11th Regional EST Forum in Asia

2-5 October 2018, Ulaanbaatar

Sustainable Urban Transport Index for Asian Cities

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UNITED NATIONS ESCAP
Economic and Social Commission for Asia and the Pacific

2030 Agenda for Sustainable Development

Sustainable Development Goals & Transport

- *Target 11.2: 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*

- New Urban Agenda:
  - Promote access for *all-safe, affordable, sustainable urban mobility*
  - TOD
  - Develop Comprehensive Mobility Plan
  - Develop *mechanisms and frameworks*
  - Greater *coordination of implementation*

Sustainable Urban Transport Index

- 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, policies

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 Relevance 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
	7.3 Improving energy efficiency
	13.2 Integrate climate change measures

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 cites
- 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
	SUM		1.00		

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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 & SUTI Calculation

Linear Normalization of indicators 1-100 scale

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

$$SUTI = \sqrt[10]{i1 * i2 * i3 \ldots i10}$$

Where i1…i10 are the indicators

Geometric mean method chosen (similar to HDI)

'Equal weight' to each SUTI indicator is applied

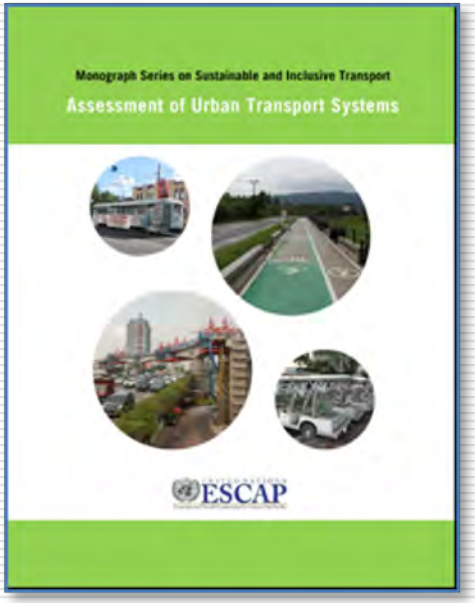
SUTI-Publication, Data Collection Guideline & Excel Calculation Sheet

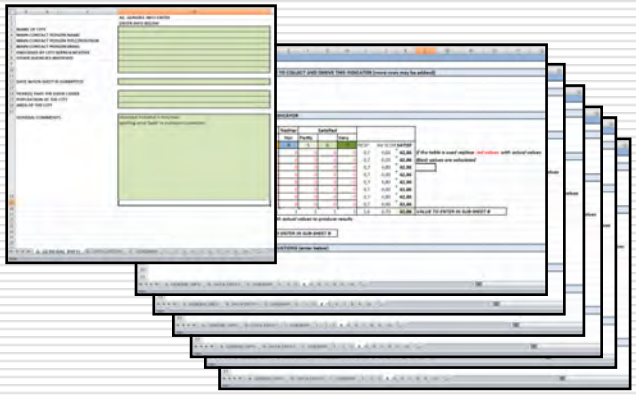
Monograph Series- Assessment of Urban Transport Systems

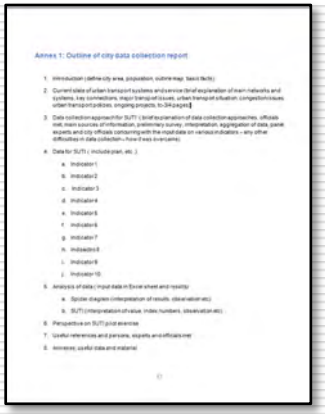
http://www.unescap.org/publications/monograph-series-sustainable-and-inclusive-transport-assessment-urban-transport-systems

Data Collection Guideline and Excel Sheet

http://www.unescap.org/events/capacity-building-workshop-sustainable-urban-transport-index-suti





