SDG indicators and analysis:

From systemic perspective

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Outline

➢ Background

➢ SDG indicators and data collection

➢ Framework of SDG indicators

➢ Implications for national SDGs implementation, monitoring and reporting

Background: Indicators development

➤ Sustainable Development Solutions Network (SDSN)

  ✓ Proposed 100 indicators on 12 June 2015 that were developed through 18 months of consultations with contributions from nearly 500 organizations and thousands of individuals.

➤ Inter-Agency and Expert Group on SDG Indicators (IAEG-SDGs)

  ✓ In March 2015, the UN Statistical Commission (46th session) created the IAEG-SDGs composed of Member States and regional and international agencies as observers.

  ✓ Provided a proposal of 229 indicators (149 "green" and 80 "grey") on 17 Dec. 2015 for consideration by the Statistical Commission at its 47th session in March 2016.

Background: IGES project on SDG indicators

➢ IGES-funded project (June 2015 – March 2016) on SDG indicators for integrating and implementing SDGs in Asia

➢ 10 countries: Bangladesh, China, Cambodia, India, Indonesia, Japan, Korea, Philippines, Vietnam and Mongolia

➢ Data collection and database construction

➢ Framework of indicators from systemic perspective

➢ Special topics: Water-energy-food nexus, sustainable cities and ecological footprints.

➢ Web tool: Data visualization and simulation

Data collection: Indicators selection

➢ SDSN-suggested 100 indicators covering all 17 SDGs with mapping with the 169 targets.

➢ Why not the IAEG Indicators? Timing of the commencement of this project and the status of the IAEG indicators.

➢ The major difference with IAEG indicators is basically in terms of comprehensiveness (the IAEG SDGs indicators are more comprehensive), and to some extent in terms of disaggregation levels (gender, age groups, etc.).

Data collection: Status and challenges

➢ SDSN indicators and data availability:

  ✓ Category A: Readily available (36 indicators)

  ✓ Category B: Not directly available (19 indicators)

  ✓ Category C and TBD: Newly developed indicators or indicators not yet developed (45 indicators)

- Collected time series (2001 to 2014) data for 74 SDSN indicators of which 50 are proxy indicators:

  ✓ E.g. For "Percentage of women aged 20-24 who were married or in a union before age 18", we use "Women aged 20-24 years married before age 18 (% of women in the age group)" as proxy

➢ 10 countries: Bangladesh, China, Cambodia, India, Indonesia, Japan, Korea, Philippines, Vietnam and Mongolia

Data collection: database and analysis
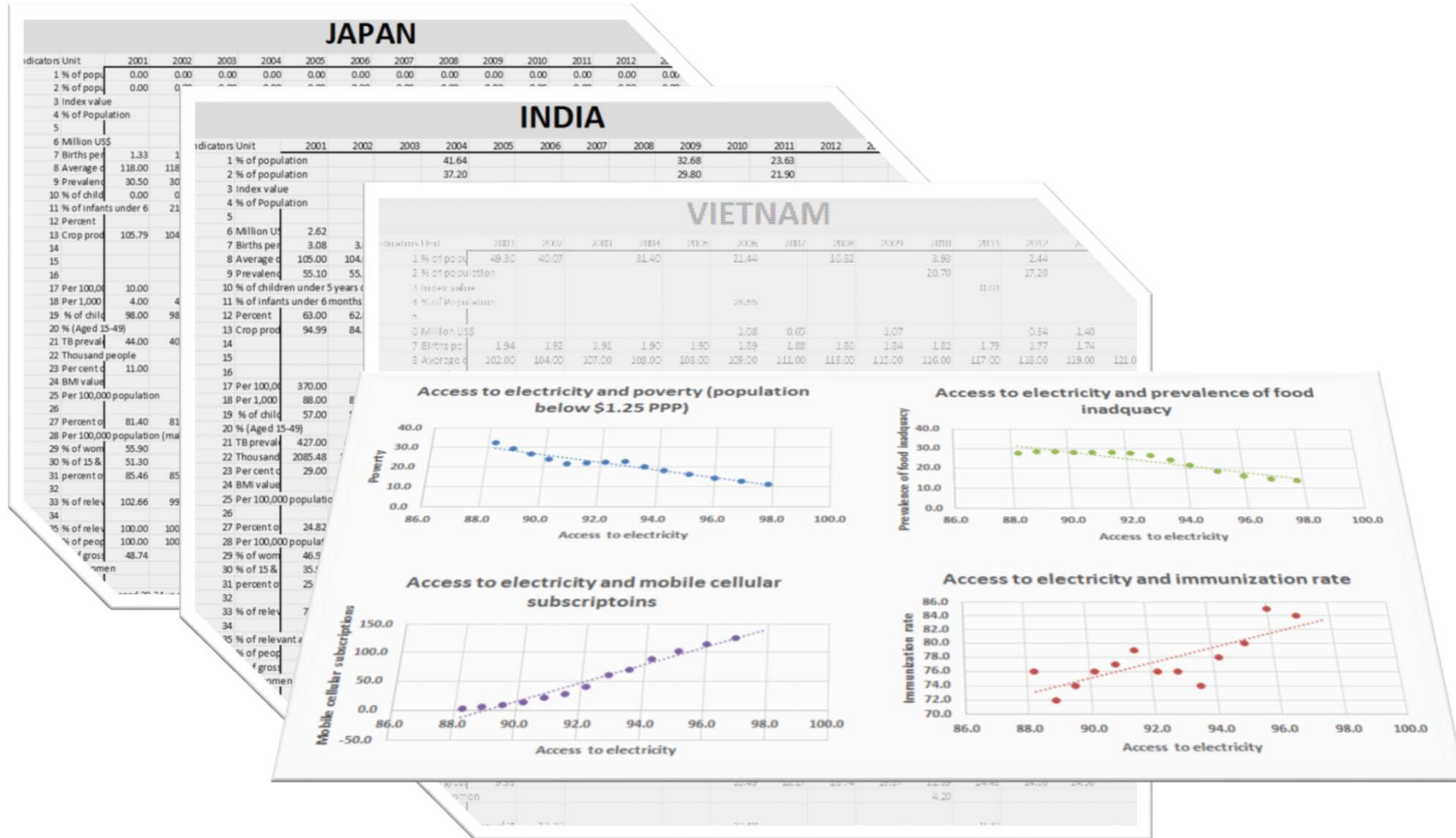
Framework of SDG indicators: Scientific background

