

SPECA WORKSHOP ON TRANSPORT RELATED SUSTAINABLE DEVELOPMENT GOALS

2-3 November 2017, Astana, Kazakhstan

Regional Overview of Sustainable Urban Transport and Sustainable Urban Transport Index

Bekhzod Rakhmatov
Transport Division
ESCAP

Sustainable Development Goals & Transport

- ❑ *Road safety: By 2020, halve the number of global deaths and injuries from road traffic accidents (Target 3.6)*
- ❑ *Transport systems: By 2030, provide access to safe, affordable, accessible and sustainable transport systems for all, improving road safety, notably by expanding public transport, with special attention to the needs of those in vulnerable situations, women, children, persons with disabilities and older persons (Target 11.2)*
- ❑ *Energy efficiency: By 2030, double the global rate of improvement in energy efficiency (Target 7.3)*
- ❑ *Infrastructure: By 2030, develop quality, reliable, sustainable and resilient infrastructure, including regional and trans-border infrastructure, to support economic development and human well-being, with a focus on affordable and equitable access for all (Target 9.1)*

Sustainable Development Goals & Transport

- ❑ *Fossil fuel: Rationalize inefficient fossil-fuel subsidies that encourage wasteful consumption by removing market distortions, (Target 12.c)*
- ❑ Additionally, transport is an enabler for achievement of other sectors' targets, such as:
 - ❑ *Rural access and investment (target 2.1 and 2.a),*
 - ❑ *Air pollution (target 3.9),*
 - ❑ *Access to safe drinking water (target 6.1),*
 - ❑ *Sustainable cities (target 11.6),*
 - ❑ *Reduction of food loss (target 12.3) and*
 - ❑ *Climate change adaptation and mitigation (target 13.1).*

New Urban Agenda

HABITAT III, 17-20 October 2016 in Quito, Ecuador

- ❑ Improve road safety and integrate it into sustainable mobility and transport infrastructure planning and design (*para 113*)
- ❑ Promote access for **all-safe, affordable, sustainable urban mobility** (*para 114*)
 - Public transport and non-motorized modes
 - Transit Oriented Development
 - Coordinated transport and land use planning
 - Urban freight and logistics concept
- ❑ Develop **mechanisms and frameworks** –based on sustainable national urban transport and mobility policies (115 and 116)
- ❑ Develop **sustainable urban and metropolitan transport and mobility plans** (117)
- ❑ Ensure **coherence with and integration** of local and national level urban policies, national transport policy
- ❑ Ensure greater **coordination of implementation** of national and cities' urban infrastructure plans

Regional Action Programme on Sustainable Transport Connectivity (2017-2021)

- Adopted by the Ministerial Conference on Transport, December 2016, Moscow
 - Regional transport infrastructure connectivity
 - Regional transport operational connectivity
 - Strengthening of transport connectivity between Asia and Europe
 - Transport connectivity for LDCs, LLDCs and SIDS
 - Rural connectivity to wider networks
 - Sustainable urban transport
 - Improving road safety

State of Urban Transport in the Region

Pattern of Urban Development

- More than 2 billion urban residents- 55% of world's urban population
- 23 of world's 37 megacities are in Asia
- 90% of world's urban expansion in developing countries- growing urban sprawls & slums
- Rapidly growing small & medium sized cities/ towns
- Cities account for more than 2/3 of energy use and GHG emissions
- Cost of Air pollution, congestion, road crashes: 5-10% of GDP
- Car centered developments & lack of affordable public transport
- **Secondary and small sized cities-** opportunities to plan and implement sustainable urban transport policies



Traffic congestion



% change in travel time

Source: Tomtom Traffic Index 2016

Urban Transport in Asian cities



- ❑ Cities with Good Example of public transport : Tokyo, Singapore, Seoul, Hong Kong, China
- ❑ Mass transit system: Bangkok, Beijing, Delhi, Jakarta, Kuala Lumpur, Moscow, Tehran, etc.
- ❑ Bus Rapid Transit: Many cities in China and India
 - 42 Asian cities, 1579 route Km, 9.3 mil passengers/day
- ❑ Cities of LDCs, LLDCs
 - Mass transit: Almaty, Baku, Tashkent and Yerevan
 - Public mass transport in still developing stage
- ❑ Non-Motorized Transport: A significant proportion of the population in Asia still depends on walking & bicycling
- ❑ Bus service, para-transit, private vehicles
- ❑ ~~Wide variance in the use of intelligent transport systems~~