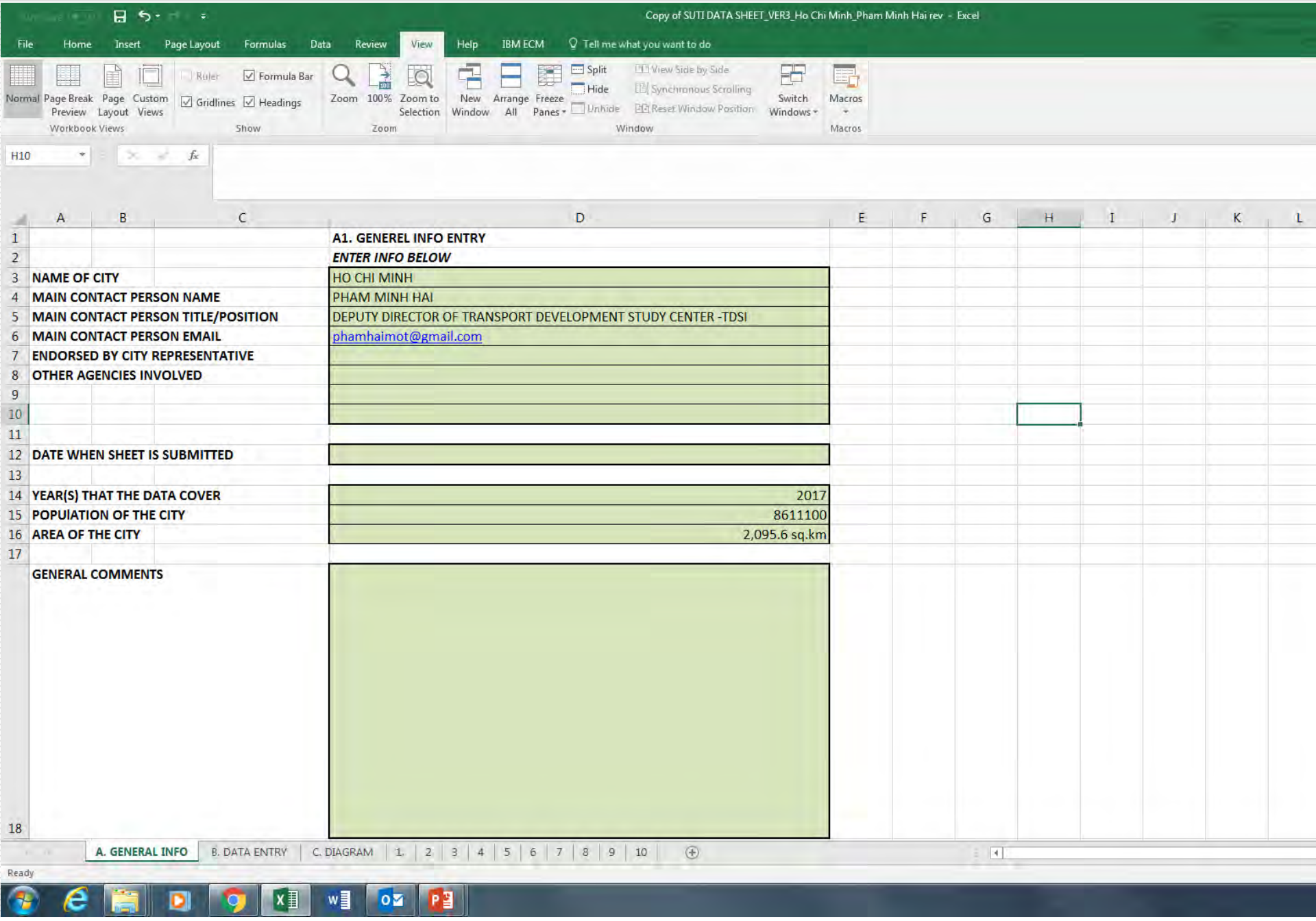


SUTI Guidelines and Excel sheet

- Support to SUTI application in cities
- Ensure consistency of SUTI calculation
- Allow comparability across cities
- Provide a common approach to:
  - Identify and document data for SUTI
  - Operate and calculate data
  - Calculate SUTI and Present results

- Data for each indicator entered in SUTI data sheet
- Automatic normalization, calculation of SUTI, and creation of spider diagram

SUTI Excel Sheet



Copy of SUTI DATA SHEET_VER3_Ho Chi Minh_Pham Minh Hai rev - Excel

File Home Insert Page Layout Formulas Data Review View Help IBM ECM Tell me what you want to do

Normal Page Break Preview Page Layout Custom Views | Ruler Gridlines Formula Bar Headings | Zoom 100% Zoom to Selection | New Window Arrange All Freeze Panes Split Hide Unhide View Side by Side Synchronous Scrolling Reset Window Position | Switch Windows | Macros