➢ UN documents and existing scientific literature, etc.

While the SDGs are addressed as 17 separate elements, "it is clear from systems science that goal areas overlap, that many targets might contribute to several goals and that some goals may conflict." – ICSU & ISSC scientific review

➢ Dependence of targets on others

e.g. Progress on ending poverty (SDG1) cannot be achieved without progress on the food security (SDG2), full and productive employment and decent work (SDG8), the reduction of inequality (SDG10), and enhancing resilience to climate change (SDG13)

➢ Important trade-offs between targets

e.g. an increase in agricultural land-use to help end hunger (SDG2) can result in biodiversity loss (SDG15), and in overuse and/or pollution of water resources (SDG6) and downstream (likely negative) effect on marine resources (SDG14), which in turn could exacerbate food security concerns.

Need to incorporate a systems perspective *to know how targets interact in a network and how they contribute to holistic sustainability*

Framework of SDG indicators: Scientific background

➢ SDGs should be limited in number, concise and easily communicable

➢ Important to maintain the 17 SDGs because specific ministries will act upon specific targets and goals

➢ Trade-off between communicability to the public and steering capacity within bureaucracies.

Highly important to develop an integrated framework of targets and indicators to limit the number of targets however achieve the wider spectrum of 17 SDGs in an efficient and effective way.

Research questions

➢ How the 169 targets and associated indicators are interlinked?

➢ What is the structure of their linkages?

➢ Do some particular targets/indicators play critical roles (such as a node in the network) which have more or different ways of connections than other targets?

➢ How to identify the critical targets therefore by addressing which as the priority areas may be efficient (in terms of using limited available resources) but sufficiently effective to achieve the sustainability from systems perspective?

Use the technique of Social Network Analysis based on a dataset of SDG indicators

Methodology

Mapping the binary linkages
- ◆ 100 indicators of SDSN
- ◆ Linkages (0,1) based on SDSN, IAEG, ICSU/ISSC proposals, etc.
- ◆ Own assessment

Data collection and analysis
- ◆ 100 indicators of SDSN
- ◆ 10 countries-10 year time series-74 indicators
- ◆ Linear relations analysis

Quantify the inter-linkages
- ◆ Linear relations of each pair if the binary linkages is 1
- ◆ Quantified 74 by 74 indicator matrix

Social Network Analysis
- ◆ One network of indicators for each country
- ◆ Identify key indicators based on various measurements of centrality
- ◆ For each indicator, assess its synergies/tradeoffs with other indicators

Social Network Analysis

➢ SNA, often used in social and behavioural science, is the analysis of the structure/pattern and structural properties of a social network.

➢ A social network, is made up of social actors (nodes) and their relations (edges).

Who reports liking whom?				
	Choice:			
Chooser:	Bob	Carol	Ted	Alice
Bob	---	0	1	1
Carol	1	---	0	1
Ted	0	1	---	1
Alice	1	0	0	---

(a)

