 0.20 | 0.25 | 0.32 | 0.42 | 0.71 |
| East Asia | 15 | 25 | 0.18 | 0.21 | 0.25 | 0.29 | 0.38 |
| Western Asia | 15 | 26 | 1.66 | 2.08 | 2.64 | 3.13 | 4.42 |
| Other Asia | 15 | 27 | 0.14 | 0.17 | 0.22 | 0.27 | 0.38 |
| West Europe | 15 | 28 | 1.69 | 2.01 | 2.42 | 2.74 | 3.59 |
| North America | 15 | 29 | 0.21 | 0.25 | 0.30 | 0.35 | 0.47 |
| Oceania, etc. | 15 | 30 | 0.03 | 0.04 | 0.05 | 0.06 | 0.08 |
| Africa | 15 | 31 | 0.00 | 0.00 | 0.01 | 0.01 | 0.01 |
| Others | 15 | 32 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Subtotal | | | 8.71 | 11.54 | 16.44 | 23.38 | 44.22 |
| Total | | | 60.01 | 91.36 | 120.58 | 158.57 | 268.58 |
| Zhezkazgan to/from | | | | | | | |
| Almaty | 16 | 1 | 49.11 | 52.82 | 64.34 | 78.37 | 112.61 |
| West Kazak. | 16 | 2 | 0.00 | 1.31 | 1.71 | 2.31 | 4.05 |
| Aktyubinsk | 16 | 3 | 0.12 | 0.13 | 0.19 | 0.26 | 0.55 |
| Karaganda | 16 | 4 | 0.00 | 1.79 | 2.34 | 3.18 | 5.63 |
| Kustanay | 16 | 5 | 0.00 | 0.38 | 0.49 | 0.67 | 1.18 |
| Atyrau | 16 | 6 | 1.69 | 1.70 | 2.18 | 2.82 | 4.59 |
| East Kazak. | 16 | 7 | 0.00 | 0.05 | 0.07 | 0.10 | 0.19 |
| South Kazak. | 16 | 8 | 0.00 | 0.47 | 0.61 | 0.83 | 1.45 |
| Zhambul | 16 | 9 | 0.84 | 0.87 | 1.15 | 1.62 | 2.92 |
| Akmola | 16 | 10 | 0.60 | 0.67 | 1.01 | 1.56 | 3.11 |
| Semipalatin. | 16 | 11 | 0.72 | 0.74 | 0.98 | 1.32 | 2.29 |
| Kokchetav | 16 | 12 | 0.24 | 0.26 | 0.37 | 0.54 | 1.06 |
| Pavlodar | 16 | 13 | 0.00 | 0.41 | 0.55 | 0.76 | 1.41 |
| North Kazak. | 16 | 14 | 0.00 | 0.33 | 0.43 | 0.59 | 1.06 |
| Kzyl-Orda | 16 | 15 | 1.69 | 1.73 | 2.26 | 2.89 | 4.67 |
| Zhezkazgan | 16 | 16 | 14.17 | 15.49 | 19.80 | 25.70 | 42.10 |
| Turgai | 16 | 17 | 0.00 | 0.12 | 0.16 | 0.21 | 0.37 |
| Mangistau | 16 | 18 | 0.00 | 0.33 | 0.43 | 0.58 | 1.03 |
| Taldykorgan | 16 | 19 | 0.00 | 0.04 | 0.05 | 0.07 | 0.13 |
| Subtotal | | | 69.18 | 79.54 | 99.12 | 124.40 | 190.39 |
| Russia | 16 | 20 | 17.40 | 20.66 | 25.43 | 31.61 | 47.07 |
| East Europe | 16 | 21 | 1.60 | 1.96 | 2.54 | 3.38 | 5.66 |
| Central Asia | 16 | 22 | 0.80 | 0.97 | 1.23 | 1.61 | 2.60 |
| China | 16 | 23 | 2.20 | 2.69 | 3.31 | 4.02 | 5.80 |
| Mongolia | 16 | 24 | 0.40 | 0.46 | 0.54 | 0.63 | 0.83 |
| East Asia | 16 | 25 | 0.46 | 0.53 | 0.62 | 0.71 | 0.91 |
| Western Asia | 16 | 26 | 4.28 | 5.27 | 6.48 | 7.74 | 10.65 |
| Other Asia | 16 | 27 | 0.35 | 0.44 | 0.54 | 0.66 | 0.93 |
| West Europe | 16 | 28 | 4.37 | 5.08 | 5.94 | 6.77 | 8.65 |