Workbook Views Show Zoom Window Macros

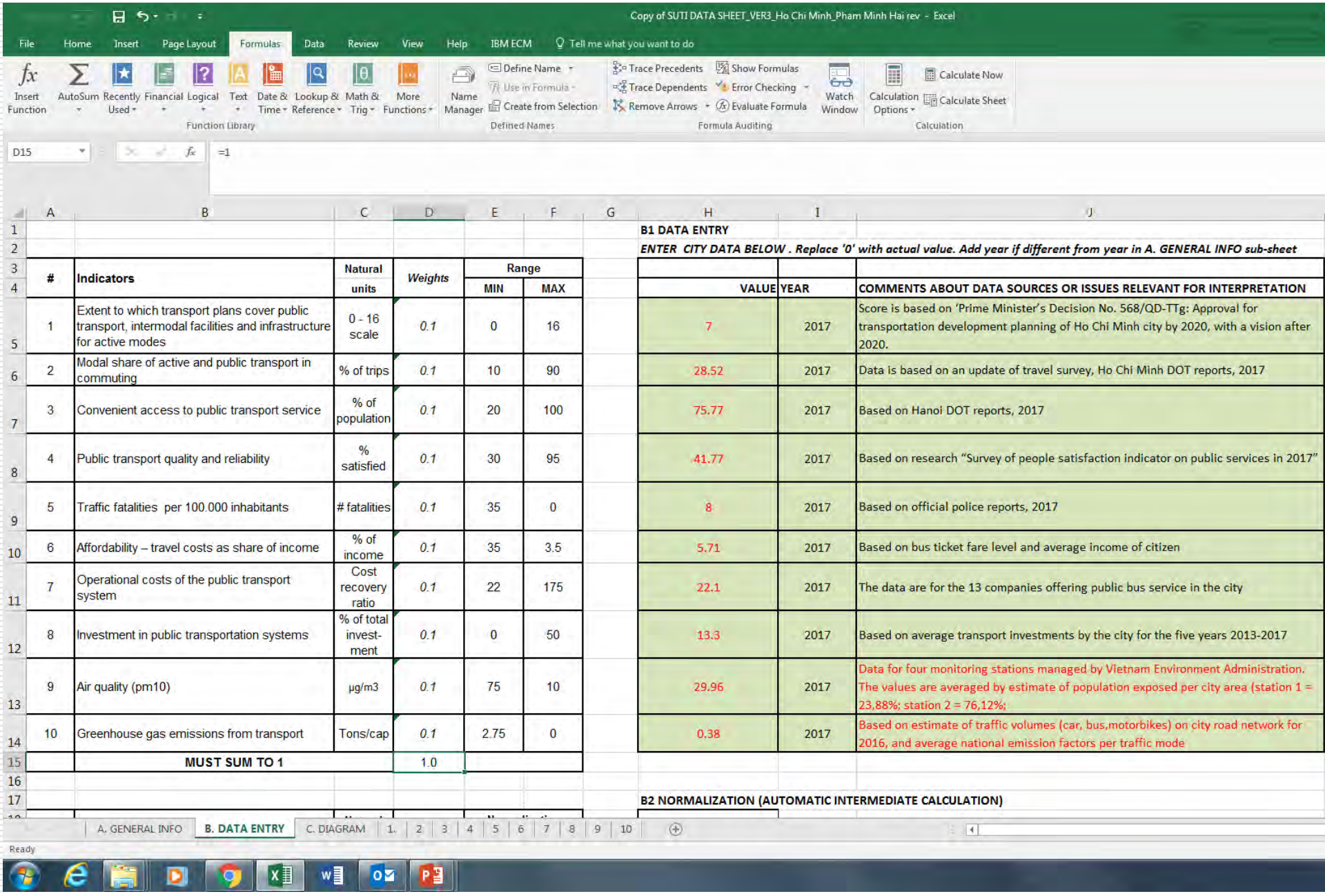
H10

	A	B	C	D	E	F	G	H	I	J	K	L
1				**A1. GENEREL INFO ENTRY**								
2				***ENTER INFO BELOW***								
3	**NAME OF CITY**			HO CHI MINH								
4	**MAIN CONTACT PERSON NAME**			PHAM MINH HAI								
5	**MAIN CONTACT PERSON TITLE/POSITION**			DEPUTY DIRECTOR OF TRANSPORT DEVELOPMENT STUDY CENTER -TDSI								
6	**MAIN CONTACT PERSON EMAIL**			phamhaimot@gmail.com								
7	**ENDORSED BY CITY REPRESENTATIVE**											
8	**OTHER AGENCIES INVOLVED**											
9												
10												
11												
12	**DATE WHEN SHEET IS SUBMITTED**											
13												
14	**YEAR(S) THAT THE DATA COVER**			2017								
15	**POPUIATION OF THE CITY**			8611100								
16	**AREA OF THE CITY**			2,095.6 sq.km								
17												
18	**GENERAL COMMENTS**											

A. GENERAL INFO | B. DATA ENTRY | C. DIAGRAM | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10

Ready

Data entry and normalization



Copy of SUTI DATA SHEET_VER3_Ho Chi Minh_Pham Minh Hai rev - Excel

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Name Manager | Define Name | Use in Formula | Create from Selection | Defined Names

Trace Precedents | Trace Dependents | Remove Arrows | Show Formulas | Error Checking | Evaluate Formula | Watch Window | Formula Auditing

Calculation Options | Calculate Now | Calculate Sheet | Calculation

D15 =1

B1 DATA ENTRY

ENTER CITY DATA BELOW . Replace '0' with actual value. Add year if different from year in A. GENERAL INFO sub-sheet

#	Indicators	Natural units	Weights	Range MIN	Range MAX	VALUE	YEAR	COMMENTS ABOUT DATA SOURCES OR ISSUES RELEVANT FOR INTERPRETATION
1	Extent to which transport plans cover public transport, intermodal facilities and infrastructure for active modes	0 - 16 scale	0.1	0	16	7	2017	Score is based on 'Prime Minister's Decision No. 568/QD-TTg: Approval for transportation development planning of Ho Chi Minh city by 2020, with a vision after 2020.
2	Modal share of active and public transport in commuting	% of trips	0.1	10	90	28.52	2017	Data is based on an update of travel survey, Ho Chi Minh DOT reports, 2017
3	Convenient access to public transport service	% of population	0.1	20	100	75.77	2017	Based on Hanoi DOT reports, 2017
4	Public transport quality and reliability	% satisfied	0.1	30	95	41.77	2017	Based on research "Survey of people satisfaction indicator on public services in 2017"
5	Traffic fatalities per 100.000 inhabitants	# fatalities	0.1	35	0	8	2017	Based on official police reports, 2017
6	Affordability – travel costs as share of income	% of income	0.1	35	3.5	5.71	2017	Based on bus ticket fare level and average income of citizen
7	Operational costs of the public transport system	Cost recovery ratio	0.1	22	175	22.1	2017	The data are for the 13 companies offering public bus service in the city
8	Investment in public transportation systems	% of total invest-ment	0.1	0	50	13.3	2017	Based on average transport investments by the city for the five years 2013-2017
9	Air quality (pm10)	µg/m3	0.1	75	10	29.96	2017	Data for four monitoring stations managed by Vietnam Environment Administration. The values are averaged by estimate of population exposed per city area (station 1 = 23,88%; station 2 = 76,12%;
10	Greenhouse gas emissions from transport	Tons/cap	0.1	2.75	0	0.38	2017	Based on estimate of traffic volumes (car, bus,motorbikes) on city road network for 2016, and average national emission factors per traffic mode
	MUST SUM TO 1		1.0					

B2 NORMALIZATION (AUTOMATIC INTERMEDIATE CALCULATION)

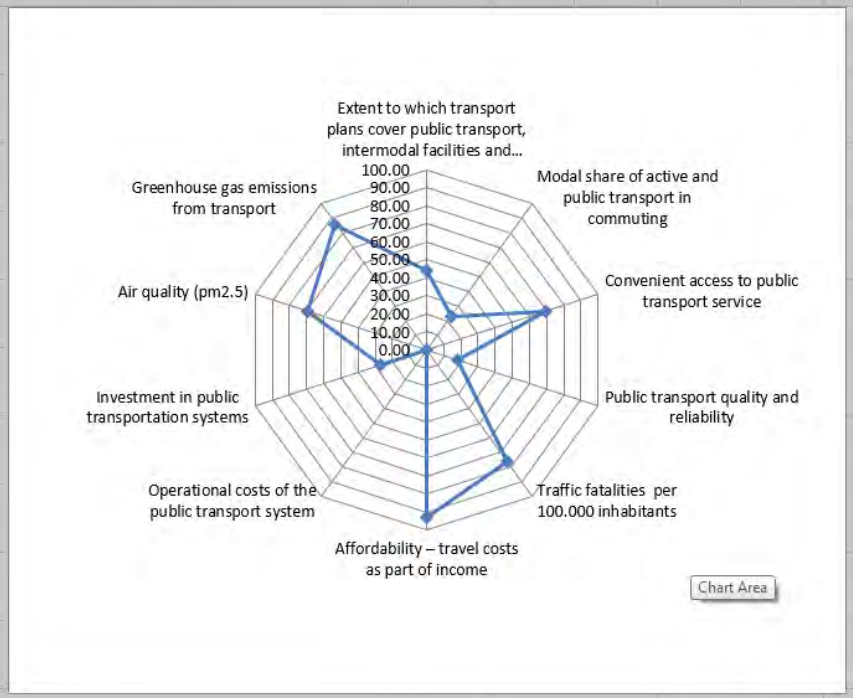
A. GENERAL INFO | B. DATA ENTRY | C. DIAGRAM | 1. | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10

