UNITED NATIONS ESCAP

Economic and Social Commission for Asia and the Pacific

Sustainable Urban Transport Index

Data Collection Guideline

Bangkok, 2017

This report has been issued without formal editing.

This *Data Collection Guideline* has been prepared to support collection and analysis of urban transport data for application of SUTI in pilot cities. It can also be used by other cities wishing to use SUTI for assessment of urban transport systems and services. The preparation of the guideline was led by Mr Madan B. Regmi and Mr. Henrik Gudmundsson provided substantive contribution to the report.

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1. Introduction

1.1 Background and purpose

The Sustainable Urban Transport Index (SUTI) has been developed by UN ESCAP to help summarize, track and compare the performance of Asian cities with regard to sustainable urban transport and the related Sustainable Development Goals (SDGs), more specifically target 11.2.

SUTI is now entering a pilot phase where it is to be tested in practice before deciding on further development, refinement and full-scale application in other Asian. This document presents guidelines for cities, experts, or other agencies collecting data to calculate SUTI.

SUTI calculation is based on the ten indicators that are shown in table 1.1. These are the ten indicators for which data needs to be collected using this guideline.

Table 1.The ten SUTI indicators

1	Extent to which transport plans cover public transport, intermodal facilities and infrastructure for active modes
2	Modal share of active and public transport in commuting
3	Convenient access to public transport service
4	Public transport quality and reliability
5	Traffic fatalities per 100.000 inhabitants
6	Affordability – travel costs as share of income
7	Operational costs of the public transport system
8	Investment in public transportation systems
9	Air quality (pm10)
10	Greenhouse gas emissions from transport

The report for Phase 1 of the project describes in detail the process, framework, and criteria used to select these indicators from a large pool, as well as the design of the SUTI. The number of indicators has been kept low in order to minimize the efforts required to collect and report data for SUTI.

This guideline is accompanied by a ***data sheet.*** The city experts are to enter the collected data for SUTI in this data sheet. A city representative or related official(s) needs to endorse the data on behalf of the city.

Only one data value per indicator is needed to calculate SUTI. However, more data need to be collected and entered in the data sheet to derive each SUTI indicator value, as explained later.

Entering data for all ten indicators will calculate SUTI and enable a sustainability-based review of the performance of the city's transport systems and policies, as well as comparisons with other cities.

It is important that each city collects data for the same ten indicators and seeks to follow the same procedure as described in this guideline to enhance comparability of results across cities.

Any gaps or necessary deviations in the data collection or other procedures should be noted in the spaces provided for comments in the data sheet.

At the end of the process the city will review the results, complete the data sheet, and submit it as annex to a report on the city's experience. A draft format for this report is annexed to this guideline.

1.3 Overview of the guideline

The aim of this guideline is to help cities and experts prepare the collection of data for the SUTI indicators, enter the data into the data sheet for calculation, and report results and findings.

The guideline has four Chapters.

Chapter 2 provides a general description of the data collection process including issues to be aware of across all the indicators, as well as general guidance on filling in the SUTI data sheet.

Chapter 3 provides the specific data collection guidance for the individual indicators.

Each indicator has its own section (3.1 – 3.10) where the following elements are included:

- Relevance of the indicator for the SUTI framework (why to measure it);
- Exact definition of the indicator;
- The unit for measuring the indicator and inserting in the data sheet (e.g. traffic fatalities per 100.000 inhabitants of the city)
- Defining the scale (the minimum and maximum allowed values) for the indicator;
- Procedure and data sources to collect or derive data;
- Results to enter in the data sheet (with hypothetical examples); and
- Literature with further guidance on methodology or data sources (in some sections).

Chapter 4 describes how the city can review the results and outlines the way forward towards assessment and comparison among cities in support of policies to improve urban transport systems.

Annex 1 is the outline for the city's pilot project data report.

2. Data needs and data collection in general

2.1 General procedure for all indicators

A structured process to collect, calculate/produce and submit the data needed for deriving SUTI for each city is needed. It is estimated that it should be possible to complete the process within one or two months, depending on the existence/availability of useful data, and the manpower allocated.

There should be a key responsible person or a designated team for this process. It is to be expected that more than one person needs to be involved at various points in the identification, collection and derivation of the full set of indicators. Work on several indicators may proceed in parallel. The key responsible should be a person with good overall knowledge of the transport systems and transport policies of the city, and preferably experienced with data collection.

The data that is collected and produced/calculated must be entered in the SUTI data sheet that accompany this guidance along the way, together with any relevant comments on the data. The indicator values to be entered in the SUTI data sheet of behalf of the city need to be endorsed by official representatives of the city or other related official(s).

2.2 Issues with indicators to consider in planning for data collection

Some indicators will require more work than others to collect and produce. For some indicators data will be more or less immediately available in a database or document, whereas others will require collection of some data followed by calculation and aggregation procedures. Most indicators will require more effort than simply looking up a number in the archives.

Typically, the needed data may not all be found within one office or department of the city administration. Most likely several offices or branches will need to be consulted or involved in the work at some point. Some data may even require input from outside organizations, such as a local or regional public transport authority, police, hospitals, national agency, or others (more on this below).

This guidance cannot foresee in advance which indicators will pose the most challenges or involve most work for each city, or which particular offices the city needs to involve. This depends on how the city and country is organized internally and city's previous efforts and existing data.

However, as a general advice table 2.1 seeks to indicate which indicators are likely to require the most effort. More detail of the process of data collection for all indicators is found in the section on each indicator in chapter 3.

Table 2. The indicators described according to expected required effort

Indicator 1: Extent to which transport plans cover public transport, intermodal facilities and infrastructure for active modes

This indicator must be produced by undertaking a manual document review of the City's most recent transport plan, and score it with a set of criteria defined for this indicator. This review involves designating an expert or a small expert team to read and score the plan according to the criteria. Time, manpower and independence, should be secured for this process.

Indicator 2: Modal share of active and public transport in commuting

This 'modal share' indicator is of interest in many cities, but definitions vary, and data can be a problem. In case no data exist, or existing ones are outdated (e.g. 10 years old or more) the city will need to derive new data on transport volumes (trips) per mode. This may involve conducting some form of a travel survey, or using other methods, as described in section 3.2. This can be a major task

Indicator 3: Convenient access to public transport service

This indicator requires the combination of data for the density and frequency of the public transport (PT) service network, and data for the number of citizens living in 500 m buffer zones of main nodes in the network. There are different methods to estimate these data as described in section 3.3 but it may require some effort to derive data both for PT frequency and population inside the buffer zones.

Indicator 4: Public transport quality and reliability

This indicator is based on measuring the satisfaction of Public Transport users with the quality and reliability of public transport service. Any existing survey results may need to be updated, adjusted or re-interpreted to match the format defined in this guidance. If no survey exists, a basic survey has to be prepared and conducted within a short time. This involves some practical survey work

Indicator 5: Traffic fatalities per 100.000 inhabitants

Traffic fatality numbers can usually be found in official statistics, hospital or police records. Limited effort.

Indicator 6: Affordability – travel costs as part of income

The indicator needs data on costs for a monthly pass or similar to the PT network as well as statistical data on income for segments of the population. At best it requires limited effort.

Indicator 7: Operational costs of the public transport system

This indicator should not be too difficult to derive from the accounting reports and data of public transport companies. It will likely be necessary for some cities to consult public PT authority or company or individual operators to request the data. This should be done in due time.

Indicator 8: Investment in public transportation systems

The indicator uses data from public accounts of investments and spending. Some but unknown effort.

Indicator 9: Air quality (pm10)

The indicator use is population weighted air quality monitoring data reported to national agency or WHO. May need conversion from PM2.5 data if PM10 not available. Should require limited effort.

Indicator 10: Greenhouse gas emissions from transport

If an account or estimate of the emissions of CO2 from transport in the city is not available, a figure has to be calculated using emission factors and data for traffic volumes (vehicle kilometers) for all emitting modes, or indirectly from gasoline and diesel sales. Collecting and compiling this information could be one of the most time and effort consuming tasks of all.

As mentioned, for several indicators it may also be necessary to alert or involve other agencies early on. Depending on the situation in each city this could be the case especially for the ones indicated in table 2.2. However, this need may pertain to other indicators as well depending on the local situation.

Table 2. The indicators that may require the most in contributions from outside city traffic/transport divivion

Indicator 1: Extent to which transport plans cover public transport, intermodal facilities and infrastructure for active modes

As mentioned in table 2.1 an expert or (more ideally) an expert panel is needed to for this indicator to review and score the city's transport plans. The review should involve at least one expert person not responsible for producing the plan to be reviewed to ensure the integrity of the review. Such person(s) need to be contacted and accept the task from early on.

Indicators (2) 3, 4, 6, 7 and 8 *are* directly measuring public transport performance would typically require collaboration with relevant PT authority, company or individual operators, in case this service is not all directly under the control of the city. Rather than going ad hoc on each indicator it may be relevant to formulate a consolidated request for PT assistance for all of these indicators.

Indicator 5: Traffic fatalities per 100,000 inhabitants

Traffic fatalities per 100,000 inhabitants. This may require the involvement of police or health authorities or national transport or statistical authorities.

Indicator 8: Investment in public transportation systems

The indicator will require assistance from a financial account officer of the city to identify and extract accounting data on general and public transport expenditures.

Indicator 9: Air quality (pm10)

This indicator may require input from city environmental department or national environmental agency. If PM10 data are not available there may be data for PM2.5 or other pollutants that can be used as basis to derive the indicator (see section 3.9).

Indicator 10: Greenhouse gas emissions from transport

Greenhouse gas emissions from transport. If data for transport CO_2 emissions are not available these may need to be calculated based on traffic data for different modes and vehicles types or fuel data as mention in table 2. To provide such data may require input from national road administration, national vehicle registry, or energy administration.

Rather than simply starting from one end, it is recommended to first sketch an overall plan for how to conduct the data collection process with regard to each of the indicators, considering:

- Likelihood that the city already has data in house on the indicator;
- Data needed or useful for more than one indicator; and
- Need to involve different offices, authorities, external agencies or experts per indicator.

2.3 General definitions and data sheet entries

This section provides general definitions and formats and describes the process to enter the required information in the SUTI data sheet as part of the pilot exercise.

General definitions

The SUTI uses mostly standard international definitions, formats, units etc.

Numbers are metric and generally use SI units; Points '.' are used as decimal marks in the text and the data sheet. Commas ',' are 1,000 separators)

Some general basic terms used are shown in table 2.3.

Table 2.3 Basic general terms and definitions

'Indicator': a variable selected to represent a key property of a system or a wider phenomenon of interest. A SUTI indicator is one of ten variables selected to represent sustainable urban transport.

'Index' a type of indicator that consists of two or more indicators that each measure distinct system characteristics in separate units that are normalized and aggregated.

'**SUTI':** Sustainable Urban Transport Index. SUTI is an index based on normalization, equal weighting, and aggregation of the ten SUTI indicators.

'Value': the number to be entered for each variable (indicator) in the SUTI data sheet.

'Data': The numerical units used to calculate or derive values for the SUTI indicators. Data will originate in various sources and methods (measurements, surveys, observations, calculations, etc).

City: The 'city' is the named geographical area and administrative unit that is responsible for filling in the data sheet. It is important that all indicators refer to the same geographical area and same administrative unit. If this differs across indicators it should be noted in the data sheet (see below.)

Data sheet entry

The data sheet has 13 sub-sheets. The two main sub-sheets are '**A. GENERAL INFO'** and **'B. DATA ENTRY'.** The city is to enter general information about the city in the **Sub-sheet A**. The data for each indicator to calculate SUTI in entered in **sub-sheet B**. In these two sub-sheets the city should only enter data in the green cells: Green cells

Sub-sheet C **'DIAGRAM'** will show the SUTI diagram as illustrated in the figure in chapter 4 when data have been entered in sub-sheet B. Sub-sheet C should not be modified by the city.

In addition to these three main sub-sheets there is **one sub-sheet for each indicator, sub-sheets 1-10**. These sub-sheets should be used by the city to enter 'raw' and processed data and to perform intermediate calculations to derive the SUTI indicator values to be included in sub-sheet B.

Following sections explain the detailed content and expected entry of information for the sub-sheets.

Sub-sheet A. GENERAL INFO

In this sub sheet the city can enter information about the city and the data collection. Most elements are self-explanatory:

	A1. GENEREL INFO ENTRY
	ENTER INFO BELOW
NAME OF CITY	
MAIN CONTACT PERSON NAME	
MAIN CONTACT PERSON TITLE/POSITION	
MAIN CONTACT PERSON EMAIL	
ENDORSED BY CITY REPRESENTATIVE	
OTHER AGENCIES OR OFFICES INVOLVED	
DATE WHEN SHEET IS COMPLETED	
YEAR(S) THAT THE DATA COVER	
POPULATION OF THE CITY	
AREA OF THE CITY	
GENERAL COMMENTS	

'**YEAR(S) THAT THE DATA COVER** Data should be for the same year for all indicators, preferably 2016. This will make it easier to compare across cities or years. If data are for different years this should be mentioned in the designated comment cells in the DATA ENTRY and indicator sub-sheet.

'**POPULATION OF THE CITY'**, is used in indicators 3, 5, 10. It should be the same figure used.

'**AREA OF THE CITY**' is not used directly in any indicator, but it is useful to ensure agreement about the geographical area. It may also be useful for further analysis of city data.

