

## **Operational definitions and measurement scales**

### **World Development Indicators**

#### ***Agricultural land (% of land area)***

It is measurable on a ratio scale, operationally defined as:

The share of land area that is arable, under permanent crops and under permanent pastures.

Arable land includes land defined by the FAO as land under temporary crops (double-cropped areas are counted once), temporary meadows for mowing or for pasture, land under market or kitchen gardens, and land temporarily fallow. Land abandoned as a result of shifting cultivation is excluded. Land under permanent crops is land cultivated with crops that occupy the land for long periods and need not be replanted after each harvest, such as cocoa, coffee, and rubber. This category includes land under flowering shrubs, fruit trees, nut trees, and vines, but excludes land under trees grown for wood or timber. Permanent pasture is land used for five or more years for forage, including natural and cultivated crops.

Source: <http://devdata.worldbank.org>

#### ***Agriculture, value added (% of GDP)***

It is measurable on a ratio scale, operationally defined as:

Forestry, hunting, and fishing, as well as cultivation of crops and livestock production.

Value added is the net output of a sector after adding up all outputs and subtracting intermediate inputs. It is calculated without making deductions for depreciation of fabricated assets or depletion and degradation of natural resources. The origin of value added is determined by the International Standard Industrial Classification (ISIC), revision 3. Note: For VAB countries, gross value added at factor cost is used as the denominator.

Source: <http://devdata.worldbank.org>

#### ***Alternative and nuclear energy (% of total energy use)***

It is measurable on a ratio scale, operationally defined as:

Clean energy.

It is noncarbohydrate energy that does not produce carbon dioxide when generated. It includes hydropower and nuclear, geothermal, and solar power, among others.

Source: <http://devdata.worldbank.org>

#### ***CO2 emissions (metric tons per capita)***

It is measurable on a ratio scale, operationally defined as:

Carbon dioxide emissions which are stemming from the burning of fossil fuels and the manufacture of cement.

They include carbon dioxide produced during consumption of solid, liquid, and gas fuels and gas flaring.

Source: <http://devdata.worldbank.org>

### ***Electric power consumption (kWh per capita)***

It is measurable on a ratio scale, operationally defined as:

The measurement of the production of power plants and combined heat and power plants less transmission, distribution, and transformation losses and own use by heat and power plants.

Source: <http://devdata.worldbank.org>

### ***Energy use (kg of oil equivalent per capita)***

It is measurable on a ratio scale, operationally defined as:

The use of primary energy before transformation to other end-use fuels, which is equal to indigenous production plus imports and stock changes, minus exports and fuels supplied to ships and aircraft engaged in international transport.

Source: <http://devdata.worldbank.org>

### ***Exports of goods and services (% of GDP)***

It is measurable on a ratio scale, operationally defined as:

The value of all goods and other market services provided to the rest of the world.

They include the value of merchandise, freight, insurance, transport, travel, royalties, license fees, and other services, such as communication, construction, financial, information, business, personal, and government services. They exclude compensation of employees and investment income (formerly called factor services) and transfer payments.

Source: <http://devdata.worldbank.org>

### ***Foreign direct investment, net inflows (BoP, current US\$)***

It is measurable on a ratio scale, operationally defined as:

The net inflows of investment to acquire a lasting management interest (10 percent or more of voting stock) in an enterprise operating in an economy other than that of the investor.

It is the sum of equity capital, reinvestment of earnings, other long-term capital, and short-term capital as shown in the balance of payments. This series shows net inflows (new investment inflows less disinvestment) in the reporting economy from foreign investors. Data are in current U.S. dollars.

Source: <http://devdata.worldbank.org>

## **Forest area (sq. km)**

It is measurable on a ratio scale, operationally defined as:

The land under natural or planted stands of trees of at least 5 meters in situ, whether productive or not, and excludes tree stands in agricultural production systems (for example, in fruit plantations and agroforestry systems) and trees in urban parks and gardens.

Source: <http://devdata.worldbank.org>

## **GDP (current US\$)**

It is measurable on a ratio scale, operationally defined as:

The sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products.

It is calculated without making deductions for depreciation of fabricated assets or for depletion and degradation of natural resources. Data are in current U.S. dollars. Dollar figures for GDP are converted from domestic currencies using single year official exchange rates. For a few countries where the official exchange rate does not reflect the rate effectively applied to actual foreign exchange transactions, an alternative conversion factor is used.