Ready

SUTI spider diagram

Copy of SUTI DATA SHEET_VER3_Ho Chi Minh_Pham Minh Hai rev - Excel

	C1 RESULT SPIDER DIAGRAM	
1	Extent to which transport plans cover public transport, intermodal facilities and infrastructure for active modes	43.75
2	Modal share of active and public transport in commuting	23.15
3	Convenient access to public transport service	69.71
4	Public transport quality and reliability	18.11
5	Traffic fatalities per 100.000 inhabitants	76.21
6	Affordability – travel costs as part of income	92.98
7	Operational costs of the public transport system	0.07
8	Investment in public transportation systems	27
9	Air quality (pm2.5)	69.29
10	Greenhouse gas emissions from transport	86.28
	Index, Geometric Mean	**25.3953**



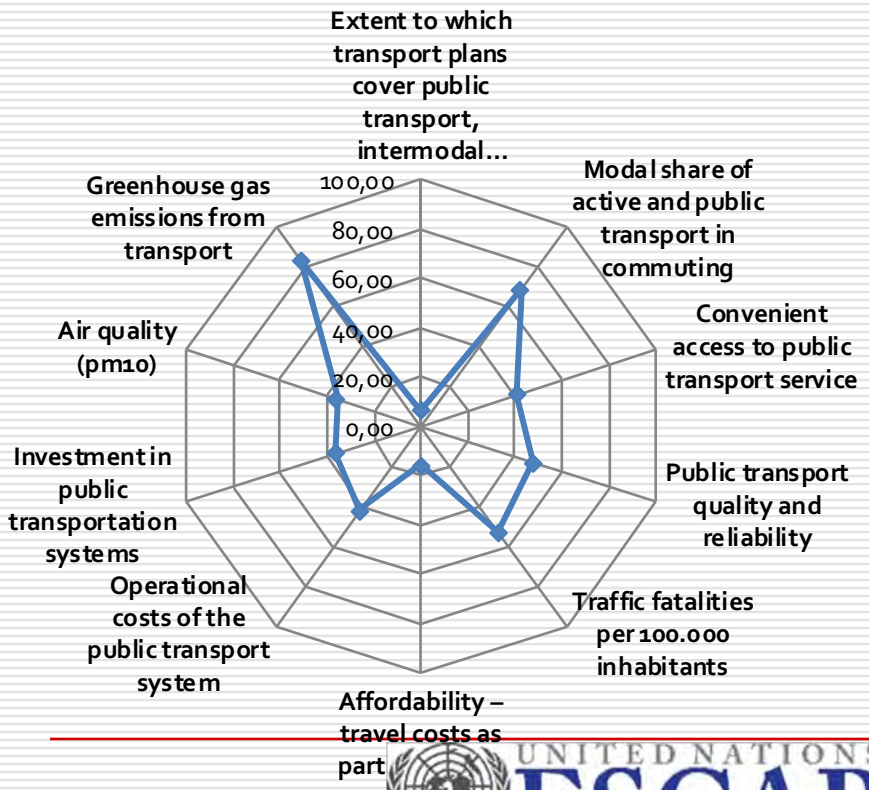
A. GENERAL INFO | B. DATA ENTRY | C. DIAGRAM | 1. | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10