(b) $CH_3 - CH - CH_2 - CH_3$ with CH_3 attached to CH

(c) 1 — 2 — 3 — 4 — 5
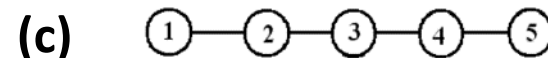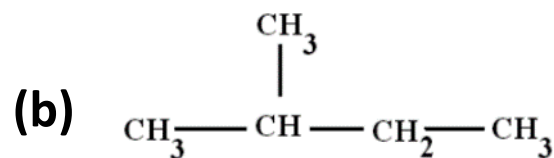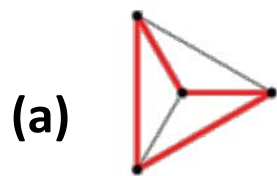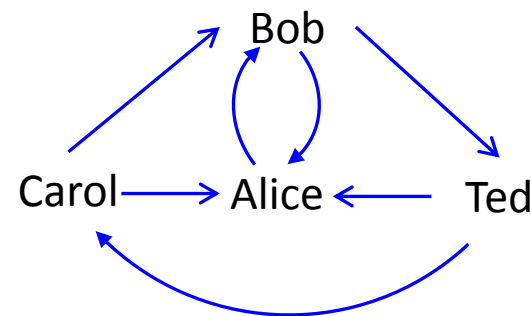
Social Network analysis

➢ Use graph theory for identifying the "most important" actors which placed in strategic locations in the network.

➢ Centrality: Central actors are those extensively involved in relationships with other actors which makes them more visible in the network.

➢ Various measurements of centrality:

- Degree centrality: Measuring the total ties with others;

- Closeness centrality: Measuring how close (distance) to all other actors;

- Betweeness centrality: Measuring the importance in connecting nonadjacent actors (groups of actors).

Social Network analysis of 100 SDSN indicators

➢ Mapping the binary linkages (0/1)of 100 indicators: SDSN indicators

➢ Visualising 100-indicator network in graph

➢ Identification of key indicators measured by various centrality metrics

Key indicators measured by centrality

Indicator	Outdegree	Indicator	Betweenness	Indicator	Closeness
50	48	**3**	0.087	**50**	0.664
51	48	72	0.046	**51**	0.664
3	46	**50**	0.030	**68**	0.660
45	46	**51**	0.030	**3**	0.656
46	46	**57**	0.030	**12**	0.639
47	37	**12**	0.028	**45**	0.639
88	33	6	0.021	**46**	0.639
6	31	**68**	0.021	70	0.631
5	30	100	0.020	25	0.631
49	30	47	0.018	**10**	0.623
57	29	70	0.018	69	0.623
12	29	59	0.016	24	0.619
10	29	**10**	0.016	66	0.615
92	29	**45**	0.015	8	0.607
59	27	**46**	0.015	9	0.607
77	26	98	0.015	11	0.607
25	25	79	0.014	23	0.607
68	24	5	0.013	27	0.607
58	24	88	0.013	**57**	0.604
78	23	55	0.013	67	0.600
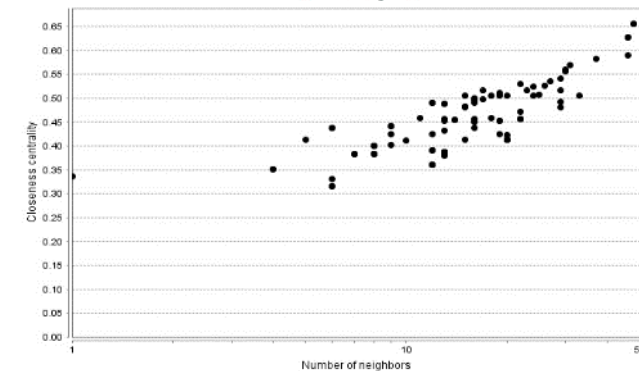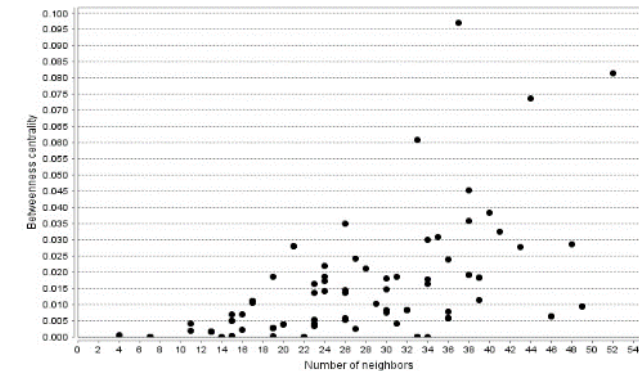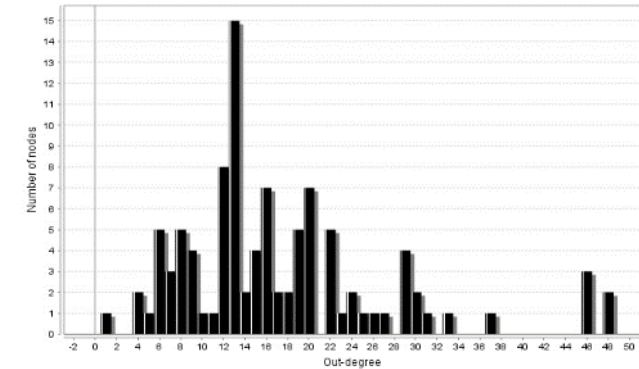
9 Key indicators and their definitions