Source: <http://devdata.worldbank.org>

## **GNI per capita, Atlas method (current US\$)**

It is measurable on a ratio scale, operationally defined as:

The gross national income, converted to U.S. dollars using the World Bank Atlas method, divided by the midyear population.

GNI is the sum of value added by all resident producers plus any product taxes (less subsidies) not included in the valuation of output plus net receipts of primary income (compensation of employees and property income) from abroad. GNI, calculated in national currency, is usually converted to U.S. dollars at official exchange rates for comparisons across economies, although an alternative rate is used when the official exchange rate is judged to diverge by an exceptionally large margin from the rate actually applied in international transactions. To smooth fluctuations in prices and exchange rates, a special Atlas method of conversion is used by the World Bank. This applies a conversion factor that averages the exchange rate for a given year and the two preceding years, adjusted for differences in rates of inflation between the country, and through 2000, the G-5 countries (France, Germany, Japan, the United Kingdom, and the United States). From 2001, these countries include the Euro area, Japan, the United Kingdom, and the United States.

Source: <http://devdata.worldbank.org>

## **Gross capital formation (% of GDP)**

It is measurable on a ratio scale, operationally defined as:

Outlays on additions to the fixed assets of the economy plus net changes in the level of inventories.

Fixed assets include land improvements (fences, ditches, drains, and so on); plant, machinery, and equipment purchases; and the construction of roads, railways, and the like, including

schools, offices, hospitals, private residential dwellings, and commercial and industrial buildings. Inventories are stocks of goods held by firms to meet temporary or unexpected fluctuations in production or sales, and "work in progress." According to the 1993 SNA, net acquisitions of valuables are also considered capital formation.

Source: <http://devdata.worldbank.org>

### ***High-technology Exports (% of manufactured exports)***

It is measurable on a ratio scale, operationally defined as:

The products with high R&D intensity, such as in aerospace, computers, pharmaceuticals, scientific instruments, and electrical machinery.

Source: <http://devdata.worldbank.org> United Nations, Comtrade database.

### ***Imports of goods and services (% of GDP)***

It is measurable on a ratio scale, operationally defined as: The value of all goods and other market services received from the rest of the world.

They include the value of merchandise, freight, insurance, transport, travel, royalties, license fees, and other services, such as communication, construction, financial, information, business, personal, and government services. They exclude compensation of employees and investment income (formerly called factor services) and transfer payments.

Source: <http://devdata.worldbank.org>

### ***Improved sanitation facilities, urban (% of urban population with access)***

It is measurable on a ratio scale, operationally defined as:

The access to improved sanitation facilities refers to the percentage of the population with at least adequate access to excreta disposal facilities that can effectively prevent human, animal, and insect contact with excreta.

Improved facilities range from simple but protected pit latrines to flush toilets with a sewerage connection. To be effective, facilities must be correctly constructed and properly maintained.

Source: <http://devdata.worldbank.org>

### ***Improved water source, urban (% of urban population with access)***

It is measurable on a ratio scale, operationally defined as:

Access to an improved water source refers to the percentage of the population with reasonable access to an adequate amount of water from an improved source, such as a household connection, public standpipe, borehole, protected well or spring, and rainwater collection.

Unimproved sources include vendors, tanker trucks, and unprotected wells and springs. Reasonable access is defined as the availability of at least 20 liters a person a day from a source within one kilometer of the dwelling.

Source: <http://devdata.worldbank.org>

### ***Industry, value added (% of GDP)***

It is measurable on a ratio scale, operationally defined as:

The value added in mining, manufacturing (also reported as a separate subgroup), construction, electricity, water, and gas.

Value added is the net output of a sector after adding up all outputs and subtracting intermediate inputs. It is calculated without making deductions for depreciation of fabricated assets or depletion and degradation of natural resources. The origin of value added is determined by the International Standard Industrial Classification (ISIC), revision 3. Note: For VAB countries, gross value added at factor cost is used as the denominator.

Source: <http://devdata.worldbank.org>

### ***Inflation, GDP deflator (annual %)***

It is measurable on a ratio scale, operationally defined as:

The annual growth rate of the GDP implicit deflator shows the rate of price change in the economy as a whole.

The GDP implicit deflator is the ratio of GDP in current local currency to GDP in constant local currency.

Source: <http://devdata.worldbank.org>

### ***Internet users (per 100 people)***

It is measurable on a ratio scale, operationally defined as:

People with access to the worldwide network.

Source: <http://devdata.worldbank.org>

### ***Life expectancy at birth, total (years)***

It is measurable on a ratio scale, operationally defined as:

The number of years a newborn infant would live if prevailing patterns of mortality at the time of its birth were to stay the same throughout its life.

