Annex 1.2: Socio-cultural dimension urban sustainability indicators, their definition and techniques of normalization, and expected direction with respect to sustainability

Sustainability indicators	Main source	Explanations of the indicators	Normalization techniques	Expected direction with respect to sustainability
Demographics	23,24	Life expectancy and healthy life years at age 65	Re-scaling technique	The higher life expectancy and healthy life index, the higher sustainability of a city
Education	25,26,27	The act of imparting or acquiring general knowledge, developing the powers of reasoning and judgment	Re-scaling technique	The higher education level, the more sustainability cities
Income equality	7, 8, 9	The extent to which income is distributed in an uneven manner among a population.	Re-scaling technique	The higher the gap between the rich and the poor, The less the sustainability.
Work life balance	10,11, 13, 21, 28	proper prioritizing between work (career and ambition) and lifestyle (health, pleasure, leisure, family and spiritual development/ meditation)	Re-scaling technique	The higher value of work life balance index the more sustainability of a city
Crime rate	29,30,32	Percentage of the population affected by crime	Re-scaling technique	The lower the proportion of population affected by crime, the higher sustainability of city over time
Health	21, 24, 31, 32	Death rate due to chronic diseases by sex	Re-scaling technique	The lessor death rate due to chronic diseases, the more sustainability
Housing	10, 23,36,37	The proportion of household heads having their own residence/home	Re-scaling technique	The higher the proportion of households having their own home, the more sustainability of a city
Social & cultural network	10, 20, 25, 29	Sense of belonging, wellbeing, community cohesion, safety, relationships with neighbors' & local networks.	Re-scaling technique	The higher the social and cultural network, the stronger the sustainability.

Annex1.3: Environmental dimension urban sustainability indicators, their definition and techniques of normalization, and expected direction with respect to sustainability

Indicators	Main source	Definitions of indicators	Normalization techniques	Expected direction with respect to sustainability
Environmental risks	17, 21,22, 35,41	The extent of exposure to different environmental risk	Re-scaling technique	The higher rate of exposure to different environmental risks, the less sustainability of a city
Energy	10, 22, 35	Percentage of energy consumed in the city that comes from renewable sources	Re-scaling of proportion of population who reported energy consumption from renewable sources	The larger the amount of renewable energy consumed and the more sustainability of a city
Land use/ Green spaces	17,34, 36, 41	Percentage of preserved areas/ reservoirs/ waterways/parks in relation to total land area	Re-scaling of Proportion of green spaces compared to total area of a city	The higher percentage of green spaces index, the more sustainability of the city
Greenhouse gas emission	21, 31, 37, 38,39	Total amount of greenhouse gas emissions per city and per capita	Re-scaling technique	The larger amount of GHG emission and the less sustainability of a city
Waste management	10, 17, 40, 41	Percentage of population with access to safe waste disposal infrastructure	Re-scaling of proportion of population who reported access to safe waste disposal infrastructure	The higher the proportion of safe waste disposal index the more sustainability of city
Water availability	31,34,36, 42	Proportion of population with access to adequate and safe drinking water	Re-scaling of Proportion of population who reported adequate water supply	The higher rate of population with access to adequate and safe drinking water, the more sustainability of the city

Annex 1.4: Institutional dimension urban sustainability indicators, their definition and techniques of normalization, and expected direction with respect to sustainability

Indicators	Main source	Definitions of indicators	Normalization techniques	Expected direction with respect to sustainability
Institutional capacity	12,17, 36, 39	Adoption of integrated urban plans and perceptions of the government's ability to formulate and implement policies that promotes private sector development.	Re-scaling technique	The higher rate of institutions capability to develop integrated urban plans and formulate and implement policies, the more sustainability of a city
Institutional framework	7, 12, 28	Perceptions of the extent to which public power is exercised for public gain as well as capture of the institution by elites.	Re-scaling technique	The more transparent and accountable the institutional framework and the more the sustainability.
Local authority services	7, 12, 13, 28	Perceptions of the quality of public services, the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies.	Re-scaling technique	The higher value of local authority services quality index, the more the sustainability.
Local partnership	12, 36, 37	Citizens' engagement with environmental and sustainability oriented activities	Re-scaling technique	The higher local partnership index, the more sustainability of a city
Local community participation	7,12,36, 37	Residents' ability & willingness to take action to shape the local environment; or as active members in associations for urban improvement and quality of life	Re-scaling of proportion of population who reported participation in local community activities	The higher rate of local community participation, the higher sustainability of a city and vice versa
Gender mainstreaming	11, 40, 43, 44	Concept of assessing the different implications for women and men of any planned policy action	Re-scaling technique	The higher the rate of gender mainstreaming in planned actions, the higher the sustainability and vice versa