Sustainable Urban Transport Index

Purpose of the SUTI


- ❑ To **measure** urban transport and progress towards Sustainable Development Goals (SDGs) in Asian cities
- ❑ To help **summarize, compare and track** the performance of urban transport in cities
- ❑ To **facilitate** discussion to develop plans and policies to improve urban transport
- ❑ **Simple Approach:**
 - ❑ Not too many indicators
 - ❑ Not complex calculations,
 - ❑ Simple, based on existing methodology and policies

General Methodology

- ❑ Develop **framework** based on ST literature
- ❑ Identify, review and select **indicators**:
 - Framework based review
 - Criteria based review
 - Expert based review
- ❑ Construct **index**
 - Normalizing the indicators
 - Weighting the components
 - Aggregating components into one composite index



Framework, Foundation & Dimensions

| Framework | Dimensions |
|---|--|
| Sustainable Development | Economic Dimension impacts |
| | Social Dimension impacts |
| | Environment Dimension impacts |
| Sustainable Mobility Paradigm | Avoid strategy |
| | Shift strategy |
| | Improve strategy |
| SDG Targets Relevant for Urban Transport | 3.6 Deaths and injuries from road traffic |
| | 9.1 Quality, reliable, sustainable, resilient infrastructure |
| | 11.2 Access to safe, affordable, accessible and sustainable transport systems for all, |
| | 11.6 Adverse environmental impact including air quality |
| | <i>7.3 Improving energy efficiency</i> |
|  | <i>13.2 Integrate climate change measures</i> |

Most important references

Extensive literature review of indicators

UN Habitat (2016)

- Suggests indicators to measure SDG goal 11, incl. target 11.2 on urban transport

WBCSD (2016) Sustainable Mobility 2.0

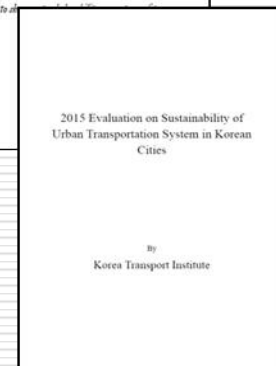
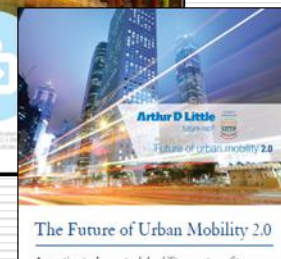
- 19 urban transport indicators
- Applied in six cities, three in Asia
- Detailed methodology

Arthur D Little/UITP (2014)

- 19 urban transport indicators
- 84 cities are covered, 30 in Asia
- Less detail, wider coverage

SUTE system, Korea (KOTI 2015)

- 24 indicators
- Applied annually to several Korean cities
- Detailed methodology



Identification of potential indicators

- ❑ **420** individual urban transport indicators identified
- ❑ Reduced to a **shortlist** of 20 most relevant indicators
- ❑ **Subjectively scored** using two sets of criteria
 - **Relevance** for Sustainable Transport framework
 - **Methodological** quality
- ❑ Resulting list of **10 indicators** in **four domains** :
 - Transport system, Social, Economic & Environmental domain
 - Reviewed & agreed at two UNESCAP meetings:
 - Expert Group Meeting, Kathmandu, September 2016
 - Regional Meeting, Jakarta, March 2017