Source: <http://devdata.worldbank.org>

### ***Merchandise trade (% of GDP)***

It is measurable on a ratio scale, operationally defined as:

The sum of merchandise exports and imports divided by the value of GDP, all in current U.S. dollars.

Source: <http://devdata.worldbank.org>

### ***Mobile cellular subscriptions (per 100 people)***

It is measurable on a ratio scale, operationally defined as:

The subscriptions to a public mobile telephone service using cellular technology, which provide access to the public switched telephone network.

Post-paid and prepaid subscriptions are included.

Source: <http://devdata.worldbank.org>

### ***Out-of-pocket health expenditure (% of private expenditure on health)***

It is measurable on a ratio scale, operationally defined as:

Any direct outlay by households, including gratuities and in-kind payments, to health practitioners and suppliers of pharmaceuticals, therapeutic appliances, and other goods and services whose primary intent is to contribute to the restoration or enhancement of the health status of individuals or population groups.

It is a part of private health expenditure.

Source: <http://devdata.worldbank.org>

### ***Population growth (annual %)***

It is measurable on a ratio scale, operationally defined as:

The exponential rate of growth of midyear population from year t-1 to t, expressed as a percentage.

Population is based on the de facto definition of population, which counts all residents regardless of legal status or citizenship--except for refugees not permanently settled in the country of asylum, which are generally considered part of the population of the country of origin.

Source: <http://devdata.worldbank.org>

### ***Population, total***

It is measurable on a ratio scale, operationally defined as:

The de facto definition of population, which counts all residents regardless of legal status or citizenship--except for refugees not permanently settled in the country of asylum, who are generally considered part of the population of their country of origin.

The values shown are midyear estimates.

Source: <http://devdata.worldbank.org>

### ***Public spending on education, total (% of GDP)***

It is measurable on a ratio scale, operationally defined as:

The current and capital public expenditure on education includes government spending on educational institutions (both public and private), education administration as well as subsidies for private entities (students/households and other private entities).

Source: <http://devdata.worldbank.org>

### ***Services, etc., value added (% of GDP)***

It is measurable on a ratio scale, operationally defined as:

The ISIC divisions 50-99 and they include value added in wholesale and retail trade (including hotels and restaurants), transport, and government, financial, professional, and personal services such as education, health care, and real

estate services.

Also included are imputed bank service charges, import duties, and any statistical discrepancies noted by national compilers as well as discrepancies arising from rescaling. Value added is the net output of a sector after adding up all outputs and subtracting intermediate inputs. It is calculated without making deductions for depreciation of fabricated assets or depletion and degradation of natural resources. The industrial origin of value added is determined by the International Standard Industrial Classification (ISIC), revision 3. Note: For VAB countries, gross value added at factor cost is used as the denominator.

Source: <http://devdata.worldbank.org>

### **Surface area (sq. km)**

It is measurable on a ratio scale, operationally defined as:

A country's total area, including areas under inland bodies of water and some coastal waterways.

Source: <http://devdata.worldbank.org>

### **Gini coefficient.**

It is measurable on a ratio scale, operationally defined as:

The income equality among the population of a country.

Source: [http://en.wikipedia.org/wiki/File:Gini\\_Coefficient\\_World\\_CIA\\_Report\\_2009.png](http://en.wikipedia.org/wiki/File:Gini_Coefficient_World_CIA_Report_2009.png)

### **Motor Vehicles**

**Motor Vehicles** describes the number and type of road vehicles that potentially compete against guided urban transit.

**Cars** describes the number of motor cars in a country. It is measurable on a ratio scale, operationally defined as follows:

Number of cars.

Source: International Road Federation *World Road Statistics, 2008-2010* [CD-ROM].

**Buses** describes the number of buses in a country. It is measurable on a ratio scale, operationally defined as follows:

Number of buses.

Source: International Road Federation *World Road Statistics, 2008-2010* [CD-ROM].

**Motorcycles** describes the number of motorcycles in a country. It is measurable on a ratio scale, operationally defined as follows:

Number of motorcycles.

Source: International Road Federation *World Road Statistics, 2008-2010* [CD-ROM].

### **Motorways km**

**Motorways** describes the total kilometers of motorways in a country. It is measurable on a ratio scale, operationally defined as follows:

Number of motorway km.

Source: International Road Federation *World Road Statistics, 2008-2010* [CD-ROM].

### **Highways km**

**Highways** describes the total kilometers of highways in a country. It is measurable on a ratio scale, operationally defined as follows:

Number of highway km.