'**GENERAL COMMENTS**' concerns any major comments the city has about the data, year, area, the procedure to collect or derive data, or other context.

Sub-sheet B. DATA ENTRY

This is the key part of the data sheet, where the city will enter data for the ten indicators, following the guidelines presented in section 3 of this report, and drawing on data entered in sub-sheets 1-10.

In Sub-sheet B the city only enters one value for each SUTI indicator, ten values in total. If the city has indicator data available for more years or areas, these can be included in the relevant sub-sheet 1-10.

The main table of the DATA ENTRY sub-sheet looks as follows:

B1 DATA ENTRY

ENTER CITY DATA BELOW

Nos.	Indicators	Natural Units	*Weights*	Range				
				MIN	MAX	VALUE	YEAR	COMMENT
1	Extent to which transport plans cover public transport, intermodal facilities and infrastructure for active modes	0 - 16 scale	*0.1*	0	16	0		
2	Modal share of active and public transport in commuting	% of trips/mode	*0.1*	10	90	0		
3	Convenient access to public transport service	% of population	*0.1*	20	100	0		
4	Public transport quality and reliability	% satisfied	*0.1*	30	95	0		
5	Traffic fatalities per 100,000 inhabitants	No. of fatalities	*0.1*	35	0	0		
6	Affordability – travel costs as part of income	% of income	*0.1*	35	3.5	0		
7	Operational costs of the public transport system	Cost recovery ratio	*0.1*	22	175	0		
8	Investment in public transportation systems	% of total invest-ment	*0.1*	0	50	0		
9	Air quality (PM10)	µg/m3	*0.1*	150	10	0		
10	Greenhouse gas emissions from transport	Tons/ Capita/year	*0.1*	2.75	0	0		
			1.0					

Each of the ten indicators has a row in the DATE ENTRY sub-sheet with 10 columns (A-J).

Column A is the number of the indicator.

Column B is the name of the indicator.

Column C lists the unit that each indicator is measured in. For example, for indicator 7 ‘Operational costs of the public transport system’ it is not the total cost that is reported, but the recovery ratio (a percentage), as described in the definition and guideline for the indicator.

Column D shows the relative weight that is applied to each indicator. In SUTI pilot each indicator assumes equal weight (10%) in the total number. This column is therefore to be ignored.

Columns E and F shows the minimum and maximum value allowed for each indicator; hence the range within the value for each indicator for the city must fall. For example, for indicator 5 ‘Traffic fatalities per 100,000 inhabitants’ the number must be between 0 and 35 fatalities per 100,000 inhabitants per year. The min and max are mostly based on data for highest and lowest performance for actual cities reported in literature and databases, as described in the Phase 1 report.

‘Min’ and ‘Max’ refers to worst and best value, not necessarily numerical minimum or maximum. Sometimes a high number is ’Min’ (worst) (e.g. indicator 9 ‘Air quality’); sometimes a high number is ‘Max’ (best) (e.g. indicator 2 ‘Modal share of active and public transport’). The calculation of SUTI is automatic and the city does not need to be concerned about this (only for information).

NOTE: If values outside the range are entered the SUTI cannot be correctly calculated. If the city observes data outside the range, it should cap this to the respective min and max of the range. If, for example, there were 40 fatalities/100,000 inh. in the reporting year the city should enter only 35. This will still indicate a very serious situation. If the actual value is outside the range, the actual number should instead be entered in the column J as a comment.

<u>**Column H**. ***This is where the city must enter the data value for each indicator***</u>. The value is to be copied from the respective indicator sub-sheet where the city has entered and/or calculated the value using the guideline (see below). The city/expert must replace the red ‘0’s in column H with the actual values.

Column I. Here the city/expert will note which year the data covers (if different from year in sub-sheet A).

Column J. Here the city/expert will enter comments about the indicator or the indicator value. For example, naming the data sources and if data were derived via a special procedure; if it is uncertain; or any other aspects worth noting for the interpretation of results and to repeat the exercise for future years.

Below table B1 is seen another set of nearly identical rows called ‘**B2 NORMALIZATION (AUTOMATIC INTERMEDIATE CALCULATION)**’. This table is used for the calculation of the SUTI and the results when the above data are entered. <u>*Table B2 is not used or modified by the city*</u>.

At the bottom (below table B1) is found **B3 SUTI RESULT**. This is the result of the automatic calculation of aggregate the SUTI. See chapter 4 for how to use and interpret this.

Sub-Sheets for Indicators 1-10

For each indicator there is one semi-structured sub-sheet 1-10. Here the city should seek to insert all relevant collected basic data and conduct intermediate calculations or aggregations to derive the SUTI indicator value for each indicator to be copied to B DATA ENTRY sub-sheet. Most she sub-sheets provide basic tables or examples to assist calculation of the value for each indicator.

Each indicator sub-sheet has the following four elements:

'**GENERAL DESCRIPTION OF AND LINKS TO MATERIAL USED TO COLLECT AND DERIVE THIS INDICATOR**'. Here the city should provide a brief qualitative description of the data source(s) for the indicator, preferably with references and links to the relevant data sources used.

'**PROPSOSED CATEGORIES/TABLE FOR CALCULATING THIS INDICATOR'**. Each indicator has its own specific categories of data to be collected and calculated as described in this guideline, for each indicator sections 3.1-10. Where possible a table with the relevant categories of data for the indicator has been provided for the city expert to fill in, along with a formula (ratio, sum, etc. as appropriate) to derive the single indicator value to be entered in the data entry sub-sheet B for SUTI calculation. It is not 'mandatory' to use these sub-sheet tables. The tables are merely suggested for support as it is not possible to foresee exactly how the data available to the city is structured. The city expert may modify these tables, for example add other relevant categories, insert more and data columns or rows etc., or decide to construct a different table or calculation metric.

'YEAR THAT YEAR THAT THE DATA CONCERNS' (self-explanatory)

'ANY BASIC DATA, CALCULATIONS, OR ADDITIONAL OBSERVATIONS'. Below this headline the city should include whatever basic, raw, or intermediate data it has collected to derive the value for the SUTI indicator. It is merely an infinite empty space where the city can enter their data in whatever format or structure it pleases, and no structure is prescribed in advance. It is useful to include as much relevant data and information as possible to support the interpretation of the SUTI indicators and to serve as data repository and to allow comparison for data for subsequent years of reporting.

3. Data collection for each SUTI indicator

3.1 Indicator 1: Extent to which transport plans cover public transport, intermodal facilities and infrastructure for active modes

Relevance	According to sustainable urban transport policy and research it is an essential element in urban sustainable transport planning to provide for alternatives to motorized individual transport. This involves especially public transport, walking, and cycling and includes both networks and nodes/interchange facilities. Urban transport plans should support these modes explicitly and directly by incorporating goals, strategies, physical facilities, services, etc. for them. The indicator refers directly to SDG target 11.2 "By 2030, provide access to safe, affordable, accessible and sustainable transport systems for all". It is also relevant for SDG target 9.1 "Develop quality, reliable, sustainable and resilient infrastructure".
Definition	The extent to which the city's most current comprehensive transport or master plan covers the four aspects I) walking networks, II) cycling networks, III) intermodal transfer facilities and IV) expansion of public transport modes
Unit	The extent of coverage is calculated and measured on an ordinal scale from 0 to 16. First, the extent of the coverage in the urban transport plan for each of the four defined aspects I – IV, is reviewed and scored on a 5-step scale: 0) No coverage of the aspect (it is basically ignored) 1) Limited coverage of the aspect (only minor initiatives) 2) Middle coverage of the aspect (some typical initiatives) 3) Extensive coverage of the aspect (several strong initiatives) 4) Leading coverage of the aspect (ambitious, comprehensive, pioneering initiatives) The scores for all four aspects are then added together to provide the overall score ($I_{S(0-4)}$+ $II_{S(0-4)}$+ $III_{S(0-4)}$+ $IV_{S(0-4)}$), where S(0-4) is score 0-4 for each aspect).
Min and Max values	The lowest possible total score is 0 (=the case that none of the four aspects are covered at all). The highest possible total score is 16 (=the case that a city is a regional leader in all four aspects)

Procedure and data sources to collect or derive data

Overview

The indicator is based on a qualitative assessment of the city's most recent operational transport plan.

This plan (with related documents) must be identified, and then reviewed and scored by an expert or an expert panel using the units and scoring guidance provided in this section.

This indicator is of a different kind than the other nine indicators. The data to measure the indicator is the city's transport plan(s) that must be scored to produce the resulting indicator value. The method is uniquely developed for SUTI. Therefore, there is no additional literature added for this indicator.

Identification of key material to review

First the city should identify its most recent comprehensive transport plans that are still formally valid or in use. The plan should cover the jurisdiction of the city and/or transport authority.

It may be that the city has several plans covering various aspects, for example a road network plan and a plan for public transport, or a master plan and more detailed plans. The transport plan may also be part of a wider urban or master plan rather than a stand-alone transport plan, in which case the relevant parts of the master plan is reviewed. There may also be accompanying material, e.g. maps or later extensions to the plan to include in a review.

The full set of relevant plans and documents necessary to undertake a fair assessment should be identified and reviewed. If one recent comprehensive master transport plan is available it should be sufficient to review this plan.

If the city does not have any kind of active transport plan, the basis for the review should be pieced together from the main transport initiatives, decisions and investments over the last five years (e.g. 2011-2016).

Designation of an expert reviewer or panel

The city should appoint an expert or a panel of experts whose task it will be to read and score the plans with regard to this indicator. A panel can include members of the city administration, and external experts (for example from university, consultant, NGO's).

To ensure a neutral assessment it should be avoided that the review and scoring is conducted only by the same person (employee/consultant) who has been the main author of the transport plan to be reviewed as well. Obviously, such a person can be involved or consulted if necessary.

If the review is conducted by a panel the members should seek for a consensus on scoring. If this is not possible the panel should note differences of opinion when reporting the indicator in the accompanying space in the data sheet.

Reviewing the material

The plan and and/or necessary other documents are read by the expert or the panel with the aim to assess and score how well the plan covers public transport, intermodal facilities and infrastructure for active modes, more specifically the four aspects described in the definition of the indicator.

The review should conclude by a score 0-4 for each aspect, as described in the 'Unit' section above. These four scores are then added to get one final number 0 -16.

To do this scoring the panel should review the following three features for each of the four aspects:

1) Goals and visions in the plan for each aspect
2) Infrastructure, facilities and measures in the plan for each aspect
3) Funding and budgets in the plan for each aspect

The table below explains and exemplifies how to understand and apply these features.

1) Stating clear goals and visions for each aspect.
Visions, goals, objectives and targets are key components of a plan, and useful to demonstrate commitment to sustainable transport. Goals are stronger if they are quantified and accompanied by a performance monitoring process. For example, only a vague goal that, 'The City will make cycling a more attractive option for short trips' is rather less clear (= 'limited' coverage for cycling aspect). In contrast goals that 'The City will increase the modal share of public transport from 25 to 40 %; the share of walking and cycling from 20 to 40%, and limit individual motorized transport from 55 to 20% by 2030 – to be monitored on an annual basis' suggests a strong goal feature (clear quantitative goals; extensive or even leading coverage for this aspect).

2) Designating infrastructure, facilities and measures for each aspect in the plan.
A transport plan usually designates specific projects and measures to be adopted and/or built, as typically described, shown on maps, listed in tables. The extent of the designation is important as well as the level of detail. For example: Dedicated cycle lanes are planned along one of the city's main transport corridors only (= limited effort; low coverage of cycling). Or: City is building three new intermodal terminals to connect rail and bus services in the city, and will reroute bus lines to serve these terminals optimally, with detailed assessment of impacts (=strong effort; extensive coverage).

3) Allocating funding, specifying budgets, securing finance for the facilities.
A plan needs investments and may involve running costs for new transport operations or services. Some budget may be local (general tax, revenues), other parts may be from central government, or lending institutions. A budget can be secured. For example: 'The City plan does not mention any budget for facilities for cyclists (= no coverage of this action for cycling aspect) Or: The City will allocate X amount to construct the cycle lanes needed for a fully connected cycle network, which means a 200% increase of the budget over the next 5 years, which have been secured by a development bank credit, and a city council budget decision (=strong commitment, extensive or even leading coverage of this aspect).

Assessing the three features together allows a comprehensive review and scoring for each aspect.

For example, if clear and ambitious goals are set for cycling this counts towards higher score 0-4 for the cycling aspect; whereas if their plan does not designate any real budget to fulfill the goal this counts towards lower score 0-4 for the aspect. All three features should be considered.

Below table provides a roughly indicative guideline for allocating scores to the various aspects of an urban transport plan. It is not possible to specify a fully detailed assessment framework as each city is unique. The evaluator/panel may use an own approach. However, the process should review all four aspects in a comprehensive way and use the 0-16-point total scale, to match the SUTI framework.