No.	Indicators	Goals
3	Multidimensional Poverty Index	**Goal 1**. End poverty in all its forms everywhere
10	Prevalence of stunting and wasting in children under 5 years of age	**Goal 2**. End hunger, achieve food security and improved nutrition, and promote sustainable agriculture
12	Percentage of women, 15-49 years of age, who consume at least 5 out of 10 defined food groups	**Goal 2**. End hunger, achieve food security and improved nutrition, and promote sustainable agriculture
45	Percentage of population using safely managed water services, by urban/rural (modified MDG Indicator)	**Goal 6**. Ensure availability and sustainable management of water and sanitation for all
46	Percentage of population using safely managed sanitation services, by urban/rural (modified MDG Indicator)	**Goal 6.** Ensure availability and sustainable management of water and sanitation for all
50	Share of the population using modern cooking solutions, by urban/rural	**Goal 7**. Ensure access to affordable, reliable, sustainable, and modern energy for all
51	Share of the population using reliable electricity, by urban/rural	**Goal 7**. Ensure access to affordable, reliable, sustainable, and modern energy for all
57	Ratification and implementation of fundamental ILO labor standards and compliance in law and practice	**Goal 8**. Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all
68	[Ratio of land consumption rate to population growth rate, at comparable scale]– to be developed	**Goal 11**. Make cities and human settlements inclusive, safe, resilient and sustainable

9 key indicators in the network of 100 indicators
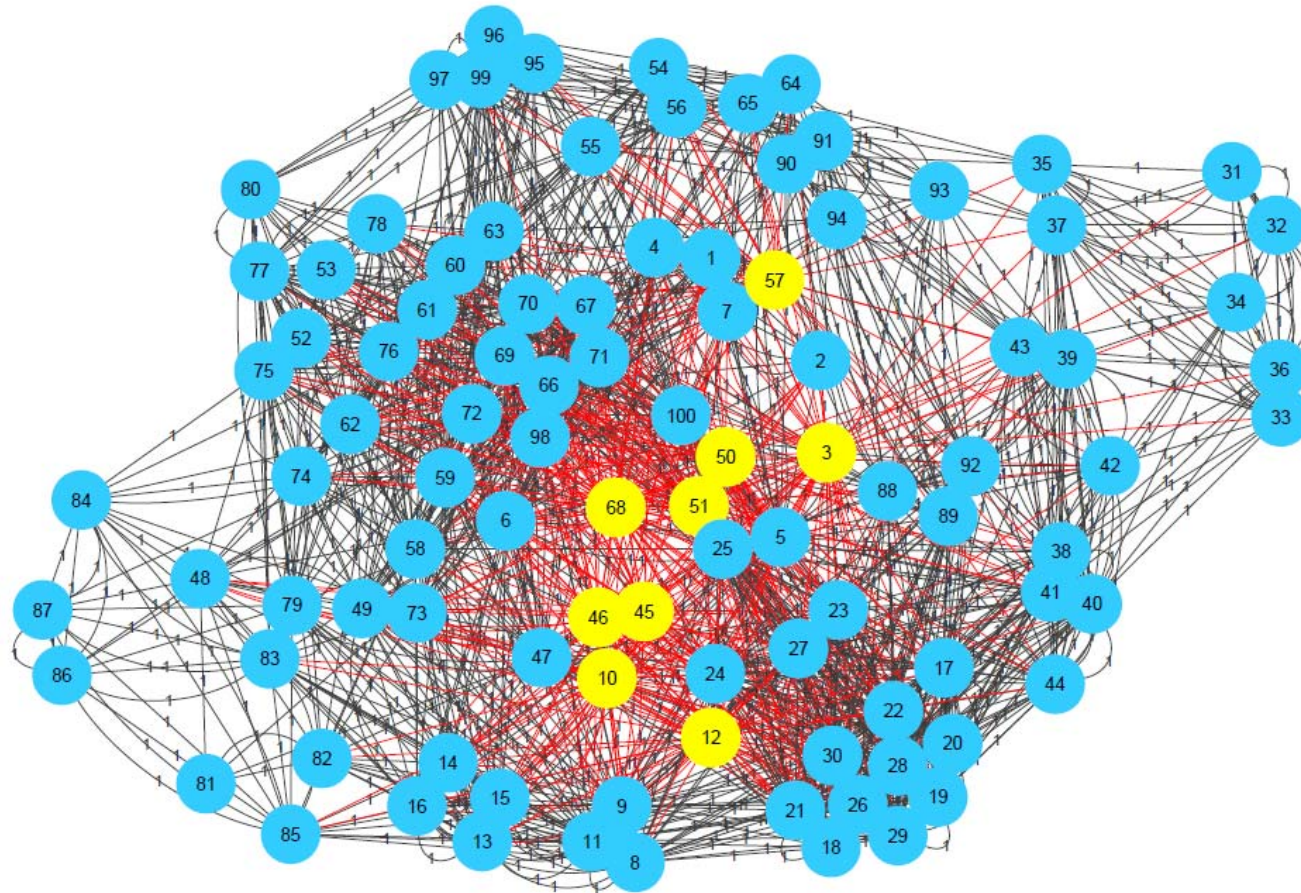
9 key indicators directly linked with 81 indicators