Source: International Road Federation *World Road Statistics, 2008-2010* [CD-ROM].

### **Secondary- and Other Roads km**

**Secondary- and other roads km**, describes the total kilometers of secondary- and other roads in a country. It is measurable on a ratio scale, operationally defined as follows:

Number of secondary and other road km.

Source: International Road Federation *World Road Statistics, 2008-2010* [CD-ROM].

### **Economic freedom**

**Country Economic Freedom** describes the prevailing freedom to make economic decisions in a country. It is measurable on a ratio scale operationally defined as:

The Heritage Foundation's Index of Economic Freedom.

Source: <http://www.heritage.org/index/Ranking>

### **Average Petroleum Fuel Prices US c/liter**

**Average petroleum price, US c/liter**, describes the average price of diesel and gasoline per liter in a country. It is measurable on a ratio scale, operationally defined as follows:

Average diesel and gasoline price, US c/liter.

Sources: <http://www.gtz.de/de/dokumente/gtz2009-en-ifp-full-version.pdf> , with prices for other years calculated from trends in International Road Federation *World Road Statistics, 2008-2010* [CD-ROM].

## **Local Setting**

### **City Area km<sup>2</sup>**

**Area km<sup>2</sup>** measures the physical extent of a city. It is measurable on a ratio scale, operationally defined as:

Area km of, city, or conurbation, square kilometers.

Sources: <http://www.citymayors.com/statistics/largest-cities-2007.html>,  
<http://en.wikipedia.org/wiki/city>, and  
[http://en.wikipedia.org/wiki/List\\_of\\_United\\_States\\_cities\\_by\\_area](http://en.wikipedia.org/wiki/List_of_United_States_cities_by_area)

### **Metro population, persons**

**Metro population** describes the size of the population in a city. It is measurable on a ratio scale, operationally defined as follows:

Metro population, persons.



Sources: <http://www.citymayors.com/statistics/largest-cities-mayors-ad.html>,  
[http://en.wikipedia.org/wiki/List\\_of\\_United\\_States\\_cities\\_by\\_area](http://en.wikipedia.org/wiki/List_of_United_States_cities_by_area)

To match populations in agglomerations to their guided transit systems, note that:

Germany: Ruhr Area includes Bonn, Dortmund, Essen, Duisburg, Düsseldorf, and Köln.

Japan: Tokyo includes Yokohama; Osaka includes Kobe and Kyoto.

Korea: Seoul includes Incheon.

Sources: <http://en.wikipedia.org/wiki/Rhine-Ruhr> and  
<http://www.citypopulation.de/world/Agglomerations.html>

### **Population growth, % pa**

*Population Growth* describes the growth rate of a city population. It is measurable on a ratio scale operationally defined as:

Population growth, %, per annum.

Source: <http://www.citypopulation.de/>

### **World Cities Score**

*World Cities Score* describes contemporary economic globalization through cities and their networks. The score for each city is measurable on an interval scale operationally defined as:

| University of Loughborough Assessment | Score |
|---------------------------------------|-------|
| Alpha++                               | 12    |
| Alpha +                               | 11    |
| Alpha                                 | 10    |
| Alpha                                 | 9     |
| Beta+                                 | 8     |
| Beta                                  | 7     |
| Beta                                  | 6     |
| Gamma+                                | 5     |
| Gamma                                 | 4     |
| Gamma-                                | 3     |
| High Sufficiency                      | 2     |
| Sufficiency                           | 1     |
| Not mentioned                         | 0     |

Source: <http://www.lboro.ac.uk/gawc/world2008t.html>

### **Green Cities Index**

*Green Cities Index* describes the environmental performance of major cities. It is measurable on an interval scale operationally defined as:

Above average                      Level 1

|               |          |
|---------------|----------|
| Average       | Level 0  |
| Below average | Level -1 |

Where assessment scales used *Well Above Average* and *Above Average*, they were combined into one category, namely *Above Average*, and similarly for *Below Average*. This was done to admit studies that had used five-point scales and those that had used three-point scales. Where no formal studies had been undertaken, the best available data were used to rate cities as above- or below average where appropriate evidence was found. Absent such evidence, they were rated average.