	Score				
Aspects	**0 No coverage**	**1 Limited**	**2 Middle**	**3 Extensive**	**4 Leading**
I) walking networks	No goals No designation No budget	Vague goal Little designation seen in plans Small or unclear budget	Qualitative goals Some designation in 1-2 major areas/corridors Some budget	Quantitative goals Much designation across city; Increasing but realistic budget	Ambitious goals Full designation across city Major secured new funding
II) cycling networks	No goals No designation No budget	Vague goal Little designation seen in plans Small or unclear budget	Qualitative goals Some designation in 1-2 major areas/corridors Some budget	Quantitative goals Much designation across city: Increasing but realistic budget	Ambitious goals Full designation across city Major secured new funding
III) intermodal transfer facilities	No goals No designation No budget	Vague goal Little designation seen in plans Small or unclear budget	Qualitative goals Some designation in 1-2 major areas/corridors Some budget	Quantitative goals Much designation across city; Increasing but realistic budget	Ambitious goals Full designation across city Major secured new funding
IV) public transport	No goals No designation No budget	Vague goal Little designation seen in plans Small or unclear budget	Qualitative goals Some designation in 1-2 major areas/corridors Some budget	Quantitative goals Much designation across city; Increasing but realistic budget	Ambitious goals Full designation across city Major secured new funding

Calculations and data sheet entry (with examples)

The evaluator/panel can use a simple table as below to note and explain scores and calculate the total score. This table is also found in the data sub-sheet 1 for this indicator, with the total score summed.

Aspects	Explanation	Score
I) walking networks		
II) cycling networks		
III) intermodal transfer facilities		
IV) public transport		
Total (sum)		

Below the same table is filled in with a hypothetical example of text and scores.

Aspects	Explanation	Score
I) walking networks	• The plan of City X has no clear vision or goals for the role and priority of pedestrians in the city's transport system. • The plan only includes a small number of pedestrian facilities (500 m of new sidewalk and pedestrianization of one minor square, introducing two new pedestrian crossings), • The plan does not state how much funding is needed for these facilities. • All in all, City X plan has limited attention to and coverage of walking.	1
II) cycling networks	• The plan of City X mentions that cycling is an important mode of transport that should be given priority where possible. No quantitative goal to enhance cycling safety and comfort or share of bicycles in the modal split. • The plan provides separate cycle lanes (100m – 3 km) on four of 10 main arteries in the city, but not a comprehensive net. There are also detailed plans for more bike parking facilities at 20 major squares across the city. • The plan indicates investments needed for the planned facilities. Support from central government is applied for, but not yet secured. No final commitment on a long-term budget for the cycling plan. • All in all, City X transport plan has middle attention to cycling	2
III) intermodal transfer facilities	• City X plan is called 'a multi-modal strategy' but there are no goals for how to obtain or measure a multi-modal mix • The plan does include a BRT connection to the exiting long-distance bus station, but the interchange is not designated in the plan or included in the budget. There are no facilities for interchange between cycling and BRT e.g. in the form of secured bicycle parking at nodes. Mention of the rail station area as a future intermodal transfer point with a detailed project under way. • Less than half of the budget for intermodal facilities is committed • City X transport plan has limited attention to intermodality	1
IV) public transport	• City X plan has a goal that public transport will carry 30% of the city's traffic when the plan is fulfilled and there are specific intermediate goals for number of passengers to be carried on the new planned BRT system lines. • The plan introduces a BRT system with feeder lines, supplemented by significant modifications to the street network and signaling to give BRT priority throughout the network, plus other supporting measures. The long-term strategy is divided into phases, with a first 5-year stage being planned in detail spatially and timewise. The impact has been assessed with regard to transport volumes, vehicle flows, congestion and emissions after completion • The plan has secured funding for first phase from a bank, the national MOT and the city budget based on a local tax that is awaiting the result of a referendum for approval. There is indicative commitment for the full plan. • Coverage of public transport is extensive; Score: 3.	3
Total (sum)		7

When the joint score is calculated the final value is inserted as **indicator 1** in the **DATA ENTRY SHEET B**, as exemplified below.

Aspects	Score	YEAR	COMMENTS
Sum score value to enter in data sheet for indicator 1	***7***	*2015*	*Score is based on 'City X urban transport plan', 2015. Scoring conducted by 3-person team chaired by Professor NN*

The planning documents and the panel/team involved could be mentioned in the COMMENTS field

3.2 Indicator 2: Modal share of active and public transport in commuting

Relevance	To monitor the modal split is a useful indicator in providing for more sustainable urban transport solutions. The indicator refers to SDG target 11.2 “By 2030, provide access to safe, affordable, accessible and sustainable transport systems for all”. Active and public transport may be considered as more sustainable transport compared to individual motorized transport. Therefore, the indicator has a focus on increasing the share of these modes. The modal split is most critical for commuting (travel to and from work), as this travel puts the most stress on the urban transport system and the environment. Therefore, the indicator has its focus on commuting. The definition for this indicator is drawn from the ISO 37120 standard set of indicators developed by the Global City Indicators Program (GCIP 2015).
Definition	Percentage of commuting trips using active and public travel modes (= using a travel mode to and from work and education other than a personal motorized vehicle). ‘Active transport’ means cycling and walking. It does NOT include mopeds or other motorized two-wheelers. ‘Public transport’ includes public bus, BRT, tram, rail, scheduled ferry. It does NOT include taxi or unofficial motorized para-transit (auto-rickshaw, min-bus, tuk-tuk, etc). ‘Personal motorized vehicle’ therefore means passenger car, motorcycle, scooter, moped, taxi, and motorized para-transit. For example, of more exact aggregation of data categories see text below.
Unit	Percentage of trips for commuters not by personal motorized vehicle
Min and Max values	The lowest value is 10%; the highest value is 90%.

Procedure and data sources to collect or derive data

Overview

The data to derive this indicator are surveys or counts of daily trips made by commuters in the city divided into different transport modes, as defined above.

The task is thus to collect data for number of trips by mode (for a representative day, or week), add together the number trips that are made by active and public transport (as defined above) and calculate their share of the total number of trips made by all modes.

The section will discuss data sources and data categories and provide a simple table to calculate the modal split according to the definition and based on the data collected.

Data sources

Possibly modal split data is collected and reported already in the city's existing transport plan or other traffic related strategies or documents. If so, this may directly deliver the data needed for this indicator, or point to underlying sources from where the needed modal split data can be derived.

If this is not the case, or if the data are significantly aged (10 years old or more) the modal split data must be provided or adjusted using other sources. Sources for this can include travel surveys, or traffic counts, or some combinations of sources.

Travel survey

The best source for trip by mode data is normally a travel survey, i.e. a survey of the travel activities by mode and purpose of a representative sample of the population.

A travel survey asks respondents how many trips they undertook on a day of the week, or over a period of for example five days, as well as which mode of transport was used for each trip. These data can be used to derive the modal split per day and per citizen in general, or for different populations groups, if such data are collected as well. Usually, it is the main mode of travel for each trip that is measured, if different modes were used during a trip chain.

Travel surveys also ask about the purpose of the travel, such as work, business, leisure, shopping, etc. For the SUTI modal split indicator it is only travel with the purpose of commuting that is needed; Commuting should include travel to and from work and education (but not business trips, etc).

Sometimes trip length and other trip aspects are also measured, especially if the survey is to be used to develop a transport model or provide transport forecasts. This is not needed for SUTI indicator 2, but could be very useful to calculate indicator 10 on greenhouse gas emissions (CO2) and to support urban transport planning in general.

The survey population is usually delimited by age to target the independently mobile segments of the population. For modal split for commuting it would be natural to select the adult, not retired population (e.g. 15-60 year of age). Comprehensive surveys also collect background data on travelers such as their gender, age, occupation and other features. This is not needed for the SUTI modal split indicator.

Survey methods and samples

Methods used to collect survey data include telephone interviews, personal interviews, postal questionnaires, web-based questionnaires, self-filled travel diaries, or combinations of those. The choice of method will depend on available resources (e.g. manpower and time) the local context (e.g. phone and internet availability in the country), and the desired accuracy of the survey.

If a survey is conducted it must be ensured that the survey sample is representative for the population, considering also likely number of non-respondents. For a city of 500,000 inhabitants it may be required to contact something like 1,200 individuals to get a valid response, assuming a 95% confidence level of the sampling, and a low 30% response rate.

All in all, a comprehensive travel survey would require a substantial effort. It is not likely that a full survey could be planned and conducted from scratch by a city, solely for the SUTI pilot.

Possible alternatives to a full city travel survey

First, some countries have national or regional travel surveys conducted by a central authority (e.g. Ministry of Transport or Statistical Agency. A national survey may allow an extract of data to the city level, or provide other relevant input. The Wikipedia (https://en.wikipedia.org/wiki/Travel_survey) provides a list of countries with national travel surveys but this includes only developed Western countries. The city should consult if a national or regional travel survey exists.

Second it may be relevant for the city to prepare a limited, targeted household travel survey using fewer resources then for a typical normal survey. This will not replace a full survey but may provide sufficient information to update any previous surveys or to adapt and adjust observations in a general national survey to the city level. A limited survey could avoid aspects such as trip length, origin and destination and some social and spatial variables of respondents to focus on the modal split for commuting trips. This guide does not offer further instructions for such an effort, but the city experts may wish to consult some of the literature on travel surveys methodology mentioned in the reference section further below, to discuss if this is a feasible option.

Finally, a more indirect but maybe realistic alternative could be to use traffic count data as an approximation to travel modal split. This would include visual counts of pedestrians, bicycles and passenger vehicles (e.g. bus, car, van, 2-wheeler) as well as observing the number of occupants in vehicles, at a cross section of streets around the city. The count should be restricted to the peak hours of traffic to serve as a proxy for commuting travel. This approach could provide an estimate of the commuting modal split, although only for road traffic. Rye and Stanchev (see below under references) estimate that a comprehensive cordon count requires something like 1-2 surveyors per cordon point for 3 hours, so in the order of 200-person hours for a medium sized city with 25-30 cordon points.

Calculations and data sheet entry (with examples)

Assuming relevant data can be obtained the table below shows the categories to use for this indicator and how to aggregate them. The table identifies the different travel mode categories that go into active, public, and individual motorized transport, and shows the procedure for calculating the resulting SUTI indicator value form these data.

This table is also included in the data sub-sheet 2 for this indicator to help directly calculate the value.

Below the generic table an identical table with hypothetical data for average number of trips per day by each mode for a person, for illustration.

Average number of trips per person by main mode of transport (for age group example 15-60 years)				
PURPOSE	**COMMUTING (WORK AND EDUCATION)**		*LEISURE, BUSINESS AND OTHER PURPOSES*	
MODE	Nos	subtotals	*Not relevant*	
a. Scheduled bus and minibus	A			
b. Train, metro, tram	B			
c. Ferry	C			
d. Other public	D			
e. Public transport	**(a+b+c+d)**	**(a+b+c+d)**		
f. Walking	F			
g. Bicycle	G			
h. Active transport	**(f+g)**	**(f+g)**		
i. Passenger car	I			
j. Taxi	J			
k. Motorcycle	K			
l. Scooter/moped	L			
m. Para transit (unscheduled)	M			
n. Other motorized (trucks, etc)	N			
o. Individual motorized	**(i+j+k+l+m+n)**	**(i+j+k+l+m+n)**		
p. Total	**(e+h+o)**	**(e+h+o)**		
q. Public and active	**(e+h)**	**(e+h)**		
r. Modal share of active and public transport		**= q/p *100**		

Average number of trips per person per day by main modes of transport (for age group example 15-60 years)				
PURPOSE	**COMMUTING (WORK AND EDUCATION)**		*LEISURE, BUSINESS AND OTHER PURPOSES*	
MODE	Nos.	subtotals	*Not relevant*	
a. Scheduled bus and minibus	0.4			
b. Train, metro, tram	0.3			
c. Ferry				
d. Other public	0.1			
e. Public transport		**0.8**		
f. Walking	0.25			
g. Bicycle	0.05			
h. Active transport		**0.3**		
i. Passenger car	0.3			
j. Taxi	0.01			
k. Motorcycle	0.4			
l. Scooter/moped	0.3			
m. Para transit (unscheduled)	0.2			
n. Other motorized (trucks,etc)	0.05			
o. Individual motorized		**1.3**		
p. Total		**2.4**		
q. Public and active		**1.1**		
r. Modal share of active and public transport		**46.6%**		

Finally, when the result is calculated the value is inserted as indicator 2 in the **DATA ENTRY SHEET B**, as exemplified below.

Indicator	VALUE	YEAR	COMMENTS
Modal share of active and public transport trips in commuting (%)	***46.6***	*2016*	*Data is based on an update of travel survey 2012*

The source of the data and other relevant information should be entered in the COMMENTS field.

Literature with further guidance on methodology or data sources for indicator 2

The basic definition for this modal split indicator has been established by the WORLD COUNCIL ON CITY DATA, GCIF (2015). http://open.dataforcities.org/. It is included in the international ISO standard 37120 on 'Sustainable development of communities -- Indicators for city services and quality of life'. The indicator is defined in more detail in the Standard, which can be purchased via ISO https://www.iso.org/standard/62436.html or via national standard agencies, but this reference may not provide substantial methodological guidance for data collection.

The German aid organization GIZ provides extensive guidance on transport planning methodologies and tools for developing countries and cities at http://www.sutp.org/en/. The report on 'Urban Mobility Plans – National Approaches and Local Practice' offer some general guidance on travel data collection strategies for urban mobility plans.

The Victoria Transport Policy Institute (VTPI) also provide general guidance and links to information on 'Data Collection and Surveys for transport planning, at https://www.vtpi.org/tdm/tdm40.htm

Several of the countries that have national *travel surveys* also offer English language guidelines for conducting travel surveys. However, these are comprehensive and mostly linked to the national context, as there is no international standard for travel surveys, for either countries or cities.