10 SUTI Indicators

| No | Indicators | Measurement units | Weights | Range | |
|----|---|-----------------------|---------|-------|-----------------|
| | | | | MIN | MAX |
| 1 | Extent to which transport plans cover public transport, intermodal facilities and infrastructure for active modes | 0 - 16 scale | 0.1 | 0 | 16 |
| 2 | Modal share of active and public transport in commuting | Trips/mode share | 0.1 | 10 | 90 |
| 3 | Convenient access to public transport service | % of population | 0.1 | 20 | 100 |
| 4 | Public transport quality and reliability | % satisfied | 0.1 | 30 | 95 |
| 5 | Traffic fatalities per 100,000 inhabitants | No of fatalities | 0.1 | 35 | 0 |
| 6 | Affordability – travel costs as part of income | % of income | 0.1 | 35 | 3.5 |
| 7 | Operational costs of the public transport system | Cost recovery ratio | 0.1 | 22 | 175 |
| 8 | Investment in public transportation systems | % of total investment | 0.1 | 0 | 50 |
| 9 | Air quality (pm10) | µg/m3 | 0.1 | 150 | 10 |
| 10 | Greenhouse gas emissions from transport | CO2 Eq. Tons | 0.1 | 2.75 | 0 ¹⁴ |
| | SUM | | 1.00 | | |

All 10 indicators are described with

- ❑ Indicator **relevance** for sustainable transport framework
- ❑ Proposed **definition**
- ❑ **Unit** of measurement
- ❑ **Interpretation** in regard to sustainable transport
- ❑ **Minimum and maximum values** of indicator scale to use in the index construction
- ❑ Sources in the **literature**
- ❑ **Comments** on data availability and methods to provide data
- ❑ **Examples**

Normalization for SUTI

- ❑ SUTI is constructed by aggregating information from all 10 indicators
- ❑ Indicators on different scales need to be normalized
- ❑ The method used is linear rescaling to scale of 1-100
- ❑ Common approach in composite indicator used for several sustainable transport index

$$Z_{i,c} = \frac{(X_{i,c}) - (X_{min,i})}{(X_{max,i}) - (X_{min,i})} * 100$$

- ❑ Z is the normalized indicator X for topic i and city c.
- ❑ X_{min} is the 'worst' value of the indicator in actual units, whereas X_{max} is the 'best' value

SUTI Calculation



$$\text{SUTI} = \sqrt[10]{i_1 * i_2 * i_3 \dots i_{10}}$$

Where $i_1 \dots i_{10}$ are the indicators

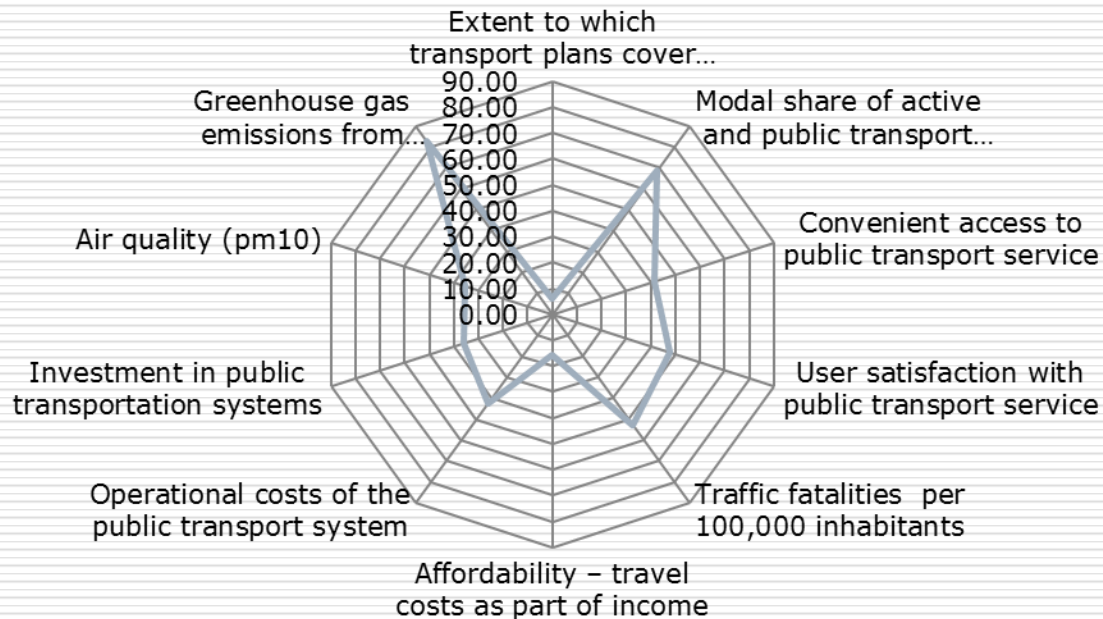
Geometric mean method chosen (similar to HDI)