Sources: <http://www.siemens.com/press/pool/de/events/2011/corporate/2011-02-asia/asian-gci-report-e.pdf> , <http://www.siemens.co.uk/events/pool/home/EFEF/sustainable-cities-european-green-city-index.pdf> , <http://www.walkthroughindia.com/lifestyle/top-10-green-cities-of-india/> , <http://www.siemens.com/press/pool/de/events/corporate/2010-11-lam/result-presentation.pdf> , [http://www.citymayors.com/environment/us\\_greencities.html](http://www.citymayors.com/environment/us_greencities.html) , [http://www.citymayors.com/environment/polluted\\_uscities.html](http://www.citymayors.com/environment/polluted_uscities.html)

### **Smart Card Application**

*Smart card application* describes the potential of a railway to offer value-added services on its own or in association with other service providers. It is measurable on a dichotomous interval scale, operationally defined as follows:

|                        |         |
|------------------------|---------|
| Smart cards in use     | Level 1 |
| Smart cards not in use | Level 0 |

Source: [http://en.wikipedia.org/wiki/list\\_of\\_smart\\_cards](http://en.wikipedia.org/wiki/list_of_smart_cards)

## **Light Rail and Tram Resources**

### **Inaugural year**

*Inaugural Year* describes the year in which the rail system was inaugurated. It is measurable on a ratio scale, operationally defined as:

The number of the year AD.

A default value of 2050 was used for cities that currently have no light rail system.

Source: *Railway Directory* and <http://en.wikipedia.org/wiki/list-of-town-tramway>

### **Operators**

*Light Rail Operators* indicates how many operators are involved in the modus. It is measurable on a ratio scale, operationally defined as:

Number of individual operators.

Source: *Railway Directory* and <http://en.wikipedia.org/wiki/list-of-town-tramway>

### **Status of project**

*Status of the Project* describes the status of the project. It is measurable on an interval scale, operationally defined as follows:

|                    |         |
|--------------------|---------|
| Operational        | Level 5 |
| Under Construction | Level 4 |

|                   |         |
|-------------------|---------|
| In Design         | Level 3 |
| Feasibility Study | Level 2 |
| Proposed          | Level 1 |

Source: *Metro Report: Urban Rail Projects, Railway Gazette 2011.*

### **Network coverage**

**Network Coverage** describes the coverage of the light rail network. It is measurable on a ratio scale, operationally defined as follows:

Route kilometers of network (number).

Source: *Railway Directory.*

### **Rolling stock fleet**

**Rolling Stock Fleet** describes the size of the vehicle fleet deployed. It is measurable on a ratio scale, operationally defined as:

Number of vehicles in fleet.

Source: *Railway Directory.*

### **Passenger journeys**

**Passenger Journeys** (light rail and tram), describes the quantity of passenger traffic moved. It is measurable on a ratio scale, operationally defined as:

Passengers conveyed (million journeys per year).

Source: *Railway Directory.*

### **Routes**

**Light Rail Routes** describes how many light rail routes are in the city. It is measurable on a ratio scale, operationally defined as:

Number of light rail routes.

Source: *Railway Directory.*

### **Stops**

**Light Rail Stops** indicates how many stops are on all the light rail routes. It is measurable on a ratio scale, operationally defined as:

Number of light rail stops.

Source: *Railway Directory.*

### **Employment created**

**Employee Count** describes the total number of light rail and tramway employees in a city. It is measurable on a ratio scale, operationally defined as:

Employees in service (number).

Source: *Railway Directory.*

## Light Metro Resources

### ***Inaugural year***

*Inaugural Year* describes the year in which the rail system was inaugurated. It is measurable on a ratio scale, operationally defined as:

The number of the year AD.

A default value of 2050 was used for cities that currently have no light metro rail system.

Source: *Railway Directory* and [http://en.wikipedia.org/wiki/list\\_of-town-tramway](http://en.wikipedia.org/wiki/list_of-town-tramway)

### ***Operators***

*Light Metro Operators* indicates how many operators are involved in the modus. It is measurable on a ratio scale, operationally defined as:

Number of individual operators.

Source: *Railway Directory* and <http://en.wikipedia.org/wiki/list-of-metro-systems>

### ***Status of project***

*Status of the Project* describes the status of the project. It is measurable on an interval scale, operationally defined as follows:

|                    |         |
|--------------------|---------|
| Operational        | Level 5 |
| Under Construction | Level 4 |
| In Design          | Level 3 |
| Feasibility Study  | Level 2 |
| Proposed           | Level 1 |

Source: *Metro Report: Urban Rail Projects, Railway Gazette 2011*.

### ***Network coverage***

*Network Coverage* describes the coverage of the light metro rail network. It is measurable on a ratio scale, operationally defined as follows:

Route kilometers of network (number).

Source: *Railway Directory*.