A very comprehensive and regularly updated description of travel survey methodologies is offered by the US Transportation Research Board with its 'ON-LINE TRAVEL SURVEY MANUAL: A Dynamic Document for Transportation Professionals'. It is available at http://www.travelsurveymanual.org/

The report by Forsyth et al (2010) provides specific guidance on surveys of walking and cycling to be conducted by local authorities www.transweb.sjsu.edu/project/2907.html.

Details on traffic counts and similar alternative methods for generating travel volume data is available in general traffic planning textbooks and similar material on the internet (for example Leduc 2008 ftp.jrc.es/EURdoc/JRC47967.TN.pdf). The A basic strategy for generating modal split data via traffic counts is offered by Rye & Stanchev (2016) in 'City level Sustainable Mobility Indicator Descriptions' (unpublished, available from the consultant on request).

3.3 Indicator 3: Convenient access to public transport service

Relevance	Access to public transport service is a key requirement for equitable access in a sustainable city. Convenient access to sustainable travel modes is the main indicator adopted by the United Nations Social and Economic Council and the United Nations Statistical Commission for monitoring SDG target 11.2 “By 2030, provide access to safe, affordable, accessible and sustainable transport systems for all”.
Definition	Proportion (percentage) of the population that has convenient access to public transport, defined as living 500 meters or less from a public transport stop with minimum 20-minute service. Public transport is a shared passenger transport service available to the general public, excluding taxis, car pools, hired buses and para-transit (same delimitation as used for public transport in indicator 2. Active transport is not included here) If possible, the measure is measured for the general population as well as for vulnerable groups (women, elderly, and persons with disabilities).
Unit	Percentage of urban population
Min and Max values	Minimum level is 20%; max level is 100% of the urban population. 100% is hardly realistic everywhere, but some cities are close to this target.

Procedure and data sources to collect or derive data

The indicator requires an estimate of how many inhabitants are living within 500-meter buffer zones around stations and bus stops with a 20 minute or more frequent scheduled service interval.

The first step is to identify the relevant stations and bus stops. To select those with a minimum 20-minute interval service will typically require consultation of a public transport authority or operator station/stop data base to extract the schedule for relevant lines indicating stop intervals at each stop, average over the day. It should be considered that more lines may meet at the same stop and therefore increase the average frequency of the stop. A database over all stops with the calculated average frequency per stop may be created, if it does not exist already.

The second step is to calculate the number of inhabitants living in buffer zones within a 500-meter radius of each selected station/stop. This data may be obtained e.g. via local census or a population registry at neighborhood level. The more fine grained the data the more accurate the population estimate will be. Some cities may have geo-referenced population data available in a Geographical Information System (GIS database or other digital form) allowing a detailed calculation of density in each buffer zone. Others may need to provide more manual estimates using maps and observations for each buffer zone.

If detailed population data by area is not available it may be necessary to divide the city into area categories and prescribe uniform average population density figures to each zone. This approach is exemplified in the next section and table.

Finally, the populations in all buffer zones are added (avoiding double counting of population in case of zone overlaps) and the share of inhabitants living in the buffer zones as a share of the total population is calculated.

Calculations and data sheet entry (with examples)

This section provides a simplified hypothetical example of data and indicator calculation as shown in the table below and explained after. The same table is included in the data sub-sheet for indicator 3.

The example is only intended to inspire cities to find their own way to structure the data and derive the indicator. The city may choose to modify, detail or extend this table, or devise a different one.

	Average frequency in daytime (6:00am-6:00pm)	**Pop. density**	**Inhabitants**
Node/stop	**Interval**	**inh/km2**	**Nos.**
Rail Line A			
StationA1	5 min	15,000	11,781
StationA2	5 min	10,000	7,854
StationA3	8 min	10,000	7,854
BRT Line B			
StopB1	10 min	10,000	7,854
StopB2	10 min	10,000	7,854
StopB3	15 min	5,000	3,927
BUS line C			
StopC1	10 min	10,000	7,854
StopC2	15 min	5,000	3,927
StopC3	20 min	5,000	3,927
StopC4	20 min	2,000	1,571
StopC5	30 min	2,000	
StopC6	60 min	2,000	
SUM			**64,403**
Total Population			**100,000**
% within 500m buffers			**64**

The example concerns a case of a small city with 100,000 inhabitants.

The first column lists al the public transport stops in the city. In this limited case there is only one rail line with three stops in the city, one BRT line with three stops, and one regular bus line with 6 stops.

The second column reports the average frequency of stops during the daytime (6:00am-6:00pm) for each station/stop based on operating schedules. As per the definition of the indicator only stops with 20 min. or higher frequency are to be included.

In the third column the city has inserted the average population density in the 500m-buffer zone around each stop/station. The case city has chosen a most basic approach by using only four categories of uniform urban area, with average density at 15,000; 10,000; 5,000 and 2.000 inh/km2.The areas are classified based on population data for the census area each buffer belongs to, plus each area functional composition (e.g. residential, commercial…) and general observations of density and height of the building mass.

In the fourth column the population in each buffer zone is calculated. Each 500-m buffer circle corresponds to 0.785 km2, of land, and it is assumed that that the area is homogenous.

In the bottom row the population in the buffers is added and the share of the total population is calculated. In this case it is found to be 64% of the population having convenient access to public transport. Due the simplifications in this example the results would be an approximation to the actual or experienced convenience of access.

Finally, when the result is calculated the value is inserted as indicator 3 in the **DATA ENTRY SHEET B**, as exemplified below.

Indicator	VALUE	YEAR	COMMENTS
Convenient access to public transport service	***64***	*2016*	*The data is based on the city 2016 census for population in areas within 500 m of main nodes, and the 2016 schedule of public buses and commuter trains*

Literature with further guidance on methodology or data sources for indicator 3

This buffer zone indicator has – in various specifications - been proposed by different authors and agencies to measure access to transport. Most importantly it has been adopted as indicator for SDG target 13.2 on convenient access to safe and sustainable urban transport.

The United Nations 'Inter-Agency and Expert Group on Sustainable Development Goal Indicators' has classified this indicator as 'Tier II', meaning indicators "for which a methodology has been established but for which data are not regularly available" https://unstats.un.org/sdgs/files/meetings/iaeg-sdgs-meeting-03/Provisional-Proposed-Tiers-for-SDG-Indicators-24-03-16.pdf.

There is nevertheless still some debates and issues regarding methodology.

One useful reference is the report by UNHABITAT (2016) on Indicators and monitoring for SDG Goal 11 on Cities and Sustainable Communities.[1] The report discusses various approaches for this indicator. One consideration is to replace the rigid 500 m circle as the buffer indicating 'convenient access with the use of actual walking distance e.g. from home to station or stop. However, this even if this may be more accurate it may also require more effort on the data collection side in many cities.

The Word Business Council on Sustainable Development (WBCSD) also offers guidance for this indicator in their 'Sustainable Mobility 2.0' project[2]. One of the suggestions of WBCSD is to accept longer buffer distance to a rail station (with higher quality connections) 800 m. and shorter for a bus stop, 400 m. Another proposed deviation is that WBCSD includes access to shared services (share car and bike stations not only public transport nodes) in their measure of the indicator. Those options are not adopted for the SUTI indicator.

WBCSD has run practical tests of their proposed transport indicators including this one in a number of several cities including Indore, India, as reported in a case study report[3]. The city was able to derive data and apply the indicator despite some challenges. A useful lesson was that the performance of the city was revealed as low, at only 53% of population with convenient access. The city has now adopted a strategy to improve the level of convenient access, among other efforts.

In another project 'MISTRA' the city of Bangalore also gained experience with this indicator. The figure below shows the data collection process adopted for the city. The city reports several challenges for collecting the data, for example lack of locating information for many bus stops and lack of data for exact population density within zones. The city used average density values similar to what is applied in the hypothetical example above. Despite the challenges the indicator was calculated, and the result found to be low at 42%. Like Indore, Bangalore also see the result as important input, urging the city to provide more convenient access to public transport to large parts of the population. This report can be found via the link http://journals.sagepub.com/doi/full/10.1177/0956247815619865

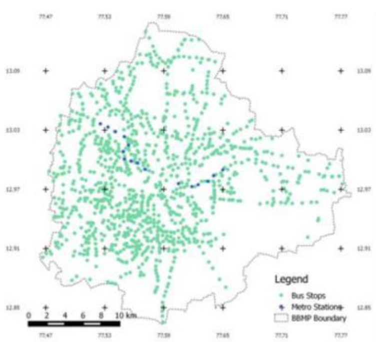
[1] UN Habitat (2016) SDG Goal 11 Monitoring Framework. A Guide to Assist National and Local Governments To Monitor and Report on SDG Goal 11, UN Habitat, March 2016 https://webcache.googleusercontent.com/search?q=cache:-73Bq2915SUJ:https://unhabitat.org/sdg-goal-11-monitoring-framework/+&cd=1&hl=da&ct=clnk&gl=dk

[2] WBCSD (2016). Methodology and indicator calculation method for sustainable urban mobility. Second Edition. Sustainable Mobility Project 2.0 SMP2.0. The World Business Council for Sustainable Development, Geneva. http://www.wbcsd.org/Overview/Resources?projects=967&searchText=

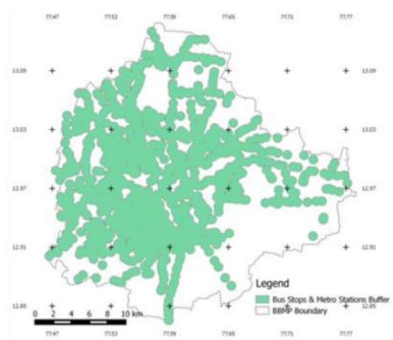
[3] WBCSD (2016). Project Report for the city of Indore, India as part of Sustainable Mobility Project 2.0 (SMP2.0). World Business Council for Sustainable Development, Geneva, January 2016. http://www.wbcsd.org/work-program/sector-projects/mobility.aspx

Methodology

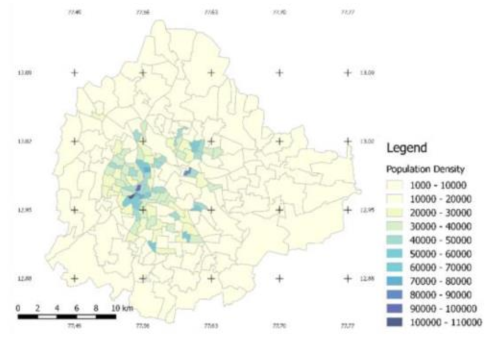
Maps depicting the methodology



Mapping of Bus stations and Metro stations within BBMP Boundary



Identification of area within 0.5km (radii) from which transit location



Mapping population distribution for 198 wards of BBMP

3.4 Indicator 4: Public transport quality and reliability

Relevance	The indicator is relevant in support of SDG target 11.2 “By 2030, provide access to safe, affordable, accessible and sustainable transport systems for all” and SDG target 9.1 “Develop quality, reliable, sustainable and resilient infrastructure”. Providing high quality service in urban public transport (PT) is essential for attracting passengers and limiting individual motorized transport in the long term. High share in public transport modes supports urban sustainability including the economy. Both objective and subjective indicators can be used to measure PT quality and reliability. The user’s positive subjective experience of the service is critical for people’s desire to choose public transport. Monitoring the subjective user satisfaction is therefore becoming a widespread approach among urban public transport companies in the world using satisfaction surveys. Reliability and predictability are important aspects of the perceived quality of the public transport system.
Definition	The degree to which passengers of the public transport system are satisfied with the quality of service while using the different modes of public transport
Unit	Overall share of satisfied customers as percentage of all public transport users (%) based on a survey.
Min and Max values	30 is the expected minimum, 95 the expected maximum

Procedure and data sources to collect or derive data

Overview

The method to collect data for this indicator is via a satisfaction survey of users or customers of public transport service. In a satisfaction survey, passengers are asked to rate their satisfaction with several aspects of the public transport service on an ordinal scale, from very satisfied to very unsatisfied. Normally surveys are conducted as brief questionnaires made on board the relevant service (in the bus, train, station etc.)

The city itself may have conducted such surveys more likely the local public transport authority, company, regional agency or operator. The results of an existing survey may need to be adapted to follow the scope for the SUTI indicator, as described below.

If the city or local public transport companies do not have recent or valid surveys, a new one need to be produced for this indicator along the following scope.

Scope for the survey

The survey (whether existing or new) should cover various aspects of user satisfaction using questions reflecting those aspects. It is particularly important to address aspects like reliability or punctuality, as these are critical parameters for PT quality. The following eight typical dimensions are proposed as ones to include in survey questions to generate the SUTI indicator,

How satisfied are you with:

- Frequency of the service
- Punctuality (delay)
- Comfort and cleanliness of vehicles
- Safety of vehicles
- Convenience of stops/stations
- Availability of information
- Personnel courtesy
- Fare level

If the city already has a recent representative satisfaction survey at hand covering various aspects this may be used even if it does not fully match these exact parameters. If the city or urban transport company has a strong focus on particular aspects of quality (for example safety for women; or interconnectivity) these aspects may well be included in the survey for SUTI, even if these are not mentioned above. It is not essential that all cities use the same questions for satisfaction parameters used in the survey, as long as the survey ensures a broad representation of quality aspects.