| North America | 16 | 29 | 0.54 | 0.63 | 0.75 | 0.86 | 1.13 |
| Oceania, etc. | 16 | 30 | 0.08 | 0.10 | 0.12 | 0.14 | 0.18 |
| Africa | 16 | 31 | 0.01 | 0.01 | 0.01 | 0.02 | 0.02 |
| Others | 16 | 32 | 0.00 | 0.00 | 0.00 | 0.01 | 0.01 |
| Subtotal | | | 32.50 | 38.80 | 47.52 | 58.16 | 84.43 |
| Total | | | 101.68 | 118.34 | 146.64 | 182.56 | 274.82 |

## Air Passenger Movement (Arrival + Departure) by Region (Capital Replacement, Low Case)

(Thousands)

| | Code No. (I) | Code No. (J) | 1995 | 2000 | 2005 | 2010 | 2020 |
|---|---|---|---|---|---|---|---|
| Turgai to/from | | | | | | | |
| Almaty | 17 | 1 | 16.90 | 19.37 | 23.14 | 28.20 | 39.76 |
| West Kazak. | 17 | 2 | 0.00 | 0.06 | 0.08 | 0.11 | 0.21 |
| Aktyubinsk | 17 | 3 | 0.58 | 0.59 | 0.75 | 1.00 | 1.66 |
| Karaganda | 17 | 4 | 0.00 | 0.49 | 0.63 | 0.86 | 1.50 |
| Kustanay | 17 | 5 | 0.00 | 0.37 | 0.47 | 0.64 | 1.10 |
| Atyrau | 17 | 6 | 0.00 | 0.01 | 0.02 | 0.02 | 0.04 |
| East Kazak. | 17 | 7 | 0.00 | 0.02 | 0.03 | 0.04 | 0.08 |
| South Kazak. | 17 | 8 | 3.00 | 3.40 | 4.14 | 5.20 | 7.81 |
| Zhambul | 17 | 9 | 0.00 | 0.02 | 0.03 | 0.04 | 0.08 |
| Akmola | 17 | 10 | 0.00 | 0.17 | 0.23 | 0.32 | 0.57 |
| Semipalatin. | 17 | 11 | 0.00 | 0.01 | 0.02 | 0.03 | 0.05 |
| Kokchetav | 17 | 12 | 0.00 | 0.11 | 0.14 | 0.19 | 0.34 |
| Pavlodar | 17 | 13 | 0.00 | 0.26 | 0.33 | 0.45 | 0.78 |
| North Kazak. | 17 | 14 | 0.00 | 0.08 | 0.11 | 0.15 | 0.26 |
| Kzyl-Orda | 17 | 15 | 0.00 | 0.07 | 0.10 | 0.13 | 0.25 |
| Zhezkazgan | 17 | 16 | 0.00 | 0.12 | 0.16 | 0.21 | 0.37 |
| Turgai | 17 | 17 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Mangistau | 17 | 18 | 0.00 | 0.10 | 0.13 | 0.17 | 0.30 |
| Taldykorgan | 17 | 19 | 0.00 | 0.01 | 0.01 | 0.02 | 0.03 |
| Subtotal | | | 20.48 | 25.28 | 30.51 | 37.81 | 55.20 |
| Russia | 17 | 20 | 0.48 | 0.48 | 0.63 | 0.88 | 1.55 |
| East Europe | 17 | 21 | 0.00 | 3.11 | 3.79 | 4.77 | 7.12 |
| Central Asia | 17 | 22 | 0.00 | 0.07 | 0.09 | 0.12 | 0.19 |
| China | 17 | 23 | 0.00 | 0.08 | 0.10 | 0.13 | 0.20 |
| Mongolia | 17 | 24 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| East Asia | 17 | 25 | 0.01 | 0.01 | 0.02 | 0.02 | 0.02 |
| Western Asia | 17 | 26 | 0.12 | 0.14 | 0.16 | 0.20 | 0.26 |
| Other Asia | 17 | 27 | 0.01 | 0.01 | 0.01 | 0.02 | 0.02 |
| West Europe | 17 | 28 | 0.12 | 0.13 | 0.15 | 0.17 | 0.21 |
| North America | 17 | 29 | 0.02 | 0.02 | 0.02 | 0.02 | 0.03 |