### ***Rolling stock fleet***

*Rolling Stock Fleet* describes the size of the vehicle fleet deployed. It is measurable on a ratio scale, operationally defined as:

Number of vehicles in fleet.

Source: *Railway Directory*.

### ***Passenger journeys***

*Passenger Journeys* (Light metro), describes the quantity of passenger traffic moved. It is measurable on a ratio scale, operationally defined as:

Passengers conveyed (million journeys per year).

Source: *Railway Directory*.

## **Routes**

**Light Metro Rail Routes** describes how many light metro rail routes are in the city. It is measurable on a ratio scale, operationally defined as:

Number of light metro rail routes.

Source: *Railway Directory*.

## **Stations**

**Light Metro Rail Stations** indicates how many stops are on all the light metro rail routes. It is measurable on a ratio scale, operationally defined as:

Number of light metro rail stations.

Source: *Railway Directory*.

## **Employment created**

**Employee Count** describes the total number of light metro employees in a city. It is measurable on a ratio scale, operationally defined as:

Employees in service (number).

Source: *Railway Directory*.

## **Heavy Metro Resources**

### **Inaugural year**

**Inaugural Year** describes the year in which the rail system was inaugurated. It is measurable on a ratio scale, operationally defined as:

The number of the year AD.

A default value of 2050 was used for cities that currently have no heavy metro rail system.

Source: *Railway Directory* and <http://en.wikipedia.org/wiki/list-of-metro-systems>

### **Operators**

**Heavy Metro Rail Operators** indicates how many operators are involved in the modus. It is measurable on a ratio scale, operationally defined as

Number of individual operators.

Source: *Railway Directory* and <http://en.wikipedia.org/wiki/list-of-heavy-metro-systems>

### **Status of project**

**Status of the Project** describes the status of the project. It is measurable on an interval scale, operationally defined as follows:

|                    |         |
|--------------------|---------|
| Operational        | Level 5 |
| Under Construction | Level 4 |
| In Design          | Level 3 |
| Feasibility Study  | Level 2 |

Source: *Metro Report: Urban Rail Projects, Railway Gazette 2011*.

### **Network coverage**

*Network Coverage* describes the coverage of the heavy rail network. It is measurable on a ratio scale, operationally defined as follows:

Route kilometers of network (number).

Source: *Railway Directory*.

### **Rolling stock fleet**

*Rolling Stock Fleet* describes the size of the vehicle fleet deployed. It is measurable on a ratio scale, operationally defined as:

Number of vehicles in fleet.

Source: *Railway Directory*.

### **Passenger journeys**

*Passenger Journeys* (Heavy metro rail), describes the quantity of passenger traffic moved. It is measurable on a ratio scale, operationally defined as:

Passengers conveyed (million journeys per year).

Source: *Railway Directory*.

### **Routes**

*Heavy Metro Rail Routes* describes how many heavy metro rail routes are in the city. It is measurable on a ratio scale, operationally defined as:

Number of heavy metro rail routes

Source: *Railway Directory*.

### **Stations**

*Heavy Metro Rail Stations* indicates how many stops are on all the heavy metro rail routes. It is measurable on a ratio scale, operationally defined as:

Number of heavy rail stations.

Source: *Railway Directory*.

### **Employment created**

*Employee Count* describes the total number of heavy metro employees in a city. It is measurable on a ratio scale, operationally defined as:

Employees in service (number).

Source: *Railway Directory*.

## **Monorail Resources**

### **Inaugural year**

**Inaugural Year** describes the year in which the rail system was inaugurated. It is measurable on a ratio scale, operationally defined as:

The number of the year AD.

A default value of 2050 was used for cities that currently have no mono rail system.

Source: *Railway Directory* and [http://en.wikipedia.org/wiki/list\\_of-town-monorail](http://en.wikipedia.org/wiki/list_of-town-monorail)

## **Operators**

**Monorail Operators** indicates how many operators are involved in the modus. It is measurable on a ratio scale, operationally defined as

Number of individual operators.

Source: *Railway Directory* and [http://en.wikipedia.org/wiki/list\\_of-town-monorail](http://en.wikipedia.org/wiki/list_of-town-monorail)

## **Status of project**

**Status of the Project** describes the status of the project. It is measurable on an interval scale, operationally defined as follows:

|                    |         |
|--------------------|---------|
| Operational        | Level 5 |
| Under Construction | Level 4 |
| In Design          | Level 3 |
| Feasibility Study  | Level 2 |
| Proposed           | Level 1 |

Source: Metro Report: Urban Rail Projects, Railway Gazette 2011.