'Equal weight' to each SUTI indicator is applied

Excel calculation sheet for data input and analysis support

Single city -Spider diagram

City X Normalized performance

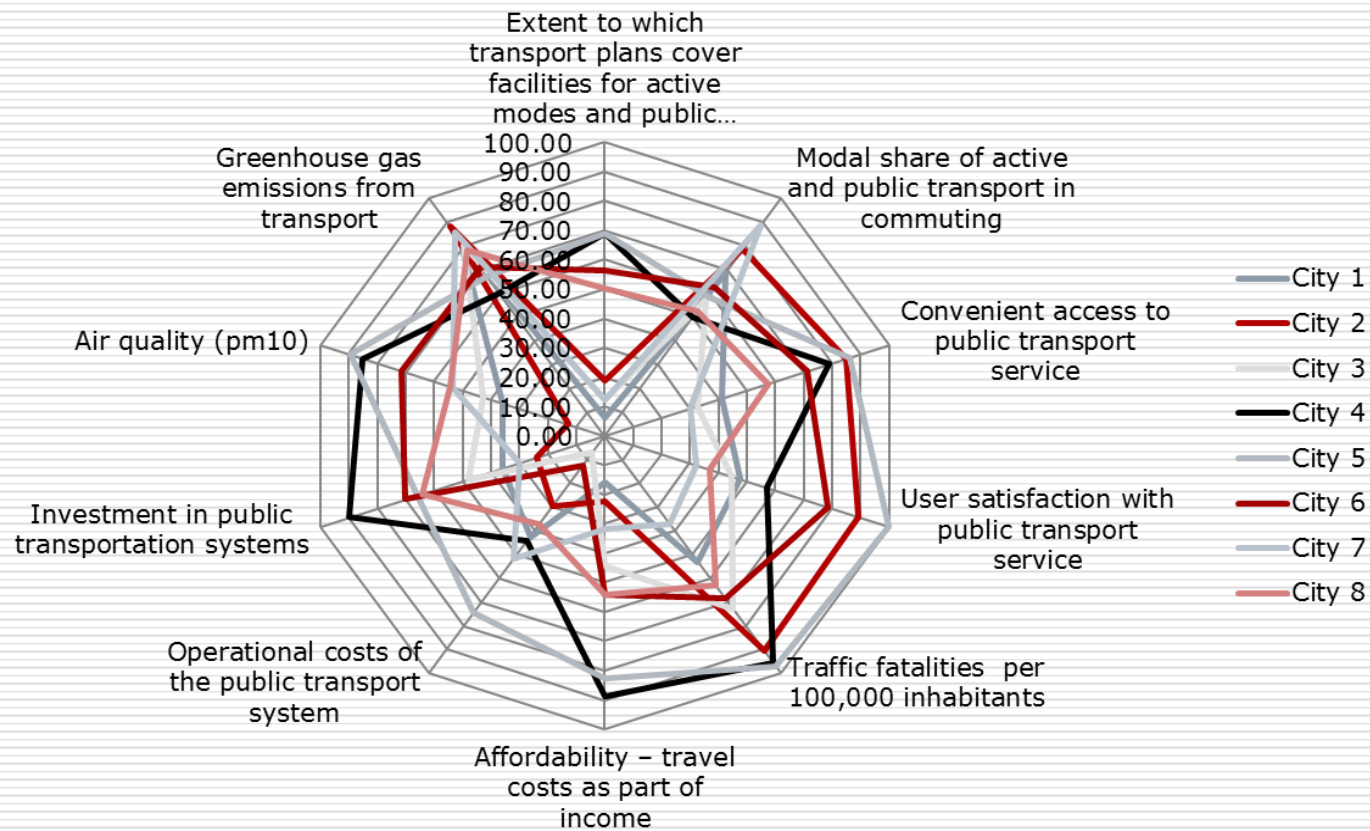


SUTI-Normalized values for multiple cities

| # | Indicators | DATA (cities) | | | | | | | |
|----|--|---------------|-------|-------|-------|-------|-------|-------|-------|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| 1 | Extent to which transport plans cover public transport, intermodal facilities and infrastructure for active modest | 6.25 | 18.75 | 12.50 | 68.75 | 68.75 | 56.25 | 12.50 | 50.00 |
| 2 | Modal share of active and public transport in commuting | 68.75 | 78.75 | 57.50 | 50.00 | 58.75 | 62.50 | 88.75 | 52.50 |
| 3 | Convenient access to public transport service | 41.25 | 85.00 | 32.50 | 78.75 | 86.25 | 71.25 | 30.00 | 57.50 |
| 4 | Public transport quality and reliability | 47.69 | 89.23 | 44.62 | 56.92 | 100.0 | 78.46 | 32.31 | 36.92 |
| 5 | Traffic fatalities per 100,000 inhabitants | 53.09 | 90.57 | 73.14 | 95.43 | 96.86 | 68.57 | 37.14 | 62.86 |
| 6 | Affordability – travel costs as part of income | 15.87 | 22.22 | 44.44 | 88.89 | 82.54 | 53.97 | 31.75 | 53.97 |
| 7 | Operational costs of the public transport system | 42.48 | 29.41 | 7.19 | 44.44 | 74.51 | 12.42 | 51.63 | 37.25 |
| 8 | Investment in public transportation systems | 36.00 | 24.00 | 48.00 | 90.00 | 66.00 | 70.00 | 30.00 | 64.00 |
| 9 | Air quality (pm10) | 35.71 | 12.86 | 42.86 | 85.00 | 89.29 | 71.43 | 53.57 | 54.29 |
| 10 | Greenhouse gas emissions from transport | 82.55 | 88.00 | 80.00 | 60.00 | 67.27 | 70.91 | 85.45 | 78.18 |

SUTI for all cities-Spider diagram

Comparing cities all indicators



SUTI for all cities-exemplification