# 9 key indicators and their linkages with others
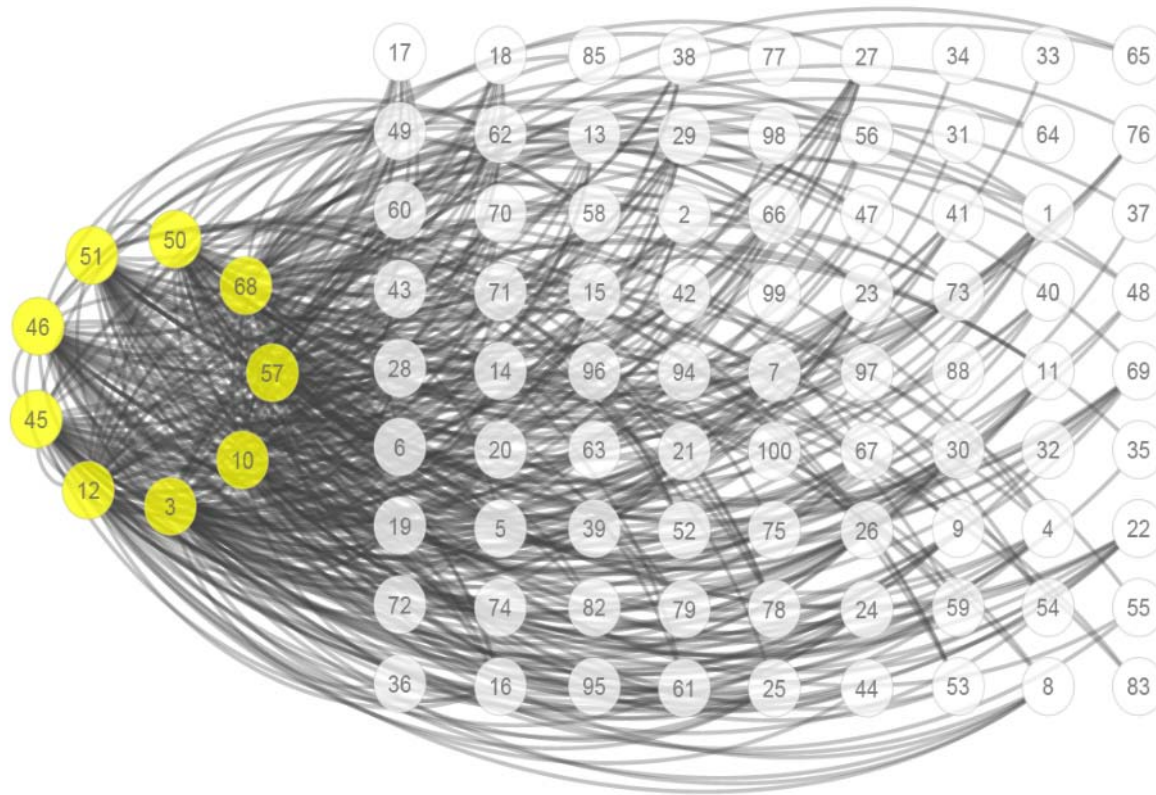
Network of 9 key indicators and their direct connections with others

Area coverage

- Link 90% of 100 indicators through direct linkages;

- Link with all indicators through direct linkages with 81 indicators and indirect linkages with the left 10 indicators through other indicators.