For the SUTI indicator, a figure representing the total average satisfaction is needed. This must be derived as the average score across the several categories (such as those above). The user satisfaction should be expressed on an ordinal (Likert) scale. The suggestion here is to use a seven-point scale with the level 4 as neutral. The following categories could be used,

1. 'Very dissatisfied'
2. 'Dissatisfied'
3. 'Partly dissatisfied'
4. 'Neither satisfied nor dissatisfied'
5. 'Partly satisfied'
6. 'Satisfied'
7. 'Very satisfied'

Alternatively, a five-point scale may be used. On a five-point scale levels 2 and 6 above are excluded (and numbers redefined to five steps).

The SUTI indicator is based on summing all the three categories that express to some degree 'satisfied'. On the seven-point scale it would be answers in categories 5, 6, 7. On a five-point scale it would be categories 4 and 5. The indicator is the share of answers in these 'satisfied' categories out of the total responses (e.g. 70%).

For each mode of public transport, a representative sample of lines or services should be selected for the survey. As a minimum the most frequently used lines should be surveyed.

In the case of different modes of transport are used the survey should ideally be conducted for all services weighted with respect to market share or patronage (the amount of transport users). the sample size is adjusted as well).

Calculations and data sheet entry (with examples)

Below in is an example of a table to collect satisfaction data for each respondent using the categories and point scale introduced above.

	Dissatisfied				Satisfied		
	Very		Partly		Partly		Very
Dimension	1	2	3	4	5	6	7
Frequency of the service							
Punctuality (delay)							
Comfort and cleanliness of vehicles							
Safety of vehicles							
Convenience of stops/stations							
Availability of information							
Personnel courtesy							
Fare level							

The second table illustrates hypothetical results if a survey, including all responses in one table and the survey results in the columns to the right. The first results column sums all responses per satisfaction category. The second calculates the average satisfaction score per category. The far right column presents results for the SUTI indicator, the overall satisfaction value.

	Dissatisfied				Satisfied					
	Very		Partly		Partly		Very			
Dimension	1	2	3	4	5	6	7	**RESP**	**AV SCORE**	**SATISF**
Frequency of the service	39	69	67	86	56	11	83	411	4.01	**36.50**
Punctuality (delay)	24	65	78	87	89	33	46	422	4.03	**39.81**
Comfort and cleanliness of vehicles	22	32	105	85	111	44	5	404	3.95	**39.60**
Safety of vehicles	2	12	14	208	66	88	24	414	4.65	**43.00**
Convenience of stops/stations	23	45	34	136	170	22	1	431	4.06	**44.78**
Availability of information	99	127	110	66	24	12	11	449	2.71	**10.47**
Personnel courtesy	7	11	33	55	179	99	44	428	5.01	**75.23**
Fare level	22	46	98	99	120	87	22	494	4.21	**46.36**
Responses	*238*	*407*	*539*	*822*	*815*	*396*	*236*	3453	431.63	**41.97**

The second table is available in the data sub-sheet for this indicator, allowing direct calculation of results if the same categories and scales are used.

The aggregate result is arrived at by summarizing the share of responses in the three 'satisfied' categories 5, 6, 7 across all eight dimensions. In this case 42% of responses are in the satisfied range.

This result would not be very impressive if this was a real case. Some public transport companies demonstrate over 90% in the satisfied range using nearly the identical survey method to this. However, this may not be realistic everywhere. Values as low as 30% are also observed.

In addition to providing the SUTI indicator the table also indicate other results of possible interest. In this case for example, the dimension 'Availability of information' shows by far the lowest satisfaction, compared to 'courtesy of the personnel' which scores the best. Besides informing the SUTI calculation the survey could also help the city identify areas for improvement.

In the example above, it is assumed that there is only one public transport company conducting a survey for a representative selection of its routes. If there are more lines or companies a larger study with weighted sum of results for all entities would provide a more comprehensive response. However, it is more important that the city choose an approach that is manageable enough to allow the survey to be repeated regularly, for example annually, in order to track performance over time.

Finally, when the result is calculated the value is inserted as indicator 4 in the **DATA ENTRY SHEET B**, as exemplified below.

Indicator	**VALUE**	**YEAR**	**COMMENTS**
Public transport quality and reliability	***42***	*2016*	*Based on satisfaction survey on three main bus lines available at website: www…*

Literature with further guidance on methodology or data sources for indicator 4

There is a considerable literature on ways to measure public transport quality and reliability, but there is not one agreed standard for it. There are basically two approaches, subjective ones as the satisfaction survey applied for the SUTI, and objective indicators measuring distinct functional aspects of public transport quality such as punctuality or connectivity. The German technical aid organization GIZ provides a condensed summary of various approaches in their report on 'Measuring Public Transport Performance' (found at http://www.sutp.org/en/).

The eight categories used to survey satisfaction for the SUTI indicator were ones highlighted in the study by de Oña and de Oña (2015), as among those most the most commonly applied in this context.[4] The reference also offers a review of the history of service quality measurement.

Eboli and Mazzulla (2009) provide an even wider account of different quality factors that have been or potentially could be addressed in public transport user satisfactions surveys[5]. A similar effort for inspiration can be found at https://nhtsurvey.econtrack.com.

In the 'Sustainable Mobility 2.0' project the World Business Council (WBCSD) adopts a similar indicator for transport quality but including *all modes,* making the task bigger. However, in the WBCSD pilot study for the city of Indore[6] the focus is measuring satisfaction with the city's BRT system only. This makes good sense because of the natural interest in the city's recent public transport investment. The case is more interesting as an example of bias risk in the design and interpretations of subjective indicators. The study applies a 5-point Likert scale for the survey. However, the 'middle' category, often regarded as neutral is here labeled as meaning 'satisfied' and therefore counted with the two higher satisfaction scores to produce an average overall satisfaction of 75%. The level would obviously be lower if the middle category was neutralized as in the SUTI method introduced in this chapter and many other studies. The general point is that results obtained via (subjective) indicators are highly sensitive to various design aspects.

As mentioned another option is to use objective measures for quality and reliability. Three of the most commonly used ones are *on-time performance*, *headway regularity*, and the *adherence to running time* (Eboli and Mazzullo 2012). Such measures are often used by major, technically advanced systems such as Metros. One of the most sophisticated measures to reflect passenger experience is the Excess Wait Time used by Transport for London (van Ort 2014)[7]. This indicator is expressed as the difference between Scheduled Wait Time (e.g. average 5 minutes for 10-minute headway) and Actual Wait Time. Many other possible objective indicators for reliability have been applied but according to van Ort 2014 and others there is still limited consistency in their usage and interpretation as indicators of public transport quality. The suggested approach for SUTI remains as the satisfaction survey described in the above. This is because of relatively simple methodology, the relatively easy interpretation, and its usefulness to inform urban transport planning on a broad range of critical issues, besides the direct use for reporting in SUTI.

[4] de Oña, Juan and de Oña. Rocio (2015) Quality of Service in Public Transport Based on Customer Satisfaction Surveys: A Review and Assessment of Methodological Approaches. http://dx.doi.org/10.1287/trsc.2014.0544

[5] Eboli, Laura and Mazzulla Gabriella (2009). A New Customer Satisfaction Index for Evaluating Transit Service Quality. Journal of Public Transportation, 12 (3): 21-37

[6] WBCSD (2016). Project Report for the city of Indore, India as part of Sustainable Mobility Project 2.0 (SMP2.0). World Business Council for Sustainable Development, Geneva, January 2016. http://www.wbcsd.org/work-program/sector-projects/mobility.aspx

[7] van Oort, Niels (2014). Incorporating service reliability in public transport design and performance requirements: International survey results and recommendations. Research in Transportation Economics, Volume 48, pp. 92-100

3.5 Indicator 5: Traffic fatalities per 100,000 inhabitants

Relevance	Traffic accidents are a leading cause of death among younger population groups in some countries and are therefore a critical element in public health. The number of fatalities also indirectly indicates the (far more frequently occurring) injuries, as well as substantial health and material costs. Almost half of all traffic fatalities occur in cities. The indicator 5 is the same as the main one adopted for monitoring SDG target 3.6 ‘By 2020, halve the number of global deaths and injuries from road traffic accidents’.
Definition	Fatalities in traffic (road; rail, etc.) in the urban areas per 100.000 inhabitants. As defined by the WHO, a death counts as related to a traffic accident if it occurs within 30 days after the accident.
Unit	Number of persons killed per 100,000 inhabitants
Min and Max values	The minimum level is set to zero fatal accidents while the max is 35 per year. While zero may not seem as an immediately realistic level to achieve, it is increasingly used as a long-term goal among transport authorities around the world and therefore a meaningful lower yardstick.

Procedure and data sources to collect or derive data

The indicator is focused on *fatalities*: People killed as the result of traffic accidents in the city each year. Fatalities are far from the only important traffic safety impact, as many more people are injured, and sometimes permanently impaired. However, it is widely considered that fatalities are tragic events that absolutely should be avoided, and therefore also registered and reported when they do occur. Moreover, it is considered by most experts and health authorities worldwide that fatality data are generally more reliable, available, and comparable than data for injuries or other impacts.

Data sources

Most counties undertake official collection and statistical reporting of traffic fatalities. This is most commonly the responsibility of the police who report observed fatalities to a designated database. It is generally considered that police reporting capture by far most of the traffic deaths that occur, much more so than injures, even if some underreporting of traffic deaths may occur via police reports, especially in lower income countries.

Cities as such are usually not directly responsible for collection or reporting on traffic fatality data. The task for the city for this indicator will therefore be to access the relevant published data or databases and extract data on the number of fatalities that have occurred within the city boundary each year, and then calculate the fatality rate.

Hence, this indicator will normally not require original production of data by a city, but rather the collection and aggregation of already existing data.

Localized fatality data

In many countries the police reporting will include registration of the location of the accident, including within which jurisdiction or city it has occurred. It differs across countries to what extent fatality data are published with a geographical breakdown. For example, in India, numbers and details of traffic fatalities are reported separately for the 50 cities with one million inhabitants or more. This is however not the case for smaller cities (Mohan et al 2015)[8].

To what extent fatality data at city level can be extracted from statistical reports or databases in different Asian countries is not clear. If official reports do not inform about fatality numbers at the individual city level it may be necessary for city experts to take contact to relevant units of traffic police, statistical agency, or other body who is responsible for the database in order to request a designated city extract from the data, if possible,

Other data sources

If no fatality data specifically for the city can be obtained it may be necessary to use average numbers on a regional or even national level drawn from official national database for this indicator. It is not likely that the national average will exactly match the city average due to different traffic and driving conditions etc. The city should therefore consider if there is any information that could be used to adjust such average figures better to the conditions of the city. This could for example be scientific studies and reports that have analyzed national fatality data in the country in order to obtain improved estimates for the city level.

In some cities *health authorities*, including individual hospitals, university clinics etc. play a role in collecting and reporting data on traffic accidents, injuries or fatalities. This may be extremely valuable for purposes like research on health impacts of traffic, and it may also sometimes provide more accurate figures than police reports in areas like injuries, if less so in regard to fatality data.

It is not straightforward to directly merge or aggregate information from such different sources due to the different methodologies used to identify and collect the data. According to the World Health Organization, it is rare that official police reporting/statistics and health institution data on traffic accidents are successfully integrated, even in wealthy developed countries.[9]

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[8] Mohan, D; Tiwari, G; Bhalla, K (2015). Road Safety In India. Status Report. Indian Institute of Technology, Delhi. http://tripp.iitd.ernet.in/

[9] Jackisch, J; Sethi, D; Mitis, F; Szymañski, T; Arra, Ian (2015). European facts and the Global status report on road safety 2015. World Health Organization, Copenhagen. http://www.euro.who.int/__data/assets/pdf_file/0006/293082/European-facts-Global-Status-Report-road-safety-en.pdf?ua=1

What the city could do is to contact local health authorities to enquire if they are involved in systematic collection of fatality data. If that is the case the city should enquire the health authority if a protocol or method to match those data to national fatality statistics or to convert the national figures to city level have been defined.

It is not recommended that SUTI pilot cities directly use health sector or other alternative fatality data, unless these are part of an already well-established protocol.

There are a few international initiatives that seek to collect city level traffic safety data for international comparison. These include the International Transport Forum- initiative on 'Safer City Streets' (https://www.itf-oecd.org/safer-city-streets) and the Bloomberg Initiative for 'Global Road Safety' (https://www.grsproadsafety.org/programmes/bloomberg-initiative-global-road-safety/).

If the city or an agency of the national government is involved in such collaboration it may already have acquired or developed fatality data at city level, which can be used.

Other modes

The fatality data should include traffic fatalities for all urban traffic modes, including road, rail, tram, water and whatever relevant.

There may be separate systems and databases for fatalities in road versus rail in the respective countries. The police may for example not have responsibility to collect and report data for rail fatalities. This could instead be a rail administration, a public health authority, or an occupational safety authority. If the city does not already collect this information for other reporting or planning purposes it may need to identify and contact the relevant authority to obtain available information. In the 'worst case' where data for other modes are not available, the road fatalities may be used alone, as these would often comprise by far the largest element, and one the city should be able to target in its policies

Aggregating the data

Assuming data are collected the city can now aggregate the data using WBCSD's formula[10].

$$FR = \frac{\sum \mathrm{x_i}\ \mathrm{K_i} * 100{,}000}{\mathrm{Inhab.City}}$$

Where,

FR is the fatality rate per 100,000
K_i is the number of fatalities for mode i
i are travel modes (road, rail, tram, ferry…)

[10] WBCSD (2016). Methodology and indicator calculation method for sustainable urban mobility. Second Edition. Sustainable Mobility Project 2.0 SMP2.0. The World Business Council for Sustainable Development, Geneva. URL: http://www.wbcsd.org/work-program/sector-projects/mobility.aspx

Calculations and data sheet entry (with examples)

A simple table to perform this aggregation is enclosed in the data sub-sheet for indicator 5.