## **Network coverage**

**Network Coverage** describes the coverage of the monorail network. It is measurable on a ratio scale, operationally defined as:

Route kilometers of network (number).

Source: *Railway Directory* [http://en.wikipedia.org/wiki/list\\_of-town-monorail](http://en.wikipedia.org/wiki/list_of-town-monorail)

## **Rolling stock fleet**

**Rolling Stock Fleet** describes the size of the vehicle fleet deployed. It is measurable on a ratio scale, operationally defined as:

Number of vehicles in fleet.

Source: *Railway Directory* [http://en.wikipedia.org/wiki/list\\_of-town-monorail](http://en.wikipedia.org/wiki/list_of-town-monorail)

## **Passenger journeys**

**Passenger Journeys** (monorail), describes the quantity of passenger traffic moved. It is measurable on a ratio scale, operationally defined as:

Passengers conveyed (million journeys per year).

Source: *Railway Directory* and [http://en.wikipedia.org/wiki/list\\_of-town-monorail](http://en.wikipedia.org/wiki/list_of-town-monorail)

## **Routes**

**Monorail Routes** describes how many monorail routes are in the city. It is measurable on a ratio scale, operationally defined as

Number of mono rail routes

Source: *Railway Directory* and [http://en.wikipedia.org/wiki/list\\_of-town-monorail](http://en.wikipedia.org/wiki/list_of-town-monorail)

## **Stations**

**Monorail Stations** indicates how many stops are on all the monorail routes. It is measurable on a ratio scale, operationally defined as:

Number of mono rail stations.

Source: *Railway Directory* and [http://en.wikipedia.org/wiki/list\\_of-town-monorail](http://en.wikipedia.org/wiki/list_of-town-monorail)

## **Employment created**

**Employee Count** describes the total number of monorail employees in a city. It is measurable on a ratio scale, operationally defined as:

Employees in service (number).

Source: *Railway Directory* and [http://en.wikipedia.org/wiki/list\\_of-town-monorail](http://en.wikipedia.org/wiki/list_of-town-monorail)

## **Automated Guided Transit Resources**

### **Inaugural year**

**Inaugural Year** describes the year in which the rail system was inaugurated. It is measurable on a ratio scale, operationally defined as:

The number of the year AD.

A default value of 2050 was used for cities that currently have no automated guided transit system.

Source: *Railway Directory* and [http://en.wikipedia.org/wiki/list\\_of-town-val](http://en.wikipedia.org/wiki/list_of-town-val)

### **Operators**

**Automated Guided Transit Operators** indicates how many operators are involved in the modus. It is measurable on a ratio scale, operationally defined as:

Number of individual operators.

Source: *Railway Directory* and [http://en.wikipedia.org/wiki/list\\_of-town-val](http://en.wikipedia.org/wiki/list_of-town-val)

### **Status of project**

**Status of the Project** describes the status of the project. It is measurable on an interval scale, operationally defined as follows:

|                    |         |
|--------------------|---------|
| Operational        | Level 5 |
| Under Construction | Level 4 |
| In Design          | Level 3 |
| Feasibility Study  | Level 2 |
| Proposed           | Level 1 |



Source: *Metro Report: Urban Rail Projects, Railway Gazette 2011*.

### **Network coverage**

*Network Coverage* describes the coverage of the automated guided transit network. It is measurable on a ratio scale, operationally defined as follows:

Route kilometers of network (number).

Source: *Railway Directory* and [http://en.wikipedia.org/wiki/list\\_of-town-val](http://en.wikipedia.org/wiki/list_of-town-val)

### **Rolling stock fleet**

*Rolling Stock Fleet* describes the size of the vehicle fleet deployed. It is measurable on a ratio scale, operationally defined as:

Number of vehicles in fleet.

Source: *Railway Directory* and [http://en.wikipedia.org/wiki/list\\_of-town-val](http://en.wikipedia.org/wiki/list_of-town-val)

### **Passenger journeys**

*Passenger Journeys* (Automated guided transit) describes the quantity of passenger traffic moved. It is measurable on a ratio scale, operationally defined as:

Passengers conveyed (million journeys per year).

Source: *Railway Directory* and [http://en.wikipedia.org/wiki/list\\_of-town-val](http://en.wikipedia.org/wiki/list_of-town-val)

### **Routes**

*Automated Guided Transit Routes* describes how many automated guided transit routes are in the city. It is measurable on a ratio scale, operationally defined as:

Number of automated guided transit routes.