SUTI Ranking for cities

| | |
|--------|-------|
| City 5 | 77.90 |
| City 4 | 69.60 |
| City 6 | 56.30 |
| City 8 | 53.48 |
| City 2 | 42.22 |
| City 7 | 39.39 |
| City 3 | 36.33 |
| City 1 | 35.54 |



SUTI next steps



- ❑ **SUTI** useful tool for urban transport
- ❑ **Data collection** and availability: Primary & Secondary
- ❑ **Frequency** of analysis: yearly?
- ❑ Performance of city across ten indicators
- ❑ Comparability across peer cities
- ❑ **Pilot application** in four cities: Colombo; Jakarta; Hanoi and Kathmandu

Strategies to Improve Urban Transport

- ❑ Integrated land use and urban transport planning
 - Improvement of public transportation
 - Intermodal transfer stations- optimum use of all modes
 - NMT- Pedestrian walkways, bicycle tracks

- ❑ Social inclusion- Affordability and coverage
 - Extend reach of public transport to vulnerable groups, communities

- ❑ Improve quality and reliability of service



Possible Policy Elements

- ❑ Road safety improvement
 - Regional goals targets and indicators
- ❑ Funding and operational costs

- ❑ Travel demand management
 - ICT, Compact city planning
 - Fare Integration, common ticketing
 - Parking policy, check private motor population

- ❑ Air quality and GHG
 - Clean Vehicle Technologies (energy, clean fuels)
 - Electric Mobility
 - Congestion management-Road pricing, car free areas/days



Concluding Remarks



- ❑ Need to enhance sustainability & safety of urban transport
- ❑ SUTI helps to monitor progress across ten indicators and compare with peers cities
- ❑ Develop and implement policies and strategies to improve urban transport systems
- ❑ Many successful examples in Asia
- ❑ SUTI application in other cities
- ❑ UNESCAP ready to support and collaborate



Thank you!

Email: rakhmatov@un.org

