

Important Airport Forecast Methods Formulas PDF



Formulas Examples with Units

List of 20 Important Airport Forecast Methods Formulas

1) Conventional Airport Forecast Methods Formulas

1.1) Domestic Passenger Enplanement Formula

Formula

$$EI_i = M_{i/j} \cdot M_{i/s} \cdot Ms_{/us} \cdot M_{US} \cdot E_{US}$$

Example

$$40.32 = 56 \cdot 0.4 \cdot 0.3 \cdot 0.12 \cdot 50$$

Evaluate Formula 

1.2) Domestic Passenger Enplanement in Location i Formula

Formula

$$M_{i/j} = \frac{EI_i}{M_{i/s} \cdot Ms_{/us} \cdot M_{US} \cdot E_{US}}$$

Example

$$55.5556 = \frac{40}{0.4 \cdot 0.3 \cdot 0.12 \cdot 50}$$

Evaluate Formula 

1.3) Percent Market Share for Airport Formula

Formula

$$M_{i/s} = \frac{EI_i}{M_{i/j} \cdot Ms_{/us} \cdot M_{US} \cdot E_{US}}$$

Example

$$0.3968 = \frac{40}{56 \cdot 0.3 \cdot 0.12 \cdot 50}$$

Evaluate Formula 

1.4) Percent Market Share for Region 'j' Formula

Formula

$$Ms_{/us} = \frac{EI_i}{M_{i/j} \cdot M_{i/s} \cdot M_{US} \cdot E_{US}}$$

Example

$$0.2976 = \frac{40}{56 \cdot 0.4 \cdot 0.12 \cdot 50}$$

Evaluate Formula 

1.5) Percent Market Share of State of total US Market Formula

Formula

$$M_{US} = \frac{EI_i}{M_{i/j} \cdot M_{i/s} \cdot Ms_{/us} \cdot E_{US}}$$

Example

$$0.119 = \frac{40}{56 \cdot 0.4 \cdot 0.3 \cdot 50}$$

Evaluate Formula 

1.6) Total Scheduled Domestic Passenger Enplanement Formula

Formula

$$E_{US} = \frac{EI_i}{M_{i/j} \cdot M_{i/s} \cdot Ms_{/us} \cdot M_{US}}$$

Example

$$49.6032 = \frac{40}{56 \cdot 0.4 \cdot 0.3 \cdot 0.12}$$

Evaluate Formula 



2) Integrated Demand Forecast Framework Formulas

2.1) Air Transport Movement per Aircraft Formula

Formula

Evaluate Formula 

$$ATM = \frac{Y - a_0 - (JF \cdot a_1) - (W \cdot a_2)}{a_3}$$

Example

$$99.95 = \frac{45010 - 10.5 - (1000 \cdot 4) - (5000 \cdot 8)}{10}$$

2.2) Airline Industry Wages Formula

Formula

Evaluate Formula 

$$W = \frac{Y - a_0 - (JF \cdot a_1) - (ATM \cdot a_3)}{a_2}$$

Example

$$4999.9375 = \frac{45010 - 10.5 - (1000 \cdot 4) - (100 \cdot 10)}{8}$$

2.3) Average Trip Length given Passenger Enplanements Formula

Formula

Example with Units

Evaluate Formula 

$$L = \frac{RPM}{EI_1}$$

$$902.5002_m = \frac{36100.01}{40}$$

2.4) Jet Fuel Price given Yield Formula

Formula

Evaluate Formula 

$$JF = \frac{Y - a_0 - (W \cdot a_2) - (ATM \cdot a_3)}{a_1}$$

Example

$$999.875 = \frac{45010 - 10.5 - (5000 \cdot 8) - (100 \cdot 10)}{4}$$

2.5) Passenger Enplanements Formula

Formula

Example with Units

Evaluate Formula 

$$EI_1 = \frac{RPM}{L}$$

$$40.0222 = \frac{36100.01}{902_m}$$



2.6) Real Gross National Product Formula

Formula

$$\text{GNP} = \frac{\text{RPM} - b_0 - (Y \cdot c)}{d}$$

Example

$$438.0952 = \frac{36100.01 - 0.01 - (45010 \cdot 0.8)}{0.21}$$

Evaluate Formula 

2.7) Real Yield given Revenue Passenger Miles Formula

Formula

$$Y = \frac{\text{RPM} - b_0 - (\text{GNP} \cdot d)}{c}$$

Example

$$45004.25 = \frac{36100.01 - 0.01 - (460 \cdot 0.21)}{0.8}$$

Evaluate Formula 

2.8) Regression Model Formulation for Yield Formula

Formula

$$Y = a_0 + (JF \cdot a_1) + (W \cdot a_2) + (ATM \cdot a_3)$$

Example

$$45010.5 = 10.5 + (1000 \cdot 4) + (5000 \cdot 8) + (100 \cdot 10)$$

Evaluate Formula 

2.9) Revenue Passenger Miles Formula

Formula

$$\text{RPM} = b_0 + (\text{GNP} \cdot d) + (Y \cdot c)$$

Example

$$36104.61 = 0.01 + (460 \cdot 0.21) + (45010 \cdot 0.8)$$

Evaluate Formula 