Source: *Railway Directory* and [http://en.wikipedia.org/wiki/list\\_of-town-val](http://en.wikipedia.org/wiki/list_of-town-val)

### **Stations**

*Automated Guided Transit Stations* indicates how many stops are on all the automated guided transit routes. It is measurable on a ratio scale, operationally defined as:

Number of automated guided transit stations.

Source: *Railway Directory* and [http://en.wikipedia.org/wiki/list\\_of-town-val](http://en.wikipedia.org/wiki/list_of-town-val)

### **Employment created**

*Employee Count* describes the total number of automated guided transit employees in a city. It is measurable on a ratio scale, operationally defined as:

Employees in service (number).

Source: *Railway Directory* and [http://en.wikipedia.org/wiki/list\\_of-town-val](http://en.wikipedia.org/wiki/list_of-town-val)

## **Bus Rapid Transit Resources**

### **Inaugural year**

**Inaugural Year** describes the year in which the bus rapid system was inaugurated. It is measurable on a ratio scale, operationally defined as:

The number of the year AD.

A default value of 2050 was used for cities that currently have no bus rapid transit system.

Source: [http://en.wikipedia.org/wiki/list\\_of-bus\\_rapid\\_transit](http://en.wikipedia.org/wiki/list_of-bus_rapid_transit)

## **Operators**

**Bus rapid Transit Operators** indicates how many operators are involved in the modus. It is measurable on a ratio scale, operationally defined as

Number of individual operators.

Source: [http://en.wikipedia.org/wiki/list\\_of-bus\\_rapid\\_transit](http://en.wikipedia.org/wiki/list_of-bus_rapid_transit)

## **Status of project**

**Status of the Project** describes the status of the project. It is measurable on an interval scale, operationally defined as follows:

|                    |         |
|--------------------|---------|
| Operational        | Level 5 |
| Under Construction | Level 4 |
| In Design          | Level 3 |
| Feasibility Study  | Level 2 |
| Proposed           | Level 1 |

Source: [http://en.wikipedia.org/wiki/list\\_of-bus\\_rapid\\_transit](http://en.wikipedia.org/wiki/list_of-bus_rapid_transit)

## **Network coverage**

**Network Coverage** describes the coverage of the bus rapid transit network. It is measurable on a ratio scale, operationally defined as follows:

Route kilometers of network (number).

Source: [http://en.wikipedia.org/wiki/list\\_of-bus\\_rapid\\_transit](http://en.wikipedia.org/wiki/list_of-bus_rapid_transit)

## **Rolling stock fleet**

**Rolling Stock Fleet** describes the size of the vehicle fleet deployed. It is measurable on a ratio scale, operationally defined as:

Number of vehicles in fleet.

Source: [http://en.wikipedia.org/wiki/list\\_of-bus\\_rapid\\_transit](http://en.wikipedia.org/wiki/list_of-bus_rapid_transit)

## **Passenger journeys**

**Passenger Journeys** (Bus rapid transit), describes the quantity of passenger traffic moved. It is measurable on a ratio scale, operationally defined as:

Passengers conveyed (million journeys per year).

Source: [http://en.wikipedia.org/wiki/list\\_of-bus\\_rapid\\_transit](http://en.wikipedia.org/wiki/list_of-bus_rapid_transit)

## **Routes**

*Bus Rapid Transit Routes* describes how many bus rapid transit routes are in the city. It is measurable on a ratio scale, operationally defined as:

Number of bus rapid transit routes.

Source: [http://en.wikipedia.org/wiki/list\\_of-bus\\_rapid\\_transit](http://en.wikipedia.org/wiki/list_of-bus_rapid_transit)

## **Stations**

*Bus Rapid Transit Stations* indicates how many stops are on all the bus rapid transit routes. It is measurable on a ratio scale, operationally defined as:

Number of bus rapid transit stations.

Source: [http://en.wikipedia.org/wiki/list\\_of-bus\\_rapid\\_transit](http://en.wikipedia.org/wiki/list_of-bus_rapid_transit)

## **Employment created**

*Employee Count* describes the total number of bus rapid transit employees in a city. It is measurable on a ratio scale, operationally defined as:

Employees in service (number).

Source: [http://en.wikipedia.org/wiki/list\\_of-bus\\_rapid\\_transit](http://en.wikipedia.org/wiki/list_of-bus_rapid_transit)

## **Time group**

### ***Calendar year***

*Calendar Year* defines the year in which data originated. It is measurable on a ratio scale, operationally defined as the serial number of the year AD.