An example: Ind-51 and its linkages (Indonesia)
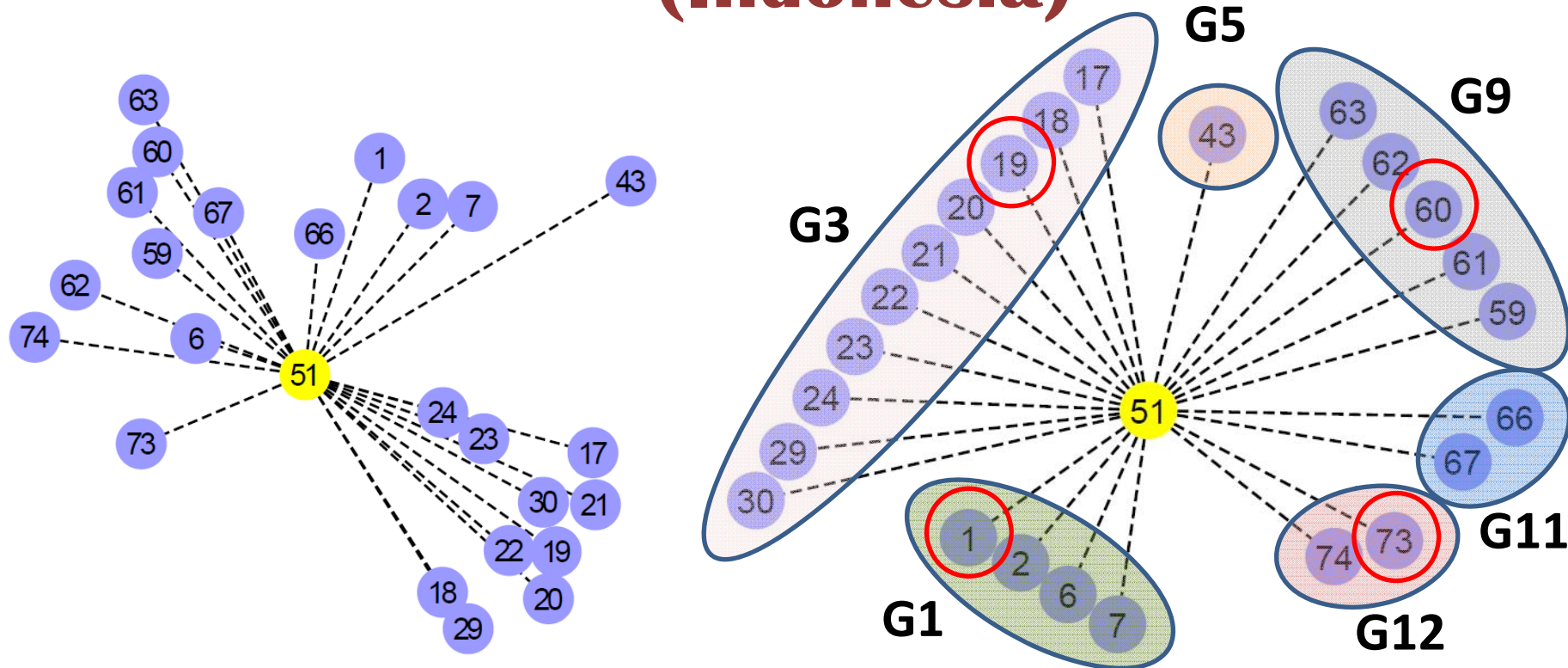
Indicator 51 and its direct linkages with other 24 indicators arranged by 6 SDGs

No.	Indicators	Goals
51	Share of the population using reliable electricity, by urban/rural	Goal 7. Ensure access to affordable, reliable, sustainable, and modern energy for all

Dataset for Ind-51 and selected linked indicators

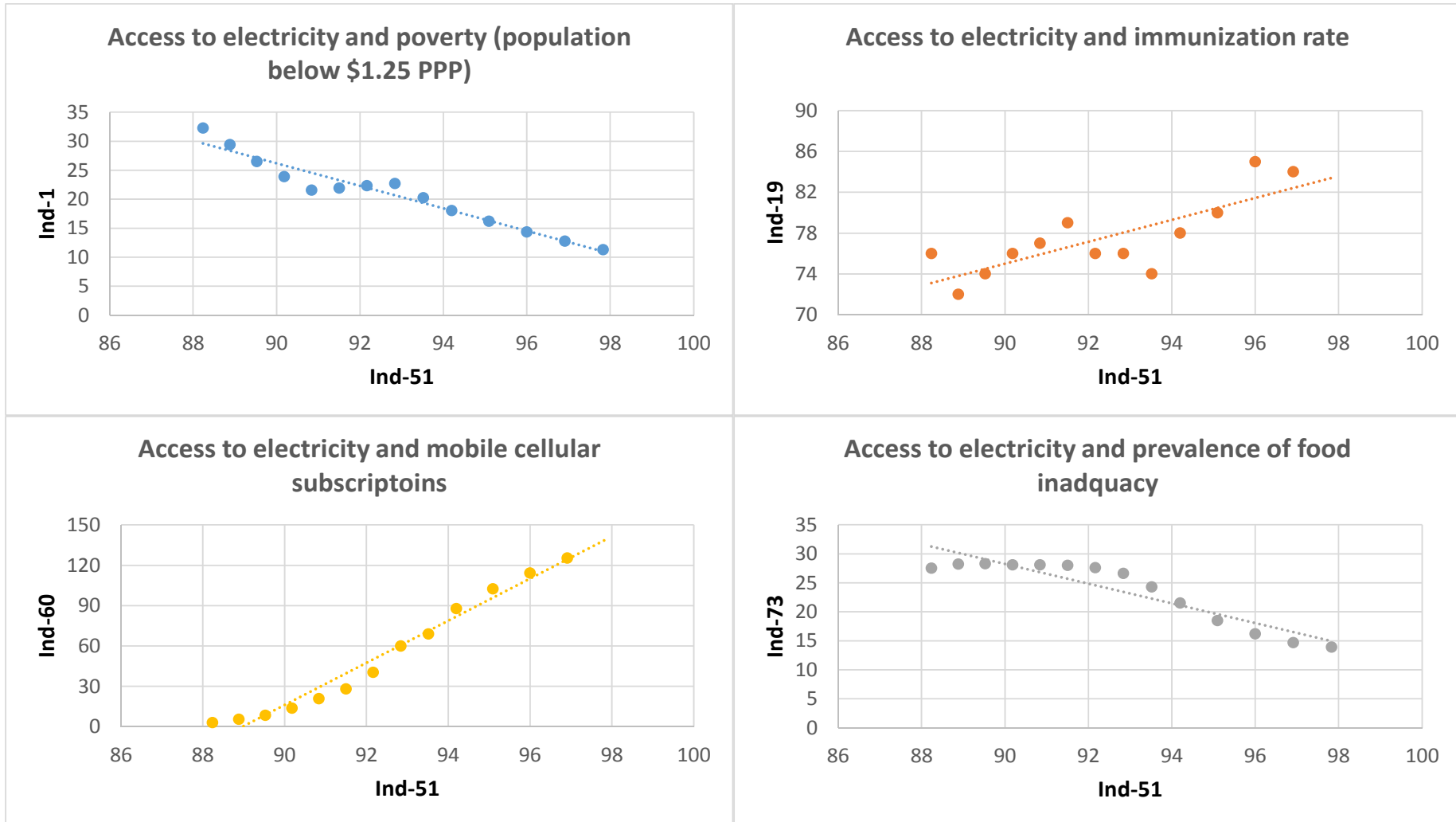|	Ind-51	Ind-1	Ind-19	Ind-60	Ind-73
Data source	WB/SE4All	WB	WHO/UNICEF	ITU	FAOSTAT
2001	88.2	32.3	76.0	3.1	27.5
2002	88.9	29.4	72.0	5.4	28.2
2003	89.5	26.5	74.0	8.5	28.3
2004	90.2	23.9	76.0	13.7	28.1
2005	90.8	21.6	77.0	20.9	28.1
2006	91.5	21.9	79.0	28.0	28.0
2007	92.2	22.3	76.0	40.4	27.6
2008	92.8	22.7	76.0	60.0	26.6
2009	93.5	20.2	74.0	68.9	24.3
2010	94.2	18.0	78.0	87.8	21.5
2011	95.1	16.2	80.0	102.5	18.5
2012	96.0	14.4	85.0	114.2	16.2
2013	96.9	12.7	84.0	125.4	14.7
2014	97.8	11.3			13.9