Ready

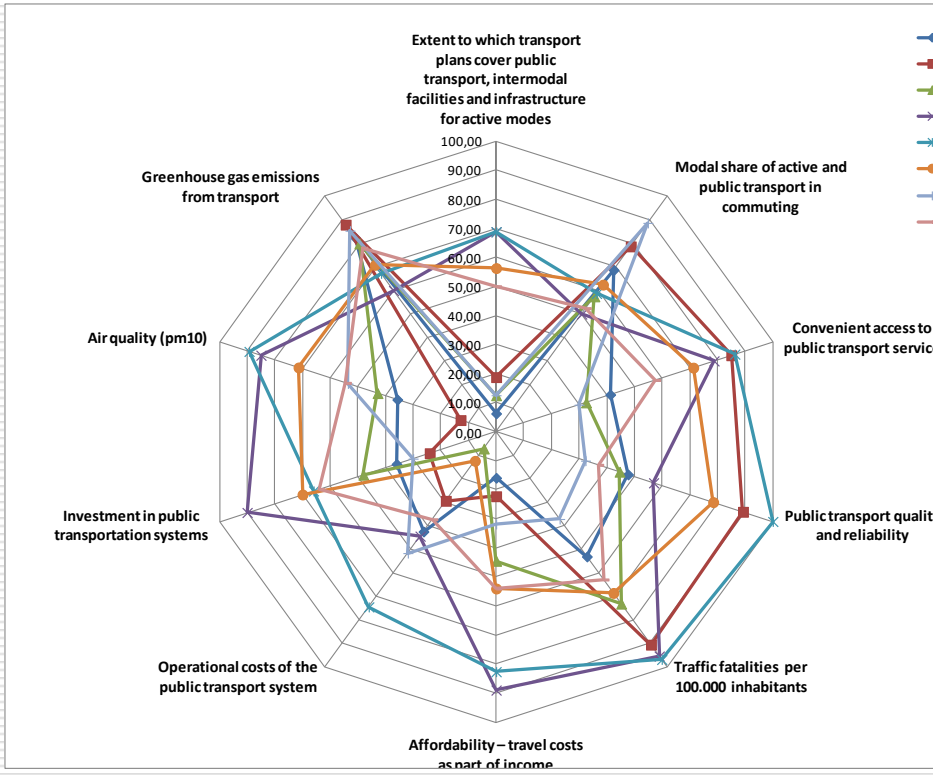
Average: 27.93233348 Count: 33 Sum

Spider diagram

Single city



Multiple City



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SUTI Pilot Application

Kathmandu
Valley
2.8 mill. Inh.
722 km2
3,878 inh./km2

Jakarta
JABODETABEK
30.1 mill. Inh.
6,767 km2
4,448 inh./km2

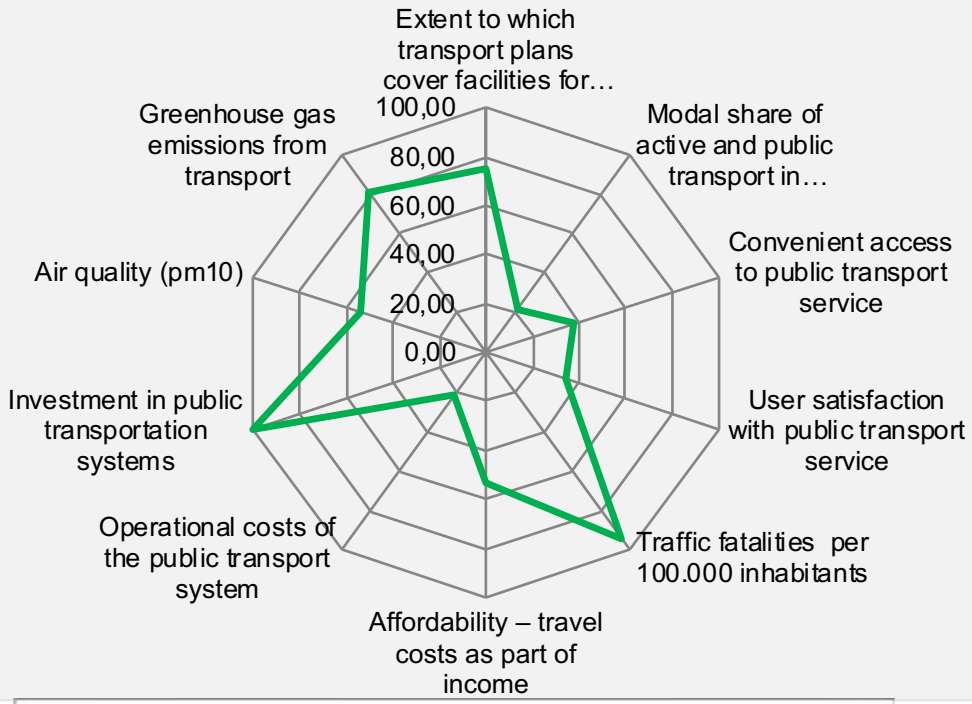
Hanoi City
7,7 mill. Inh.
3,359 km2
2,292 inh./km2

Colombo
Western Region
5.8 mill. inh.
3,684 km2
1,774 inh./km2

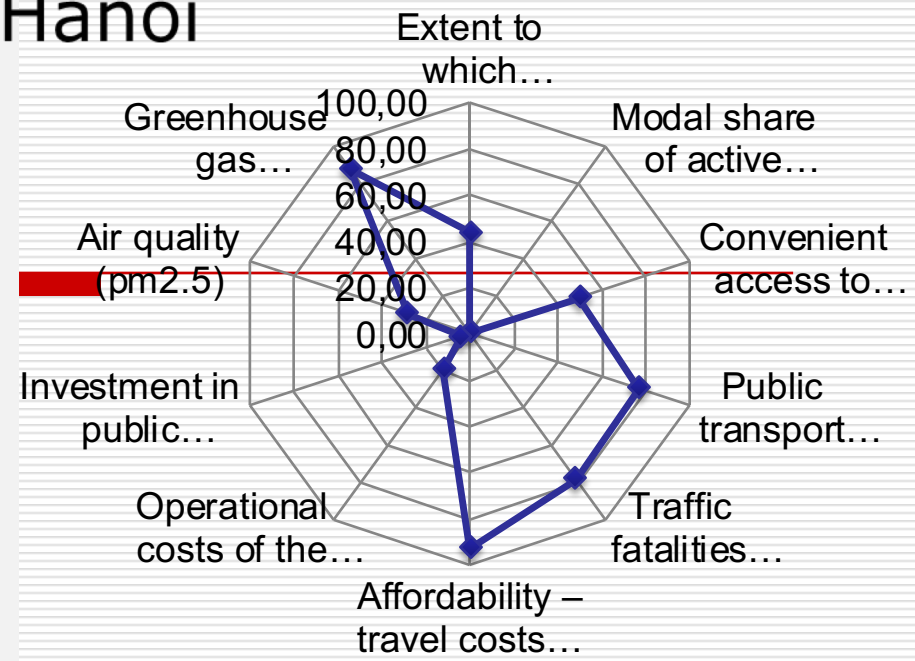
Images: Henrik Gudmundsson

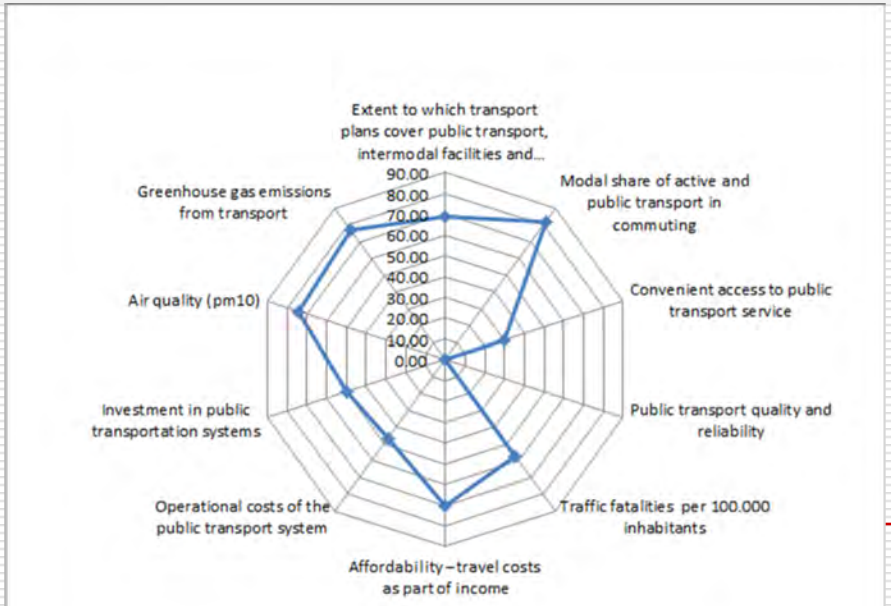
No	Indicators	Actual values				Normalized values			
		Jakarta	Hanoi	Kathmandu	Colombo	Jakarta	Hanoi	Kathmandu	Colombo
1	Extent to which transport plans cover public transport, intermodal facilities and infrastructure for active modes	12.00	7.00	7.00	11	75.00	43.75	43.75	68.75
2	Modal share of active and public transport in commuting	27.00	10.65	69.77	75.45	21.25	0.81	74.71	81.81
3	Convenient access to public transport service	50.00	60.00	85.00	44	37.50	50.00	81.25	30.00
4	Public transport quality and reliability	52.50	79.97	31.00	30.1	34.62	76.87	1.54	0.15
5	Traffic fatalities per 100.000 inhabitants	2.10	7.75	6.33	14.9	94.00	77.87	81.91	57.34
6	Affordability – travel costs as part of income	18.20	5.71	11.10	12.82	53.33	92.98	75.87	70.41
7	Operational costs of the public transport system	55.40	51.95	102.40	93.8	21.83	19.57	52.55	46.93
8	Investment in public transportation systems	50.00	1.96	17.84	24.8	100.00	3.93	35.68	49.60
9	Air quality (pm10)	75.00	56.64	88.00	46	53.57	28.24	44.29	74.29
10	Greenhouse gas emissions from transport	0.53	0.33	0.57	0.63	80.73	88.16	79.27	77.09