[7]World Bank (2018); [8]MoFED (2016) ; [9]Revenue and customs authority (2014); [10]OECD (2002) ;[11]ILO (2017); [12]City administration (2016); [13] EU (2015); [14]ETA (2014); [15]ERA (2015);[16]MoTransport (2016); [17]City Protocol (2016); [18]Regional Bureau of Culture & Tourism (2015);[19]Enterprise development office (2016); [20]Ministry of Culture & Tourism (2014); [21]WHO (2014); [22]MoEFCC (2015); 23CSA(2013); [24]Demographic Health Survey (2017); [25]UNESCO (2014); [26]Ministry of Education (2016); [27]Regional Bureau of Education (2015); [28] Ministry of Civil Service & Human Resource (2015); [29] Ministry of Social Affairs (2016); [30] Police offices in both cities (2017); [31]Ministry of Health (2014); [32]Hospitals in both cities (2015); [33]Regional Bureau of Culture & Tourism (2016); [34]Ministry of Water, Irrigation & Electricity (2017); [35]US EPA (2016); [36]MoUDH (2015); [37]Hawassa city municipality (2016); [38]ISO 37120 (2015); [39]SCI (2012); [40]UN (2015); [41]Smart city Profiles (2014); [42]Bahir Dar city water & sewerage office (2013); [43]Ministry of Women & Children (2015); [44]Regional Bureau of Women & Children (2016).

Annex 2: Normalized value (Z), Aggregate mean (μ) and standard deviation (δ) of indicators (N=215 each city)

Indicators	Bahir Dar			Hawassa		
	Z	μ	δ	Z	μ	δ
Economic indicators						
Transport infrastructure	0.58	0.96	0.201	0.60	0.91	0.284
Economic growth	0.52	0.55	0.499	0.58	0.69	0.464
Ease of doing business	0.34	0.27	0.442	0.46	0.42	0.495
Tourism	0.54	0.59	0.494	0.60	0.88	0.327
Connectivity	0.56	0.63	0.484	0.41	0.38	0.437
Employment	0.57	0.68	0.466	0.55	0.61	0.489
Socio-cultural indicators						
Demographics	0.67	0.92	0.270	0.56	0.74	0.437
Education	0.64	0.88	0.321	0.67	0.98	0.151
Income inequality	0.62	0.79	0.411	0.56	0.65	0.479
Work life balance	0.33	0.23	0.420	0.43	0.37	0.484
Crime	0.31	0.21	0.408	0.22	0.12	0.327
Health	0.51	0.53	0.501	0.30	0.19	0.394
Housing	0.56	0.64	0.481	0.60	0.87	0.332
Social &cultural network	0.59	0.72	0.452	0.50	0.49	0.501
Environmental indicators						
Environmental risks	0.59	0.72	0.452	0.60	0.77	0.423
Energy	0.60	0.92	0.270	0.57	0.98	0.151
Land use/Green spaces	0.60	0.77	0.420	0.63	0.72	0.450
Greenhouse gas emission	0.52	0.53	0.500	0.50	0.51	0.501
Waste management	0.40	0.38	0.489	0.47	0.47	0.500
Water availability	0.60	0.94	0.230	0.58	0.96	0.201
Institutional indicators						
Institutional capacity	0.53	0.60	0.452	0.59	0.74	0.440
Institutional framework	0.53	0.57	0.497	0.52	0.54	0.50
Local authority services	0.41	0.40	0.492	0.46	0.47	0.50
Local partnership	0-53	0.57	0.497	0.40	0.33	0.473
Local community participation	0.57	0.65	0.479	0.50	0.51	0.501
Gender mainstreaming	0.52	0.54	0.499	0.55	0.60	0.492

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