Ind-1 (SDG1): Proportion of population below $1.25 (PPP) per day (MDG Indicator).

Ind-19 (SDG3): Percent of children receiving full immunization (as recommended by national vaccination schedules).
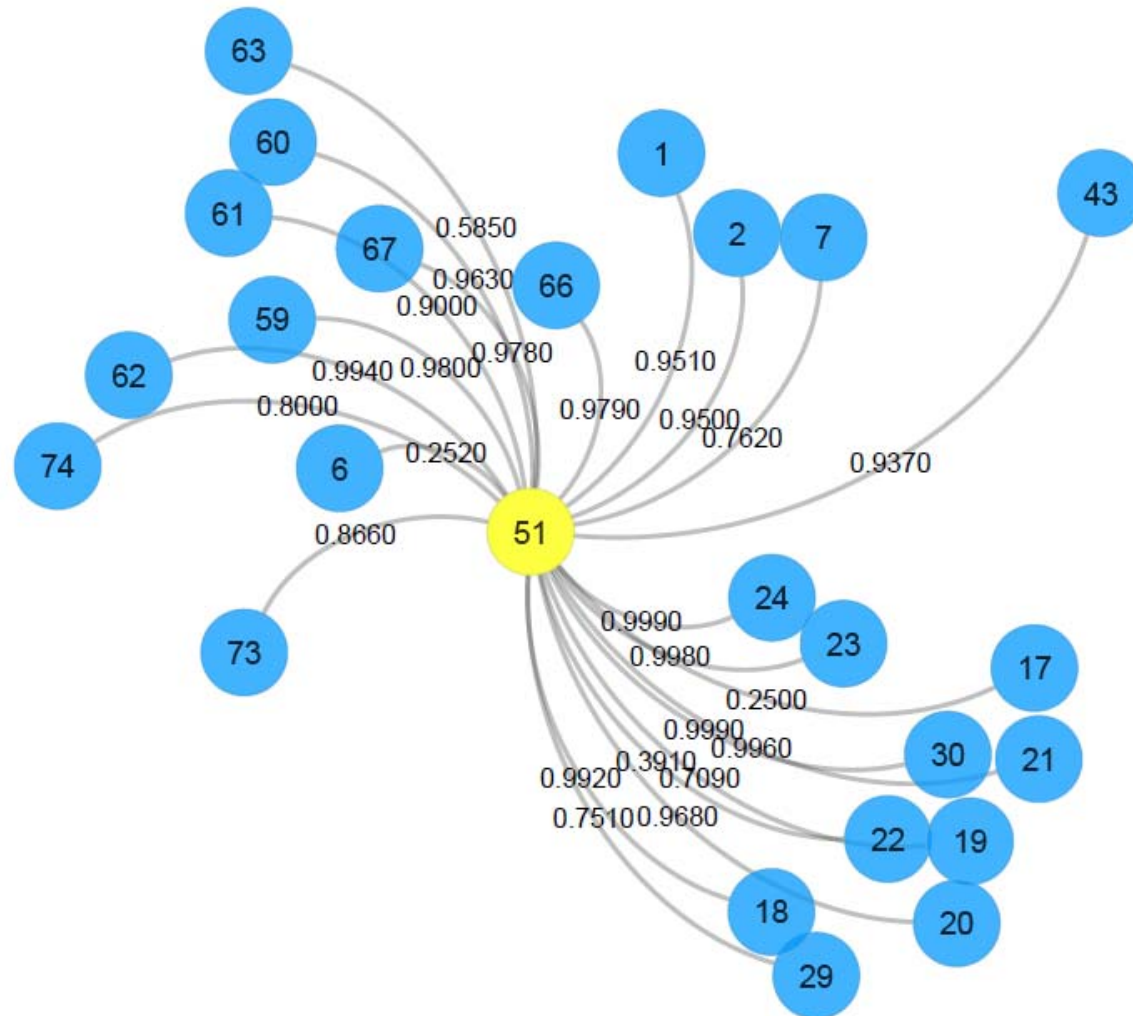
Ind-60 (SDG9): Mobile-cellular telephone subscriptions per 100 inhabitants.