Greater Jakarta

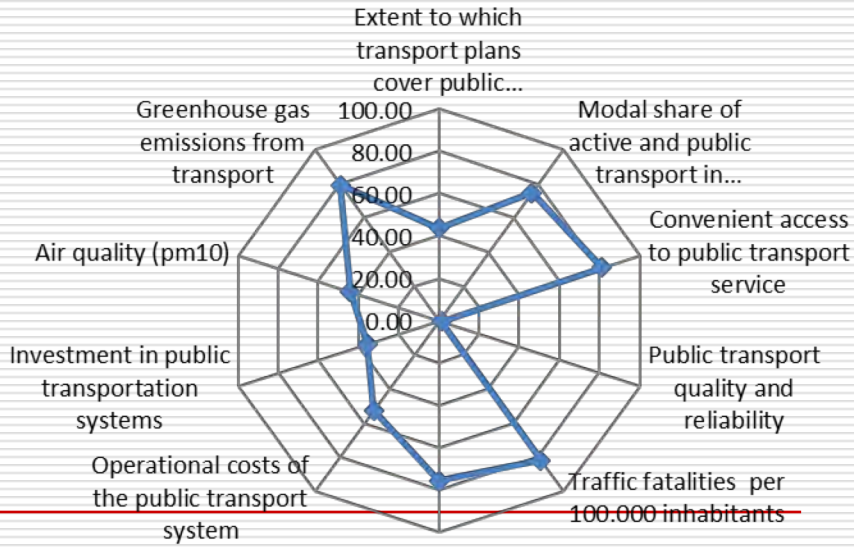


Hanoi

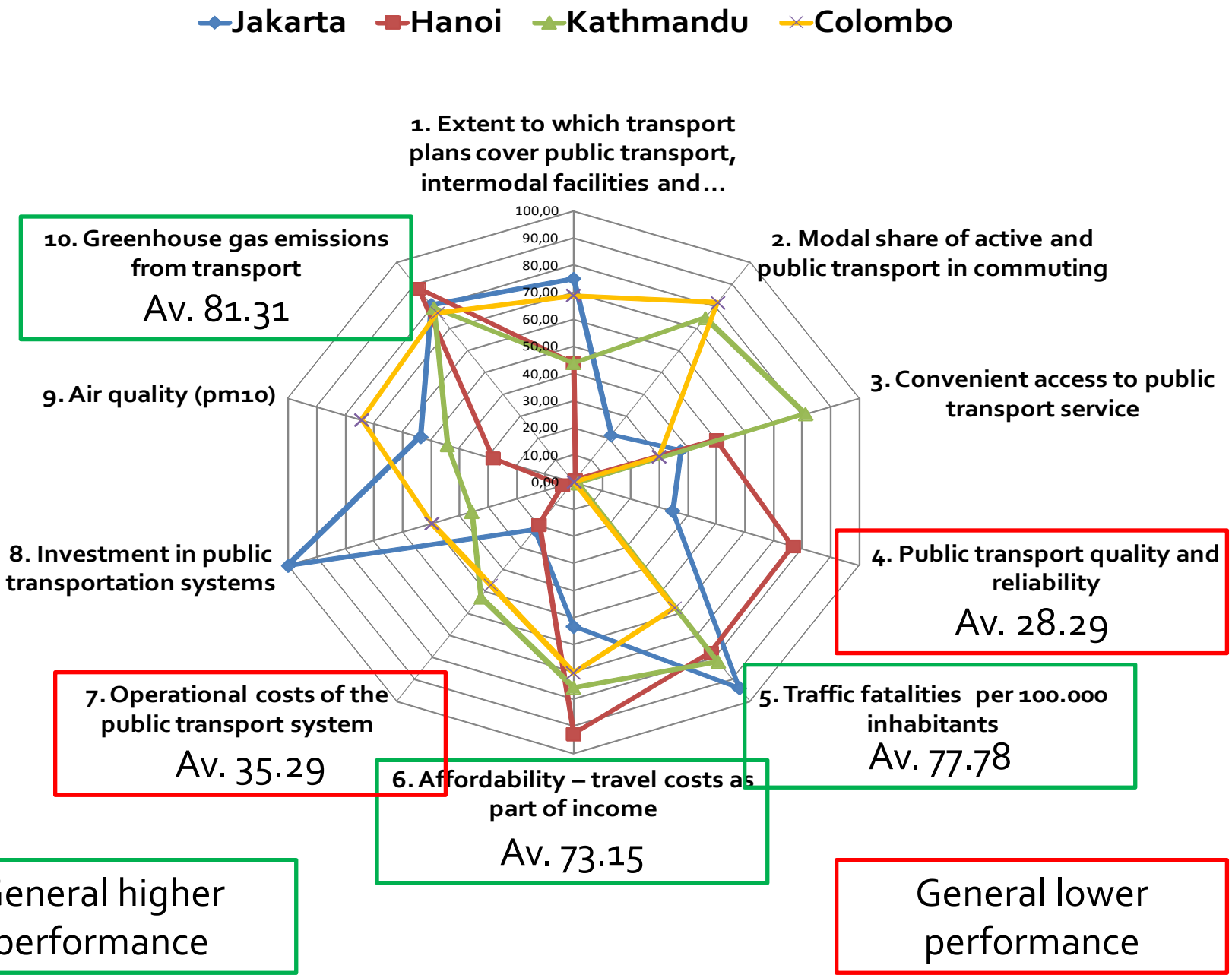




Colombo



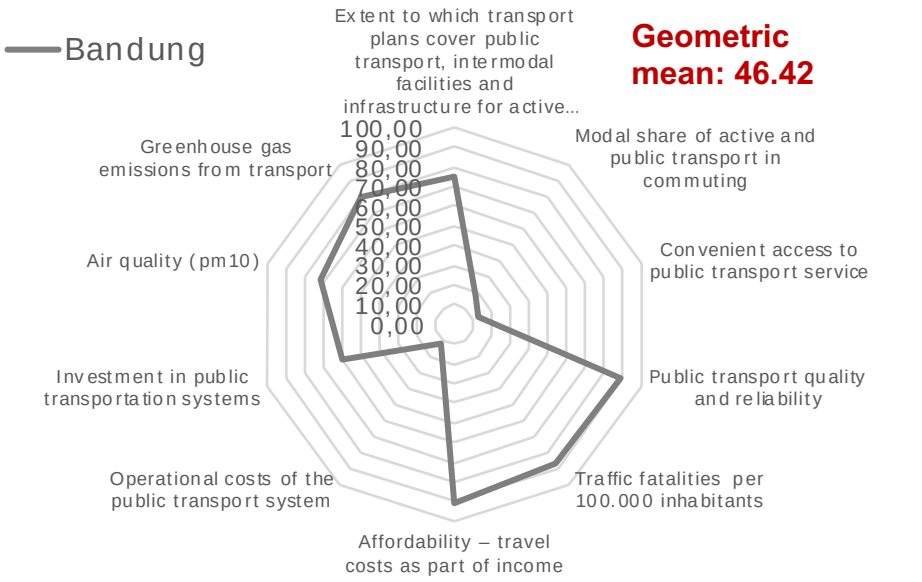
Kathmandu


Jakarta
Hanoi
Kathmandu
Colombo
1. Extent to which transport plans cover public transport, intermodal facilities and…
2. Modal share of active and public transport in commuting
3. Convenient access to public transport service
4. Public transport quality and reliability
Av. 28.29
5. Traffic fatalities per 100.000 inhabitants
Av. 77.78
6. Affordability – travel costs as part of income
Av. 73.15
7. Operational costs of the public transport system
Av. 35.29
8. Investment in public transportation systems
9. Air quality (pm10)
10. Greenhouse gas emissions from transport
Av. 81.31
100,00
90,00
80,00
70,00
60,00
50,00
40,00
30,00
20,00
10,00
0,00
General higher performance
General lower performance