| Oceania, etc. | 17 | 30 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Africa | 17 | 31 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Others | 17 | 32 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Subtotal | | | 0.68 | 4.05 | 4.97 | 6.32 | 9.62 |
| Total | | | 21.08 | 29.33 | 35.48 | 44.13 | 64.82 |
| Mangistau to/from | | | | | | | |
| Almaty | 18 | 1 | 29.49 | 33.48 | 41.09 | 50.70 | 74.42 |
| West Kasak. | 18 | 2 | 13.77 | 15.90 | 20.22 | 26.33 | 42.81 |
| Aktyubinsk | 18 | 3 | 8.02 | 9.19 | 11.59 | 15.06 | 24.22 |
| Karaganda | 18 | 4 | 0.00 | 0.94 | 1.22 | 1.65 | 2.88 |
| Kustanay | 18 | 5 | 6.06 | 6.78 | 8.50 | 10.95 | 17.35 |
| Atyrau | 18 | 6 | 54.67 | 61.43 | 75.81 | 93.54 | 139.04 |
| East Kazak. | 18 | 7 | 51.59 | 56.38 | 66.98 | 79.23 | 108.91 |
| South Kazak. | 18 | 8 | 5.96 | 6.70 | 8.39 | 10.71 | 16.81 |
| Zhambul | 18 | 9 | 0.00 | 0.38 | 0.50 | 0.69 | 1.23 |
| Akmola | 18 | 10 | 0.00 | 0.51 | 0.70 | 0.99 | 1.74 |
| Semipalatin. | 18 | 11 | 0.00 | 5.25 | 6.53 | 8.13 | 12.92 |
| Kokchetav | 18 | 12 | 16.24 | 17.75 | 21.62 | 26.21 | 37.76 |
| Pavlodar | 18 | 13 | 0.00 | 24.65 | 30.29 | 37.51 | 55.88 |
| North Kazak. | 18 | 14 | 0.00 | 0.36 | 0.47 | 0.63 | 1.11 |
| Kzyl-Orda | 18 | 15 | 0.00 | 0.71 | 0.95 | 1.28 | 2.30 |
| Zhezkazgan | 18 | 16 | 0.00 | 0.33 | 0.43 | 0.58 | 1.03 |
| Turgai | 18 | 17 | 0.00 | 0.10 | 0.13 | 0.17 | 0.30 |
| Mangistau | 18 | 18 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Taldykorgan | 18 | 19 | 0.00 | 3.78 | 4.63 | 5.73 | 8.52 |
| Subtotal | | | 185.80 | 244.61 | 300.06 | 370.10 | 548.03 |
| Russia | 18 | 20 | 53.48 | 62.39 | 78.73 | 101.48 | 161.00 |
| East Europe | 18 | 21 | 4.60 | 5.64 | 7.67 | 10.85 | 19.80 |
| Central Asia | 18 | 22 | 2.48 | 2.85 | 3.71 | 4.96 | 8.36 |
| China | 18 | 23 | 6.00 | 7.13 | 8.83 | 10.87 | 15.96 |
| Mongolia | 18 | 24 | 1.00 | 1.15 | 1.40 | 1.72 | 2.51 |
| East Asia | 18 | 25 | 1.27 | 1.43 | 1.68 | 1.93 | 2.49 |
| Western Asia | 18 | 26 | 11.99 | 14.16 | 17.47 | 21.05 | 29.27 |
| Other Asia | 18 | 27 | 0.99 | 1.18 | 1.47 | 1.79 | 2.55 |
| West Europe | 18 | 28 | 12.24 | 13.66 | 16.92 | 18.41 | 23.78 |
| North America | 18 | 29 | 1.58 | 1.78 | 2.02 | 2.34 | 3.09 |
| Oceania, etc. | 18 | 30 | 0.24 | 0.27 | 0.32 | 0.38 | 0.50 |
| Africa | 18 | 31 | 0.03 | 0.03 | 0.04 | 0.05 | 0.06 |
| Others | 18 | 32 | 0.01 | 0.01 | 0.01 | 0.01 | 0.02 |
| Subtotal | | | 95.67 | 111.61 | 139.36 | 175.82 | 269.39 |