Example aggregation of fatalities by mode

Fatalities	**#**
Road transport	*84*
Railway transport	*8*
Tram	*1*
Ferryboats	*3*
Other	*0*
Total	96
Inhabitants	*798,600*
Fatalities/100,000 inh	**12.02**

When the indicator is calculated the final value is inserted as indicator 5 in the DATA ENTRY SHEET B, as exemplified below.

Indicator	**VALUE**	**YEAR**	**COMMENTS**
Traffic fatalities per 100.000 inhabitants	***12***	*2016*	*Based on official police reports. 2016 was a year with unusually few fatalities. The average for the years 2014-16 was 20*

The source of the data and other relevant information is entered in the COMMENTS field.

3.6 Indicator 6: Affordability – travel costs as share of income

Relevance	Transport costs represent a significant share of the household budget, especially for low income households. High travel costs can also increase the costs of labor to business. Affordability is a commonly recognized feature of a sustainable transport system. The indicator will be helpful in support of the SDG target 11.2 "By 2030, provide access to safe, *affordable*, accessible and sustainable transport systems for all".
Definition	Cost of a monthly network-wide public transport ticket covering all main modes in the city, compared to mean monthly income for the poorest quartile of the population of the city.
Unit	Percentage of monthly income
Min and Max values	The minimum (worst) value is 35 percent of income to uses public transport. The maximum (best) value is 3.5 percent

Procedure and data sources to collect or derive data

This indicator is derived from two elements. The first is data is on the costs of using public transport and the second is the average monthly income of the poorest part of the population. The indicator is calculated as the ratio between the two (a percentage of the income).

The two datasets should match and be used consistently for future years. For example, income data may be available at individual or household level. It can influence comparison if different definitions of income are used. For the SUTI pilot it is important that cites describe which data sources and types are used.

Below further specifications and data sources are suggested for each element, along with calculation schemes.

Data on costs of public transport

The indicator for the cost of public transport is proposed to be the cost of a monthly network-wide pass for an adult person. Network-wide means a card or pass covering all main PT operators and services in the city. If such a pass exists in the city it is very easy to obtain the price information from the website, office, or ticket counter of the local public transport organization or authority. The variable is also easy to enter directly in the calculation of the indicator.

If there is no network-wide monthly pass the following alternatives can be considered. In every case it should be easy to obtain the needed information from the relevant PT authority or operators.

a) If there are similar pass on a yearly or weekly basis the division or multiplication is straightforward.

b) if there is a monthly pass but only for parts of the network, for example different ones for different operators, or separate for bus and metro, the card for the service deemed to have the largest share of the travel market is used. If no operator has a large share (>50%) one of the following alternatives can be used.

c) If there are only monthly passes available on a line-by-line basis, the cost of passes for two lines for one of the major operators can be added as a proxy for the price of a network pass.

d) A final alternative is to use the price of a single, standard ticket. The ticket price is multiplied by 60 (two daily trips for 15 days of the month for one person), to mirror the monthly pass price, as proposed by WBCSD in their similar indicator. If standard ticket prices vary much across different companies/modes, a weighted average of these prices could be used. For example, one company operates 30% of the services; tickets costs 10 [x]; another runs 70%; tickets cost 8 [x]. Average cost for a month (60 tickets) is then 516 [x].

In the data sub-sheet for this indicator the table below is provided to easily calculate the monthly price based on single ticket prices and market shares for up to ten operators. The market shares may not be known but could likely be stipulated by a local expert.

PUBLIC TRANSPORT PRICE

Example calculation for a city with up to 10 companies using daily ticket price as basis

Services	**Market shares (estimated)**	**Single ticket price [currency]**	**Monthly cost 60 tickets**	**Weighted monthly cost**
Company 1	19	10	600	114
Company 2	20	8.5	510	102
Company 3	35	4.5	270	94.5
Company 5	10	6	360	36
Company 6	7	12	720	50.4
Company 7	5	14	840	42
Company 8	4	10	600	24
Company 9			*0*	*0*
Company 10			*0*	*0*
Total	100		0	**462.9**

Data on Income

Data for income of the population in the country is normally available in reports and websites of a national statistical agency, economic department, or similar. The World Bank also publishes national income data for all counties in the world (http://databank.worldbank.org/data/home.aspx).

Income statistics may report household income or personal income. SUTI was originally defined using personal income but is reverting to household income since data for this variable seems more widely reported. The city should make notes of which income definition is used, and then use the same one for subsequent years of SUTI calculation.

The SUTI indicator does not use average income but mean income for lower income segments of the population as these are more vulnerable to high transport costs. The definition refers to the lowest income quartile (25%). However, national income statistics is not always available in quartiles but may be partitioned in other segments (quintiles, deciles, etc) or not at all. The lowest quintile or the third lowest decile may for example be used as substitutes. Again, the partition used by the city should be described in accompanying notes.

National income statistics is sometimes available in regional breakdowns (urban/rural, or for different provinces etc). Ideally the indicator should apply the breakdown most closely resembling the city's population (e.g. for urban population). However, as it may be impossible to obtain income group segmented values at regional level this may not be feasible. It is more critical to reflect the significantly lower income levels of the disadvantaged income groups than to reflect the typically somewhat higher incomes in urban areas for this indicator.

If income group segmented data for some reason is not available it has been proposed to use the national minimum (monthly) wage as a proxy. According to the International Labour organization (ILO) minimum wages are applied in about 90 per cent of countries in the world. The Wikipedia offers an updated list (reported in US$, https://en.wikipedia.org/wiki/List_of_minimum_wages_by_country).

Calculations and data sheet entry (with examples)

When data for the two elements has been collected the last step is to calculate the percentage.

Below an example is offered using (approximate) values for Metro Manila in the Philippines.

As no monthly pass is available, the basic fare ticket price has been obtained for the city's two main systems the MRT-3 (13 pesos) and the Light Rail (15 pesos). It is assumed that the fares have not changed since 2015 (see below). The market shares are approximated using Wikipedia information on the annual ridership of the two systems. No attempt has been made to obtain further data on public transport services in the city for this example. The calculation of the monthly cost is straightforward following similar metrics as in the table above.

Income levels have been obtained from the website of the Philippine Statistics Authority https://psa.gov.ph/income-expenditure/fies. Household income levels for 2015 is available in deciles. The third lowest decile has an annual income of 133,000 pesos = 11,083/per month.

The values are entered in the table below.

Example calculation for METRO MANILA (Note: approximation)

Services	**Annual Ridership**	**Market shares (estimated)**	**Single ticket price**	**Monthly cost (60 tickets)**	**Weighted monthly cost**
MRT-3	700,000	58.3	15	900	525
LRTA	500,000	41.7	13	780	325
Company x		0.0		*0*	*0*
Company y		0.0		*0*	*0*
Company z		0.0		*0*	*0*
Total	1200,000	100		0	**850**
Mean household income, 3 decile, 2015					**11,083**
					7.7

The same table appears in the indicator 6 data sub-sheet for easy calculation if the situation is similar.

When the indicator is calculated the final value is inserted as indicator 6 in the DATA ENTRY SHEET B, as exemplified below.

Indicator	**VALUE**	**YEAR**	**COMMENTS**
Affordability – travel costs as part of budget	***7.7***	*2015*	*The result is based on an update of the most recent survey of income levels for the population*

The source of the data and other relevant information should be entered in the COMMENTS field.

Literature with further guidance on methodology or data sources for indicator 7

The World Bank report 'Cities on the Move' has a wide discussion on various urban public transport finance measurements and indicators[11]

The report from the International Transport Forum 'Funding Public Transport' brings a number of case studies on public transport systems using fare box ratio and other indicators to characterize the systems.[12]

[11] Gwilliam, Ken (2002) CITIES ON THE MOVE. A WORLD BANK URBAN TRANSPORT STRATEGY REVIEW. The International Bank for Reconstruction and Development / The World Bank, Washington, DC https://openknowledge.worldbank.org/handle/10986/15232

[12] ITF (2013) Funding Urban Public Transport. A Case Study Compendium. International Transport Forum, OECD, Paris. https://www.itf-oecd.org/funding-urban-public-transport-case-study-compendium

3.7 Indicator 7: Operational costs of the public transport system

Relevance	The operational costs of the public transport system are critical for the ability of a city to provide affordable, efficient and competitive transport services. In this indicator the operational costs are compared to the revenue generated from fares to reflect the financial sustainability of the public transport service. The indicator relates to SDG target 11.2 "By 2030, provide access to safe, affordable, accessible and sustainable transport systems for all".
Definition	Ratio of fare revenue to operating costs for public transport systems ('Fare box ratio')
Unit	Percentage of operational costs recovered by fares
Min and Max values	Min value is that only 22% of cost is recovered. Max is recovery rate of 175 % A high value (more than 100% up to 175%) reflects a good financial sustainability. Very low numbers, close to 22%, indicates financial unsustainability with a need for extensive subsides from local or central government.

Procedure and data sources to collect or derive data

Overview

The 'fare box ratio' indicator is one of many indicators applied in the management of public transport (PT) companies. It is a ratio of two accounting datasets, namely the operational costs of running the public transport system, and the revenues collected from fares. This indicator is either directly present in annual financial reports of PT companies or it can be calculated with dataset extracted from such reports.

The indicator has been selected because it is a critical economic variable, which has been described as an indicator of the financial sustainability of the public transport service. If the fare box ratio is negative, there is a need for government subsidy. Such subsidies can come under (political) pressure and thereby challenge the service level, quality, frequency or other features of the associated public transport services. Most urban public transport systems worldwide do receive government subsidies, without this necessarily being a concern. Moreover, many PT companies have or seek other sources of income than the fare box and Treasury, such as retail services, land development, advertising etc., which makes it less critical. Nevertheless, a declining fare box ratio will, ceteris paribus, put pressure on other sources of income and thereby indicate a potential threat to the stability of the service and thereby indirectly to the promotion of the urban transport SDG target 11.2.

A limitation to the fare-box ratio as a comparative indicator is that not all cities and systems offer the same opportunities for a high fare box recovery rate. A low population density can for example make it more difficult to obtain a high ratio. Capital intensive systems (e.g. a metro) are very expensive to build

leading to accumulation of debt, but since these systems also more easily can generate savings on the operational side due to automation etc., their fare-box ratio performs better than some bus companies, even if they are financially more challenged on other accounts.

All in all, this indicator is widely used and reported also because it and it utilizes already operating economic accounts without much the need for additional data sources.

Data sources

Data should be easily obtained from the annual reports or financial accounts of the local public transport providers. The 'Fare box ratio' may not itself be reported directly, and the term may not even be used either. Major urban transport public companies (metros, major bus companies etc.) should nevertheless have the data available. However, for the indicator to make sense in the first place there obviously needs to be at least one major public transport company operating in the city. If there is none the indicator cannot be produced and the SUTI will be 10% amputated (but would still work for other indicators).

A data source is illustrated below in the form of an annual report of a dominant regional transport company in a major Asian city.

	2012		2011	
	Amount	%	Amount	%
Operating revenues				
Fare revenues	$ 13,168,409	88	$ 12,148,726	87
Other operating revenues (Note 18)	1,770,105	12	1,822,467	13
	14,938,514	100	13,971,193	100
Operating costs (Notes 7, 17 and 18)				
Transportation costs	(11,077,291)	(74)	(10,190,443)	(73)
Other operating costs	(858,498)	(6)	(812,541)	(5)
	(11,935,789)	(80)	(11,002,984)	(78)
Gross profit	3,002,725	20	2,968,209	22

In this case, the Fare box ratio for 2012 would be 13,168,409/11,077,291 **= 119%**

Calculations and data sheet entry (with examples)

The procedure for this indicator is therefore as follows: First, identify the major public transport provider. Second, solicit its latest annual report. Third, identify the fare box ratio directly in the report or if it is not presented then calculate it from other posts as in the above example. The cost post to use

should preferably concern the transport operating costs only; this is the ‘pure‘ fare box recovery ratio, not distorted by any other operations the company may pursue (e.g. retail, office space for rent etc).

If these posts are not found in the annual report, it should be possible for the city, the national government, of other public authority providing subsidies or other services for the company, to request a transcript of the relevant post in its accounts.

There may be cities without any major or dominant PT provider, but several smaller ones. In that case it is an option to collect reports from the relevant companies and calculate a simple weighted city fare box ratio, according to market shares, similar to the procedure described for indicator 6.

A hypothetical example is provided below. The same table is found in the indicator sub-sheet for ease of calculation.

WEIGHTED FARE BOX RECOVERY RATE

Services	Market shares (estimated)	Fare Revenues	Transport Operating expenses	Fare box ratio
Company 1	29.0	2,300,000	1,970,000	117%
Company 2	26.0	27,570,000	64,834,000	43%
Company 3	17.0	18,356,000	23,013,600	80%
Company 4	16.0	8,554,700	15,132,820	57%
Company 5	12.0	78,666,500	199,705,000	39%
Total	100		**Weighted**	**72.2**

Finally, when the result is calculated the value is inserted as indicator 7 in the **DATA ENTRY SHEET B**, as exemplified below.

Indicator	VALUE	YEAR	COMMENTS
Operational costs of the public transport system	***72.2***	*2016*	*The data are for the five main companies offering public bus service in the city (partly outside of city perimeter)*

The source of the data and other relevant information should be entered in the COMMENTS field.