Result of SUTI Analysis

Jakarta	52.5
Kathmandu	47.8
Colombo	32.70
Hanoi	32.2

Capacity Building Workshop on SUTI in Colombo, October 2017


Bandung
Geometric mean: 46.42
Extent to which transport plans cover public transport, intermodal facilities and infrastructure for active...
Modal share of active and public transport in commuting
Convenient access to public transport service
Public transport quality and reliability
Traffic fatalities per 100.000 inhabitants
Affordability – travel costs as part of income
Operational costs of the public transport system
Investment in public transportation systems
Air quality (pm10)
Greenhouse gas emissions from transport
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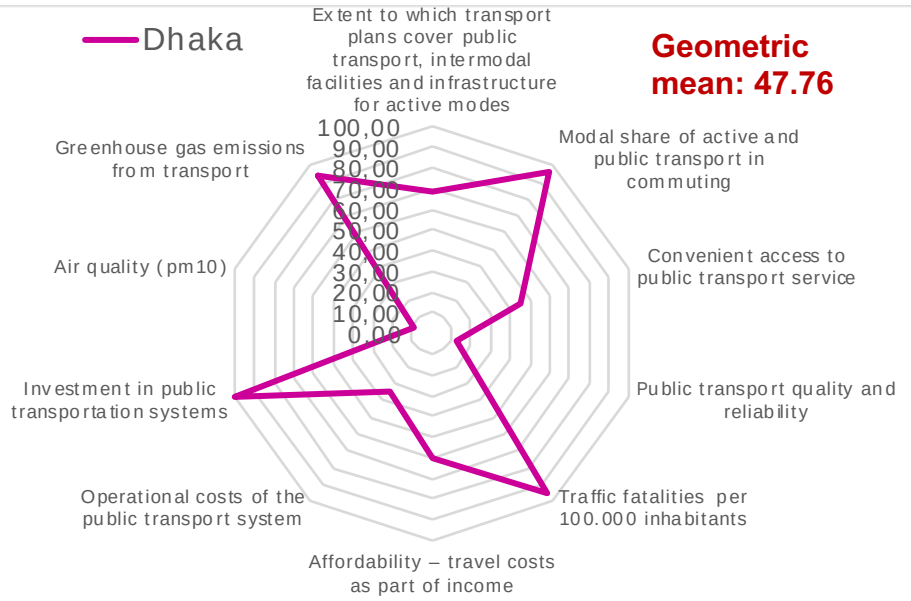
Dhaka
Geometric mean: 47.76
Extent to which transport plans cover public transport, intermodal facilities and infrastructure for active modes
Modal share of active and public transport in commuting
Convenient access to public transport service
Public transport quality and reliability
Traffic fatalities per 100.000 inhabitants
Affordability – travel costs as part of income
Operational costs of the public transport system
Investment in public transportation systems
Air quality (pm10)
Greenhouse gas emissions from transport
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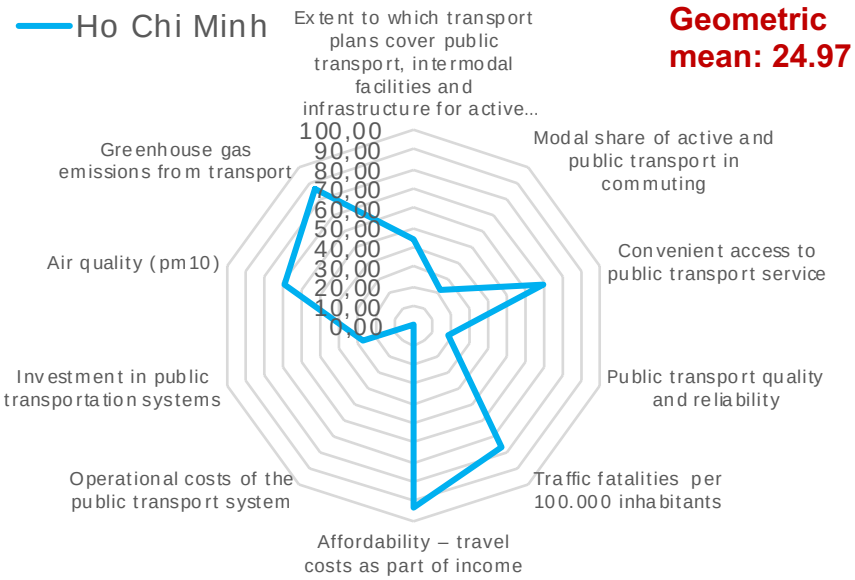
Ho Chi Minh
Geometric mean: 24.97
Extent to which transport plans cover public transport, intermodal facilities and infrastructure for active...
Modal share of active and public transport in commuting
Convenient access to public transport service
Public transport quality and reliability
Traffic fatalities per 100.000 inhabitants
Affordability – travel costs as part of income
Operational costs of the public transport system
Investment in public transportation systems
Air quality (pm10)
Greenhouse gas emissions from transport
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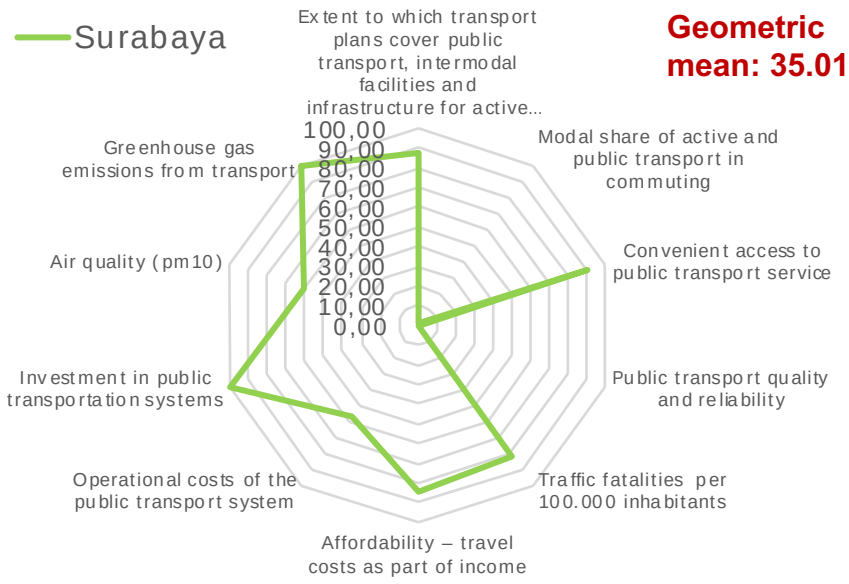
Surabaya
Geometric mean: 35.01
Extent to which transport plans cover public transport, intermodal facilities and infrastructure for active...
Modal share of active and public transport in commuting
Convenient access to public transport service
Public transport quality and reliability
Traffic fatalities per 100.000 inhabitants
Affordability – travel costs as part of income
Operational costs of the public transport system
Investment in public transportation systems
Air quality (pm10)
Greenhouse gas emissions from transport
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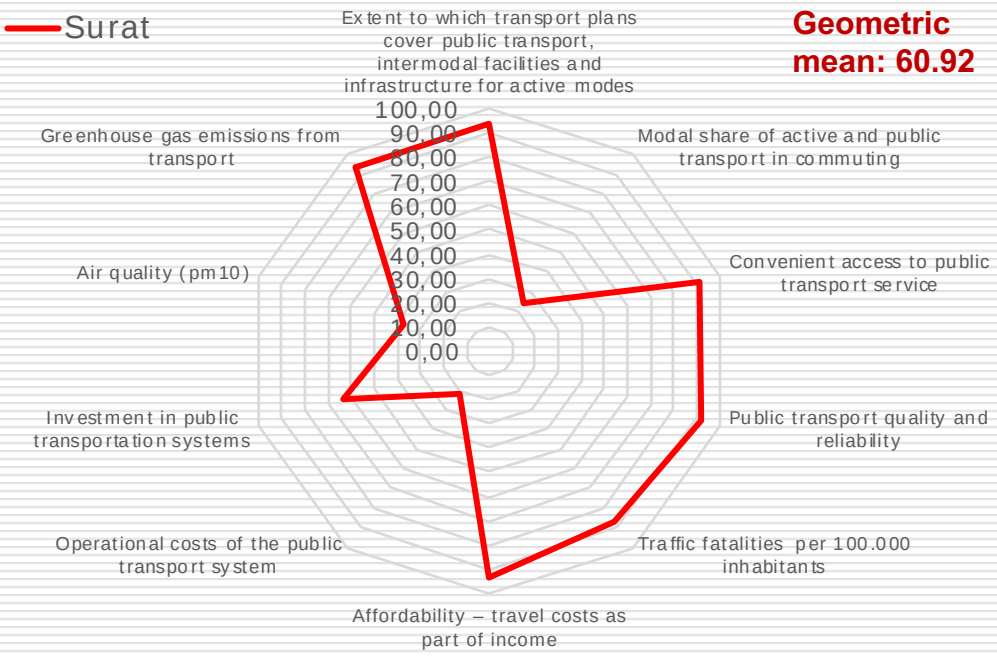

Geometric mean: 60.92

Surat	60.92
Dhaka	47.76
Bandung	46.42
Surabaya	35.01
Ho Chi Minh	24.96

Workshop on Urban Mobility and Sustainable Urban Transport Index, 12-13 September 2018, Dhaka

SUTI Next Steps

- SUTI can help assess performance of cities across ten key indicators and compare with peers cities
- Support refining policies and strategies to improve urban mobility
- 9 cities delivered all 10 SUTI indicators and index
- Draw implication for urban transport planning
- Follow-up on SUTI result & track progress (every 2 year)
- Data collection, availability and standardization
- Voluntary National Review (VNR) at HLPF, New York
- UNESCAP ready to collaborate- collaborating partners
- Further interest from Bangladesh, Bhutan, India, Islamic Republic of Iran

5th Session of the Committee on Transport,
19-21 November 2018, Bangkok

Thank you

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