2.10) Revenue Passenger Miles given Passenger Enplanements Formula

Formula

$$\text{RPM} = EI_i \cdot L$$

Example with Units

$$36080 = 40 \cdot 902_m$$

Evaluate Formula 



3) Multi-Airport Region Forecast Framework Formulas

3.1) Airline Service Weekly Departing Flights from Airport 1 Formula

Formula

Evaluate Formula 

$$AS_1 = \left(\frac{\ln\left(\frac{P_1}{P_{23}}\right) - b_{1,2} \cdot (TT_1 - TT_{23})}{b_{2,3}} \right) + AS_{23}$$

Example with Units

$$4.8539_h = \left(\frac{\ln\left(\frac{50.1}{55}\right) - 5_h \cdot (6_h - 6.5_h)}{6.8_h} \right) + 4.5_h$$

3.2) Airline Service Weekly Departing Flights from Airport 2,3 Formula

Formula

Evaluate Formula 

$$AS_{23} = - \left(\left(\frac{\ln\left(\frac{P_1}{P_{23}}\right) - b_{1,2} \cdot (TT_1 - TT_{23})}{b_{2,3}} \right) - AS_1 \right)$$

Example with Units

$$3.7461_h = - \left(\left(\frac{\ln\left(\frac{50.1}{55}\right) - 5_h \cdot (6_h - 6.5_h)}{6.8_h} \right) - 4.1_h \right)$$

3.3) Travel Times from Analysis Zone to Airports 1 given Percent of Passengers Formula

Formula

Evaluate Formula 

$$TT_1 = \left(\frac{\ln\left(\frac{P_1}{P_{23}}\right) - b_{2,3} \cdot (AS_1 - AS_{23})}{b_{1,2}} \right) + TT_{23}$$

Example with Units

$$7.0253_h = \left(\frac{\ln\left(\frac{50.1}{55}\right) - 6.8_h \cdot (4.1_h - 4.5_h)}{5_h} \right) + 6.5_h$$



3.4) Travel Times from Analysis Zone to Airports 2,3 Formula

Formula

Evaluate Formula 

$$TT_{23} = - \left(\left(\frac{\ln \left(\frac{P_1}{P_{23}} \right) - b_{2,3} \cdot (AS_1 - AS_{23})}{b_{1,2}} \right) - TT_1 \right)$$

Example with Units

$$5.4747 \text{ h} = - \left(\left(\frac{\ln \left(\frac{50.1}{55} \right) - 6.8 \text{ h} \cdot (4.1 \text{ h} - 4.5 \text{ h})}{5 \text{ h}} \right) - 6 \text{ h} \right)$$



Variables used in list of Airport Forecast Methods Formulas above

- **a_0** Regression Coefficient a
- **a_1** Regression Coefficient a_1
- **a_2** Regression Coefficient a_2
- **a_3** Regression Coefficient a_3
- **AS_1** Airline Service 1 (Hour)
- **AS_{23}** Airline Service 23 (Hour)
- **ATM** Air Transport Movement per Aircraft
- **b_0** Regression Coefficient b
- **$b_{1,2}$** Coefficient for Travel Time (Hour)
- **$b_{2,3}$** Coefficient for Airline Service (Hour)
- **c** Regression Coefficient
- **d** Regression Coefficient d
- **E_{US}** Total Scheduled Domestic Passenger
- **EI_i** Domestic Passenger Enplanement
- **GNP** Real Gross National Product
- **JF** Jet Fuel Price
- **L** Average Trip Length (Meter)
- **M_{ij}** Domestic Passenger Enplanement in Location 'i'
- **$M_{i/s}$** Percent Market Share for Airport 'i'
- **M_{US}** Percent Market Share of State
- **MS_{us}** Percent Market Share for Region
- **P_1** Percent of Passengers in Analysis Zone
- **P_{23}** Percent of Passengers in Analysis Zone 2,3
- **RPM** Revenue Passenger Miles
- **TT_1** Travel Times from Analysis Zone 1 (Hour)
- **TT_{23}** Travel Times from Analysis Zone 2,3 (Hour)
- **W** Airline Industry Wages
- **Y** Yield of Aircraft

Constants, Functions, Measurements used in list of Airport Forecast Methods Formulas above

- **Functions:** **ln**, **ln(Number)**
The natural logarithm, also known as the logarithm to the base e , is the inverse function of the natural exponential function.
- **Measurement: Length** in Meter (m)
Length Unit Conversion 
- **Measurement: Time** in Hour (h)
Time Unit Conversion 



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