3.8 Indicator 8: Investment in public transportation systems

Relevance	Investment in public transport is a relevant indicator to monitor efforts to promote sustainable urban mobility and to help shift passengers from individual to public modes. In general, it is considered more sustainable to direct investments towards public transport rather than only incremental extensions of the road network for individual transport. Relates to SDG target 11.2 "By 2030, provide access to safe, affordable, accessible and sustainable transport systems for all".
Definition	Share of all transport investments made by the city that is directed to public transport. The investments are likely to vary from year to year in a pattern that may be sensitive to the profile of individual projects. The value is therefore averaged over a period of five years.
Unit	Percentage of transport investment spending (running five-year average).
Min and Max values	Min value is 0 used for public transport; max value is 50% The Min-Max is informed by data from the UITP 'Millennium Cities Database' (UITP 2001). In this database values from 12 to 85% occur. However, these are annual values that are likely to even out when observed as average over five years. In some years a city may dedicate more than 50% of all its transport investments to public transport but within a five-year average this would more rarely be the case.

Procedure and data sources to collect or derive data

Overview

This indicator is derived from combining two values of public expenditure. The first is data on investments in public transport systems and facilities over the latest five-year period in the city. The second is data on total transport investments by the city over the same period (including, roads, signals, infrastructure, public transport facilities, facilities for pedestrians and cyclists, etc.). The ratio expresses the degree to which public transport is being favored in the investment strategies and practices of the city.

investment by mode', was proposed for a global core set of indicators by Bongardt et al (2011)[13] and it was also selected by Bachok et al (2015) for a regional transport study in Klang Valley, Malaysia[14].

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[13] Bongardt, D., Schmid, D., Huizenga, C. and Litman, T. (2011). Sustainable Transport Evaluation. Developing Practical Tools for Evaluation in the Context of the CSD Process. Sustainable Urban Transport Technical Document # 7. Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH, Eschborn March 2011 http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.357.2568&rep=rep1&type=pdf

‘Transport investment by mode’, is however difficult to interpret from sustainability point of view. With the simple transformation to PT share it is more straightforward. It should be kept in mind though, that maximizing the PT share to 100% is not necessarily optimal. Some road improvements catering to private vehicles may still be justified, and facilities for other modes such as cyclists and pedestrians may sometimes be equally or more sustainable.

Rather than using ‘transport investment by mode’, which would be difficult to interpret from sustainability point of view it is proposed to focus on the share of PT in the total investments which is somewhat more straightforward to interpret. However, it cannot necessarily be assumed that massive PT investment in all cases are more sustainable than for example, operational efficiency measures, investments in non-motorized modes, or investment in (road) safety. A high share, towards 50% is indicative of a very significant commitment from the city to public transport. A low share towards zero is indicative of insufficient support to this target.

The value is defined as a running five-year average because annual investments tend to fluctuate much over time at local level. A sharp drop when a major scheme is completed will for example not necessarily imply that the transport system of the city is suddenly more unsustainable. 5-year average is suggested for similar indicator by Dimitrou and Gakenheimer (2011).[15]

The availability of subsidies for investments e.g. from central government will affect the level of investments in the city. The most reasonable approach is to subtract direct subsidies and focus only the committed investments by the city/regional government and from local sources.

When investments are funded by loans, it should be the yearly yield (including interest) that is used.

Data sources

The source of data will be public expenditure accounts of the city and /or regional government as appropriate (if the latter is involved with funding.

Local government expenditure accounts do not follow a standardized format besides the use of normal public accosting principles and terminology. It is not necessarily the case that transport investments are accounted for in one or a set of separate accounting lines; similarly, public transport is not necessarily distinguished as such but may appear under different posts.

It has for this guideline not been possible to devise a procedure or a set of rules for how to dissect and synthesize the needed information form a public expenditure account. The indicator is therefore less operational than some of the others at this stage. The SUTI pilot will serve as an exploration for how a

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[14] Bachok, S; Ponrahono , Z; Osman, MM; Jaafar, S; Ibrahim, Mand Mohamed, MZ (2015). A preliminary study of sustainable transport indicators in Malaysia: the case study of Klang valley public transportation. Procedia Environmental Sciences 28, pp. 464 – 473

[15] Dimitriou, H.T and Gakenheimer, R. (eds.) (2011). Urban Transport in the Developing World: A Handbook of Policy and Practice, Edward Elgar, Cheltenham

methodology can be devised. This process will likely need assistance from municipal accounting staff or other specialists.

Calculations and data sheet entry (with examples)

If it will be possible to extract and process appropriate accounting data, it should be straightforward to calculate the indicator as the ratio of public transport investment to the total

A hypothetical example calculation is shown below. The same table is included in the indicator sub-sheet for possible use in calculations

INVESTMENTS BY THE CITY	**1**	**2**	**3**	**4**	**5**	**average**
PUBLIC TRANSPORT FACILITIES	0.00	0.00	0.00	0.00	0.00	**0.00**
TOTAL TRANSPORT	0.00	0.00	0.00	0.00	0.00	**0.00**
SHARE						**#DIVISION/0!**

HYPOTHETIC EXAMPLE

	2011	***2012***	***2013***	***2014***	***2015***	**average**
PUBLIC TRANSPORT FACILITIES	16,100,000.00	14,250,000.00	4,650,000.00	6,240,000.00	6,640,000.00	**9,576,000.00**
TOTAL TRANSPORT	46,350,000.00	41,250,000.00	34,776,990.00	35,987,600.00	32,776,990.00	**38,228,316.00**
SHARE						**25.0**

The resulting value is entered as indicator 8 in the **DATA ENTRY SHEET B**, as exemplified below.

Indicator	**VALUE**	**YEAR**	**COMMENTS**
Investment in public transportation systems	***25***	*(2011-2015)*	*Based on average transport investments by the city for the five years 2011-15*

The source of the data and other relevant information should be entered in the COMMENTS field.

3.9 Indicator 9: Air quality (PM10)

Relevance	Air pollution including particulate matter (PM) poses health risks for humans. More than 80% of people living in urban areas that monitor air pollution are exposed to air quality levels that exceed the World Health Organization limit values. Particulate matter has been adopted by the United Nations Social and Economic Council and the UN Statistical Commission as indicator to monitor SDG Target 11.6 'By 2030, reduce the adverse per capita environmental impact of cities, including by paying special attention to air quality and municipal and other waste management'. Traffic is a major source of air pollution in cities causing significant health problems as well as impairing visibility and affecting ecosystems and agriculture. Motor vehicles are among the main contributors to PM pollution. The UN Habitat mentions PM concentrations as a useful indicator for estimating effects of sustainable transport policies in cities.
Definition	Annual mean levels of fine particulate matter (PM10) in the air (population weighted) compared to the health threshold. [for PM2.5 as alternative, see text]
Unit	Micrograms per cubic meter (μg/m^3).
Min and Max values	Min value (worst) is 150; max value (best) is 10 (for PM10)

Procedure and data sources to collect or derive data

Overview

Air pollution comprises a range of components including particulate matter. The smaller the particles are, the greater the risk for human health. The World Health Organization (WHO) has defined air quality standards for two sizes of particulate matter to indicate levels of potential health risks. PM10 (particles with a size up to 10 micrometers) and PM 2.5 (with a size up to micrometers).

The WHO limit values are shown in the table below.

PM2.5 10 μg/m3 annual mean 25 μg/m3 24-hour mean **PM10** **20 μg/m3 annual mean** 50 μg/m3 24-hour mean

The limits are differentiated between short term (24-hour mean) and long term (annual mean) According to WHO the annual mean concentration is the best indicator for PM-related health effects.

The concentration of particulate matter is continuously monitored at stations in many cities around the world including Asia. The measurements are compared to the standards to assess the risks for human health and if necessary issue alerts to the populations.

The indicator is based on monitoring of the annual mean concentration of PM10 (or alternatively PM 2.5, see later) in the cities. Before only PM10 was monitored. Over the last decade or so attention has shifted more towards monitoring PM 2.5, because of more significant health relation. However, both components are considered indicative of health risks, and there are still more monitoring stations reporting PM 10 concentrations than PM 2.5.

Data sources

Air quality monitoring is conducted by environmental and human health authorities in each country. Most of the monitoring stations are located in cities and urban areas. In larger cities there may be several stations. The monitoring programs are for the most part open and results are readily available to local authorities and the public.

The air quality monitoring programs have also been connected across borders and coordinated by the WHO. WHO maintains a database of measurements form stations in now over 3,000 cities worldwide http://www.who.int/phe/health_topics/outdoorair/databases/cities/en/. This database contains annual PM data and is regularly updated. Asian countries and cities are represented to varying degrees in the database, for example India with stations in more than 125 cities. Some monitoring stations also exist outside WHO database.

The data source for the indicator is generally WHO, national, and local programs for air quality monitoring. It would be most appropriate to use only data from monitors reflecting traffic generated pollutions, i.e. monitors placed in street canyons or the like if possible. In the SUTI pilot participating cities should explore and clarify the characteristics of the air quality monitoring network, including location of stations, what is monitored, etc. Cities with no monitoring stations may consider using data from other similar city within same area or not fill in this part of SUTI.

PM 10 – PM 2.5

Concentrations of PM2.5 and PM10 are highly correlated. If a city monitors PM2.5 and not PM10 the WHO uses conversion factors so both figures are represented at each station. The conversion factors are city and country specific, and the correlation changes with the concentration.

To convert PM2.5 to PM10 for SUTI it is necessary to consult local expert to consider correct conversion factor.

Calculations and data sheet entry (with examples)

The simplest case is a city has one monitoring station located at street level, measuring PM 10. The most recent data for this station could be entered directly as SUTI value.

There may be more than one relevant station monitoring PM-10 concentrations in a city. The indicator should be population weighted. This means that the most relevant measure is to compare different concentrations measured in the city with estimates of the population exposed to this level.

For example, if 20% of the population is exposed to 75µg/m^3; 30% to 55µg/m^3 and 50% to 30µg/m^3, the weighted concentration is 46.5µg/m^3.

A simple table is provided to support population weighted calculation. In this example there are four monitoring stations. Three of them are near traffic. The fourth is a background stations indicating the exposure of the share of the population no living near heavier traffic. The same table is found in the indicator sub-sheet for ease of calculation. Note that all values here are fictitious,

EXAMPLE TABLE WITH FOUR MEASUREMENT STATIONS REPRESENTING POPULATION

		PM10	**Population**	**Population**	
Station	**Location**	**yearly mean**	**in area**	**percentage**	
1	Boulevard A	48	650,000	19.75	
2	Busy intersection B	66	750,000	22.79	
3	Street canyon C	81	150,000	4.56	
4	Rooftop / Background D	34.5	1,740,400	52.89	
	Total city population		3,290,400	100	
	Population weighted concentration	**46.47**	***VALUE TO ENTER IN SUB-SHEET B***		

The need and possibility to convert PM 2.5 values to PM10 should be clarified as part of pilot project exploring local air quality monitoring network and local conditions.

When the result is calculated the value is inserted as indicator 9 in the **DATA ENTRY SHEET B**, as exemplified below.

Indicator	**VALUE**	**YEAR**	**COMMENTS**
Air quality (PM10)	***46.5***	*2015*	*Data for four monitoring stations managed by XXX agency. The values are averaged by estimate of population exposed per city area (station 1 = 20%; station 2 = 30%; station 3 = 50%)*

The source of the data and other relevant information should be entered in the COMMENTS field.

3.10 Indicator 10: Greenhouse gas emissions (CO_2eq tons/year)

Relevance	Man-made emissions of CO2 and other greenhouse gasses are causing global warming and climate change. Transport contributes worldwide to around one quarter of the global energy related CO2 emissions. A major proportion of this contribution is emitted in cities. The indicator Is highly relevant for SDG 13 'Take urgent action to combat climate change and its impacts', even if this goal does not directly specify GHG targets for the urban level.
Definition	CO2 equivalent emissions from transport by urban residents per annum per capita.
Unit	Ton CO2 equivalent emitted/capita/year
Min and Max values	Min. value (worst) is 2.5 ton; Max value (best) is 0

Procedure and data sources to collect or derive data

The indicator is a calculated value of emissions of Greenhouse Gasses ($CO2_{eq.}$) from transport in a city per year, divided by the population number.

CO2 is the main greenhouse gas from transport, so it may be relevant to limit calculations to this gas. If CO2 emission data are currently not estimated at the city level, the value needs to be derived from data for transport flows and vehicle types multiplied by emission factors (g CO2/km per vehicle) for each type of vehicle, or other sources.

The World Resources Institute and others suggest a distinction between two approaches to estimate a CO2-emission figure for transport in an urban area,

1) Bottom-up approaches need data for transport volumes. More specifically these approaches may combine data for the four factors 'ASIF' - Activity (transport volume), Mode share of the volume (e.g. passenger car bus, truck, MC), Fuel intensity per mode (l/km), and Fuel types for each type of vehicle (e.g. diesel, gasoline, electricity). When these factors are estimated, it is possible to calculate CO2 emissions using standard CO2 emissions factors per type of fuel.

Transport volumes per mode and vehicle type may be calculated if a transport model, based on a travel survey for the city is available. If no such model exists, transport data have to be estimated in another way.