Ind-73 (SDG12): Prevalence of food inadequacy (%).

Correlation analysis: Ind-51 and selected linked indicators

Access to electricity and poverty (population below $1.25 PPP)

Access to electricity and immunization rate

Access to electricity and mobile cellular subscriptoins

Access to electricity and prevalence of food inadquacy

Ind-51: Quantification of linkages

Environment-related indicators: linkage with other indicators
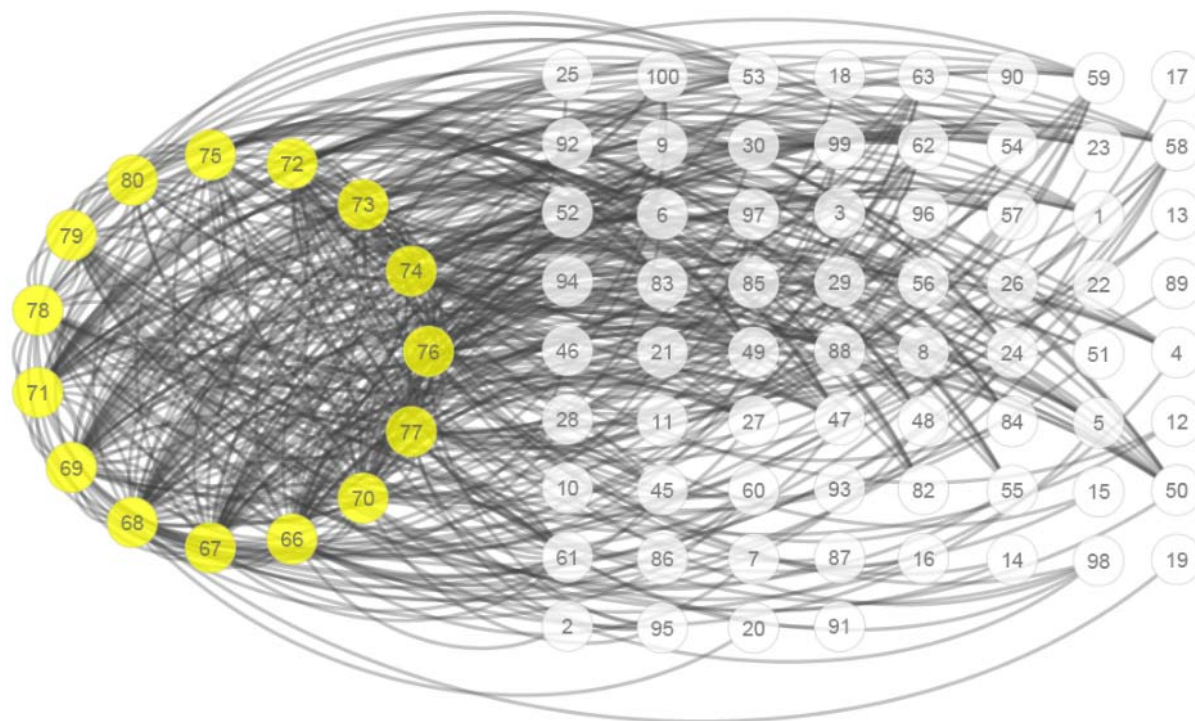
SDG11: Make cities and human settlements inclusive, safe, resilient and sustainable (Ind 66-71)

SDG12: Ensure sustainable consumption and production patterns (Ind 72-76)

SDG13: Take urgent action to combat climate change and its impacts (Ind 77-80)

Implications for national implementation, monitoring and reporting

➢ Limited number of indicators can well present the 17 SDGs and targets through network linkage and easily communicate with the wide audience from reporting viewpoint.

➢ For developing countries, when monitoring is limited in terms of capacity and resources, etc., selection of key indicators from systemic perspective can be helpful and effective.

➢ Key nodes in the network of SDGs and targets can help identify priority areas for implementation through efficient use of limited resources and effectively delivery holistic sustainability by amplifying the synergies and minimizing the trade offs.

Visualization tool: Under construction

Thank you!

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