| Total | | | 281.47 | 356.21 | 439.42 | 545.92 | 817.41 |

## Air Passenger Movement (Arrival + Departure) by Region
## (Capital Replacement, Low Case)

(Thousands)

| | Code No. (i) | Code No. (j) | 1995 | 2000 | 2005 | 2010 | 2020 |
|---|---|---|---|---|---|---|---|
| Taldykorgan to/from | | | | | | | |
| Almaty | 19 | 1 | 0.00 | 14.00 | 18.04 | 24.18 | 41.11 |
| West Kazak. | 19 | 2 | 0.00 | 10.87 | 13.22 | 18.42 | 24.28 |
| Aktyubinsk | 19 | 3 | 0.00 | 0.20 | 0.26 | 0.35 | 0.59 |
| Karaganda | 19 | 4 | 0.00 | 0.78 | 1.01 | 1.37 | 2.38 |
| Kustanay | 19 | 5 | 0.00 | 0.35 | 0.44 | 0.59 | 0.99 |
| Atyrau | 19 | 6 | 0.00 | 3.20 | 3.92 | 4.80 | 7.24 |
| East Kazak. | 19 | 7 | 0.00 | 0.65 | 0.84 | 1.13 | 1.96 |
| South Kazak. | 19 | 8 | 0.00 | 0.68 | 0.87 | 1.17 | 2.03 |
| Zhambul | 19 | 9 | 0.00 | 0.65 | 0.85 | 1.17 | 2.09 |
| Akmola | 19 | 10 | 0.00 | 0.08 | 0.12 | 0.17 | 0.31 |
| Semipalatin. | 19 | 11 | 0.00 | 0.45 | 0.59 | 0.79 | 1.39 |
| Kokchetav | 19 | 12 | 0.00 | 0.03 | 0.04 | 0.05 | 0.09 |
| Pavlodar | 19 | 13 | 0.00 | 0.30 | 0.40 | 0.55 | 0.99 |
| North Kazak. | 19 | 14 | 0.00 | 0.35 | 0.45 | 0.60 | 1.02 |
| Kzyl-Orda | 19 | 15 | 0.00 | 0.10 | 0.14 | 0.20 | 0.37 |
| Zhezkazgan | 19 | 16 | 0.00 | 0.04 | 0.05 | 0.07 | 0.13 |
| Turgai | 19 | 17 | 0.00 | 0.01 | 0.01 | 0.02 | 0.03 |
| Mangistau | 19 | 18 | 0.00 | 3.78 | 4.63 | 5.73 | 8.52 |
| Taldykorgan | 19 | 19 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Subtotal | | | 0.00 | 36.52 | 45.87 | 59.43 | 95.51 |
| Russia | 19 | 20 | 0.00 | 24.67 | 30.24 | 37.98 | 57.07 |
| East Europe | 19 | 21 | 0.00 | 18.37 | 22.43 | 28.07 | 41.82 |
| Central Asia | 19 | 22 | 0.00 | 0.21 | 0.27 | 0.38 | 0.68 |
| China | 19 | 23 | 0.00 | 0.12 | 0.17 | 0.24 | 0.44 |
| Mongolia | 19 | 24 | 0.00 | 3.43 | 3.99 | 4.68 | 6.18 |
| East Asia | 19 | 25 | 0.00 | 0.63 | 0.72 | 0.81 | 1.08 |
| Western Asia | 19 | 26 | 0.00 | 6.22 | 7.47 | 8.85 | 11.78 |
| Other Asia | 19 | 27 | 0.00 | 0.52 | 0.63 | 0.75 | 1.02 |
| West Europe | 19 | 28 | 0.00 | 5.99 | 6.84 | 7.73 | 9.56 |
| North America | 19 | 29 | 0.00 | 0.75 | 0.86 | 0.98 | 1.24 |
| Oceania, etc. | 19 | 30 | 0.00 | 0.12 | 0.14 | 0.16 | 0.20 |
| Africa | 19 | 31 | 0.00 | 0.01 | 0.02 | 0.02 | 0.03 |
| Others | 19 | 32 | 0.00 | 0.00 | 0.01 | 0.01 | 0.01 |
| Subtotal | | | 0.00 | 61.02 | 73.78 | 90.65 | 131.04 |
| Total | | | 0.00 | 97.55 | 119.66 | 150.08 | 226.55 |