One basic option is to use a representative sample of traffic counts to indicate number of vehicles for different street types. These figures need to be multiplied by total road lengths in order to produce

transport volumes. Data for vehicle types and fuel use may have to be derived from national databases such as a motor registry.

2) The top-down approach is a bit simpler to apply since it does not require detailed data for travel patterns or vehicle fleet composition. It requires fuel sale statistics by type of fuel. Form the fuel sale the CO2 emissions per fuel can be calculated and aggregated using standard CO2 emissions factors per type of fuel. Fuel sale statistics for the city area may be available in national energy statistics or databases. However, it may be difficult to obtain fuel sales data that match the fuel consumed by the city population within the city.

There are various calculation guidance and tools available to further help derive transport CO2 emissions data, based on input data for transport volumes, fuel consumption or other data:

1) A comprehensive report on ways to calculate and monitor CO2 emissions from transport, published by the Secretariat of the United Nations Framework Convention on Climate Change (UNFCCC, 2017), called 'Compendium on GHG Baselines and Monitoring Passenger and freight transport.' http://mobiliseyourcity.net/wp-content/uploads/sites/2/2017/06/Compendium_Volume-6_Transport.pdf

2) A worksheet for calculating GHG Emissions from Transport or Mobile Sources, by the GHG protocol initiative http://www.ghgprotocol.org/calculation-tools

3) An elaborate method for Co2 emission calculation at the city level is presented in WBCSD (2016)' Methodology and indicator calculation method for sustainable urban mobility. Second Edition': http://www.wbcsd.org/work-program/sector-projects/mobility.aspx

4) A detailed description of data collection for Transport CO2 Emission calculations for the case of Chinese cites (with broader relevance) is published by the GIZ http://sutp.org/en/news-reader/new-guide-on-data-collection-for-emission-quantification-in-chinese-cities.html

Calculations and data sheet entry (with examples)

Below is shown a simple example for the top down calculation based on fuel sales statistics at the city level. The example is for a hypothetical city of 3.2 mill. Inhabitants. The same table is also included in the sub-sheet for indicator 10 for support of calculations.

TOP DOWN EXAMPLE - VERY SIMPLIFIED CALCULATION BASED ON URBAN AREA FUEL SALES

	Litres sold	CO2-factor kg/l	Emissions tons/year	Population	Emission/capita
GASOLINE/PETROL	784,550,000.00	2.272	1,782,105.33		
DIESEL	420,000,000.00	2.676	1,123,920.00		
TOTAL			2,906,025.33	3,200,000.00	0.91

The indicator sub-sheet 10 also includes a very simplified calculation sheet example for the bottom-op approach (not shown here). The hypothetical example is based on the crudest standard assumptions regarding average traffic volumes per type of street, composition of the traffic, and emission factors for vehicle types. The city is strongly encouraged to collect and apply more detailed data, based on some of the more detailed guidance documents referred to above.

When a result is calculated the value is inserted as indicator 10 in the **DATA ENTRY SHEET B**, as exemplified below.

Indicator	VALUE	YEAR	COMMENTS
CO2 emissions for transport	***1.2***	*2015*	*Based on estimate of traffic volumes (car, bus, minibus, MC, light truck, heavy duty truck)) on city road network for 2015, and average national emission factors per traffic mode*

The source of the data and other relevant information should be entered in the COMMENTS field.

4. Completion, interpretation, and way forward

4.1 Completion and results

When data for all ten indicators are collected and entered into the **Sheet B DATA ENTRY** in the appropriate fields, the SUTI is complete and the results can be reviewed.

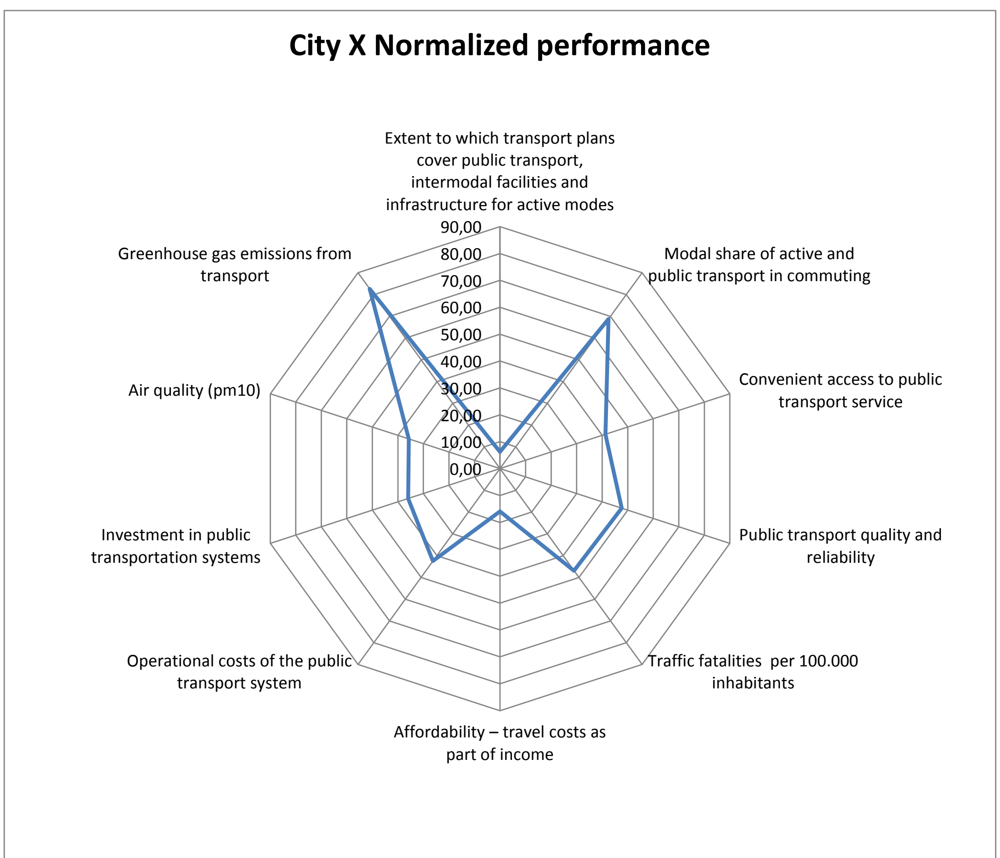
Two different calculated results can be observed.

Data Sheet B cell H35, shows the aggregate value for SUTI for the city. This is the geometric mean aggregate score across all 10 indicators, a value between 0 (worst case) and 100 (best case).

The main use of the SUTI number is for comparison. Either in comparison with other cities or comparison over time, for following or previous years for the same city. Therefore, at this pilot phase, the SUTI number can tell state of urban transport in a city compared to other pilot cities. A high score is generally positive.

The other result is a spider diagram calculated in **Sheet C DIAGRAM.** The spider diagram illustrates the performance of each indicator for the city, compared with min and max performance in the literature. This diagram is produced automatically in the data sheet when the data in entered.

An example using data for a more or less fictive city X is shown in the figure below.



In the diagram the city can immediately observe how it performs compared on a scale of 1-100 for each indicator. A high value (near the outer circle of the diagram) indicates good result, whereas the opposite is the case for a low value.

However, before starting to interpret and use the information (see below), the input should first be checked for any problems or errors in the data entry, or any possible malfunctions or of the SUTI worksheet or calculation procedures.

Elements the city should check include the following;

- Have all the red 0 values in the Data Entry Sheet B been replaced with real data?
- Were the right data entered in each field?
- Does the spider diagram look technically correct with all points at or within the scale of 100, not outside?
- Do any negative values appear in TABLE 2 NORMALIZATION in the Data Entry Sheet? Negative values indicate that the city has entered data outside the given range for each indicator. This should be corrected (capped to the lowest or highest value in the range)

More practical issues include,

- Did the city fill the General Info field of the sheet (Area, Name of contact person etc,)
- Did the city provide comments in the comment fields to explain data sources, choices made, deviation from the guideline, etc? It is important to do right away for memory.
- Did the city include all relevant data in the indicator sub-sheet (for later documentation and repeating)?
- Was the data sheet file saved and a backup created?

4.2 Interpretation of results

The city should now look on the SUTI results as presented in the spider diagram and consider any implications.

As noted, this diagram directly illustrates the relative performance of the city across the ten indicators, compared to high and low performance of cities in general, as reported in the literature.

It may be useful to first pay attention to indictors with highest and lowest performance. To begin with, the city can consider if these outcomes seem plausible. Do high or low results confirm what is already

known, or expected? Or do these results seem strange in some way, perhaps contradicting what is assumed today?

Significant poor performance on some indicators may actually point to problems in the transport system that the city was not aware of before, or which are more critical than assumed. This could potentially lead the city to take new actions or begin further analysis. Positive performance results may on the other hand be indicative of successful initiatives or may point to unknown strengths. It is a key function of systems like SUTI to help inspire reflections of this kind.

However, any extreme or surprising results may also simply be ‘project artifacts’ reflecting inadequate or misleading data, failures in the calculations, or flaws in the data sheet. Of course, seemingly neutral results may be just as be wrong or misleading as the ‘extreme’ ones. It is another important function of the pilot exercise to uncover possible weaknesses in the methodology or how it is applied, and to facilitate improvements.

Another observation to make in regard to results concerns the general consistency of performance. Do the results vary greatly across the indicators from very poor to excellent performance, or is everything on the same level? Strong inconsistency may offer clues to areas to focus more on than others in the future, whereas a more even performance could suggest that the city generally follows a balanced approach in its management of the transport system. And are the results grouped in some possibly meaningful way? For example, poor air quality may be linked also with high emissions of CO2. Or a low share of public transport could perhaps be linked with low satisfaction among users? Are there any interesting coincidences or paradoxes to observe from the spider diagram?

The point of these questions is certainly not to encourage any unfounded claims of correlation or causality among SUTI indicators. The point is rather to urge the city to discuss the how the results could be used and what kind of questions they may raise.

The city should not keep its observations and interpretations to itself. They should be noted in the pilot project report that each city is to prepare as part of the exercise. The city is invited to reflect on anything in regard to SUTI results; including,

- outcomes of interest
- confirmation of existing knowledge
- possible implications for current plans
- new problems indicated
- positive learnings
- consistency/inconsistency/paradoxes
- any suspicions concerning the SUTI methodology in general or for specific indicators.

The following section describes more generally what is expected of the pilot phase reports from cities.

4.3 Pilot report

The annex provides an outline with headlines for the pilot report.

The content is structured in sections as follows.

Section 1 will contain basic facts on the city, including basic data entered in the GENERAL INFO data sheet; population, area, location, a map.

Section 2 will provide more context by describing briefly the transport system, the transport administration, and the sustainable transport planning efforts of the city. The section should also address how the city could benefit from using SUTI, why SUTI could be relevant.

Section 3 will provide the city's account of the process they went through to generate SUTI, including organization of the process, general sources of information, calculations, reporting, and any difficulties experienced.

Section 4 describes the data collected for each indicator. Key sources should be mentioned, as well as calculations. Any issues/gaps/deviations from protocol should be mentioned. The data material itself has a place as corresponding sub-sheets of the SUTI Data Sheet that is to be submitted with the report.

Section 5 presents SUTI results and performance for the city, the aggregate SUTI number, and the SUTI diagram. The city's observations, interpretations and conclusions regarding the results are included here, as described in section 4.2. Is the city performing well, less well, or mixed? Can the SUTI tell anything new, confirm what is known, or provoke reflections?

Section 6 will contain the city's perspective on the SUTI pilot process. Has the process been meaningful and manageable? Did the communication and guidance work? How could the city use SUTI in the future? Which are the biggest challenges to make the system effective – for example manpower, data, skills, lack of standards across countries, political interest, or others?

4.4 Way forward

The overall purpose of SUTI is to help empower cities to better address sustainable transport planning challenges via structured provision and use of targeted information.

The vision of SUTI is to accelerate this process by connecting two levels; the level of the individual city who will continuously monitor and manage its transport performance with a focus on the key dimension of sustainability; and the level of the ensemble of cities who will compare and learn from one another within an open system of coordination supported by national governments, the United Nations and other international organizations.

Cities and national governments are key players in such a process and their participation and experience is therefore essential to construct and operate a successful system. The piloting phase

that is about to begin is the key opportunity to leverage their participation, and to subject the vision and the concrete architecture of SUTI to a reality check.

Annex 1: Outline of city data collection report

1. Introduction (define city area, population, outline map, basic facts).
2. Current state of urban transport systems and service (brief explanation of main networks and systems, key connections, major transport issues, urban transport situation, infrastructure, intermodal transfer facilities/locations, congestion issues, urban transport policies, ongoing projects, etc.)
3. Data collection approach for SUTI (brief explanation of data collection approaches, officials met, main sources of information, preliminary survey, interpretation, aggregation of data, panel, experts and city officials concurring with the input data on various indicators – any other difficulties in data collection – how it was overcame)
4. Data for SUTI (key data – detail in Excel sheet)
    a. Indicator 1
    b. Indicator 2
    c. Indicator 3
    d. Indicator 4
    e. Indicator 5
    f. Indicator 6
    g. Indicator 7
    h. Indicator 8
    i. Indicator 9
    j. Indicator 10
5. Analysis of data (input data in Excel sheet and results)
    a. Spider diagram (interpretation of results, observation etc)
    b. SUTI (interpretation of value, index numbers, observation etc)
6. Perspective on SUTI pilot exercise
7. Useful references and persons, experts and officials met
8. Annexes; useful data and material such as city transport plan, photographs of urban transport systems etc.