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Sustainable Development Goals: Contributions from the EAEU, SCO and BRICS Countries *

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Background: SDGs



*“The 2030 Agenda for Sustainable Development, adopted by all United Nations Member States in 2015, provides a shared blueprint for peace and prosperity for people and the planet, now and into the future. At its heart are the 17 Sustainable Development Goals (SDGs), which are an urgent call for action by **all countries - developed and developing - in a global partnership.**”*

Excerpt from the United Nations



Introduction: Problems and Methodology

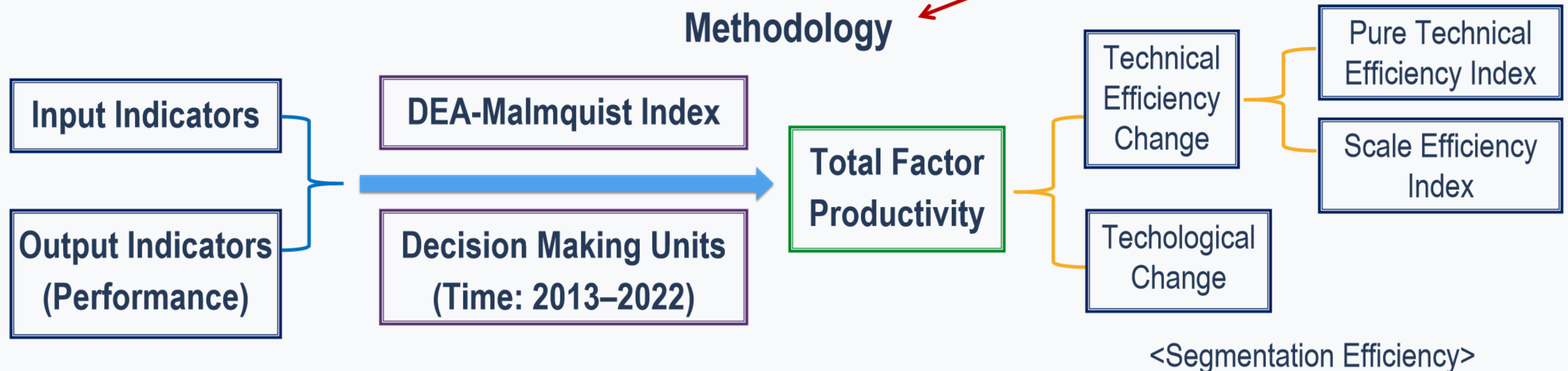
Problems in Practice

1. However, almost all studies indicate that these ambitious goals are difficult to accomplish by the time frame set.
2. This lag appears to be more pronounced in developing countries, where the practice of sustainable development goals may run counter to short-term economic development.

Research Questions

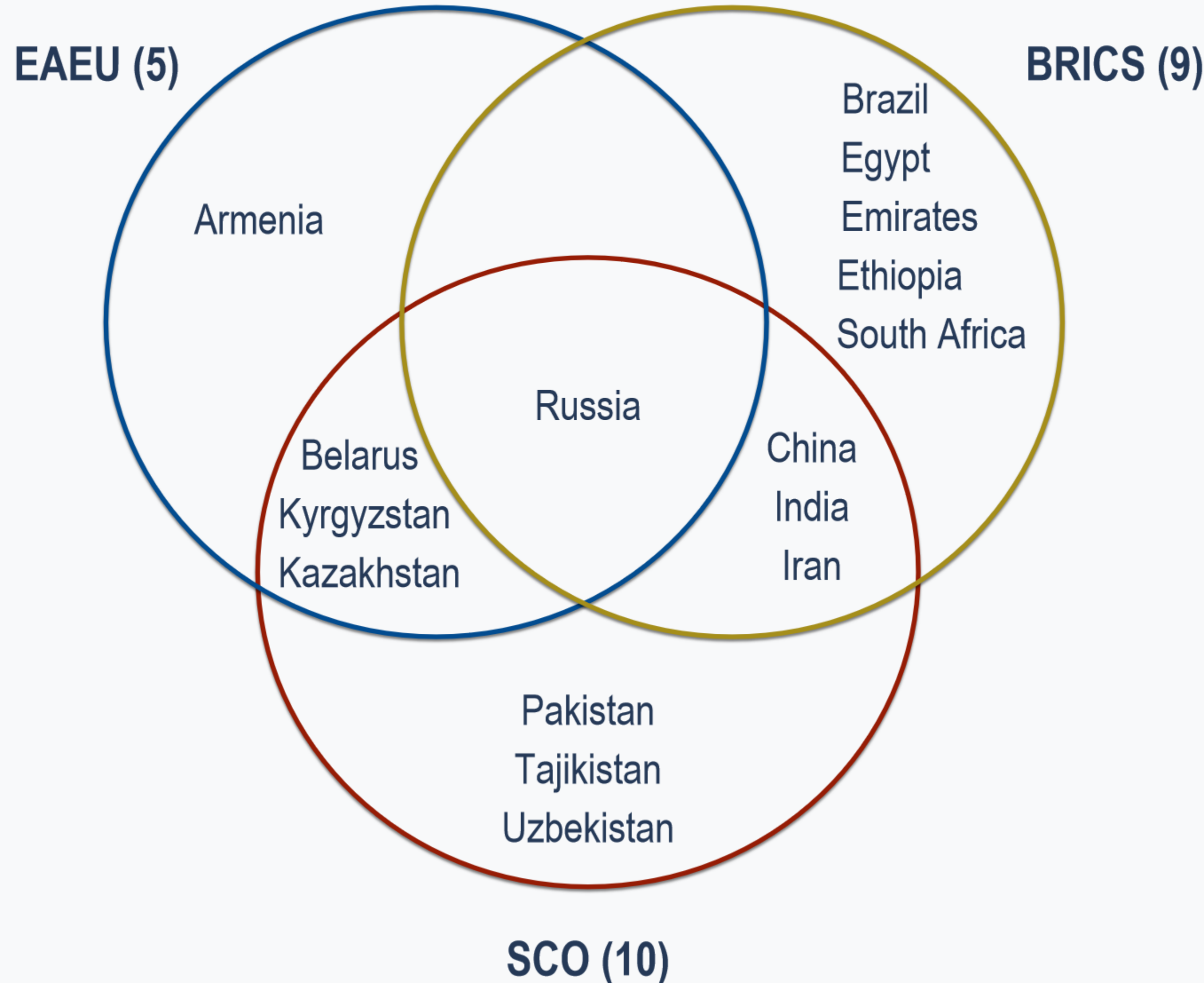
The study focuses on analysing the **performance & productivity** of developing countries in achieving sustainability goals.

Methodology





Decision Making Units: 16 developing countries



Decision Making Units (Time: 2013–2022)

Official member states (see left picture) of the following international organizations by 2024 are listed as decision making units: Eurasian Economic Union (EAEU), BRICS, Shanghai Cooperation Organization (SCO).

They are representatives of the vast number of developing countries. Moreover, they are important partners or participants of the Belt and Road Initiative (initiated by China)* and the Eurasian Economic Union.

** There is no physical institution, but it cooperates with other multilateral mechanisms, such as BRICS and SCO.*



Output Indicators: SDGs Indicators

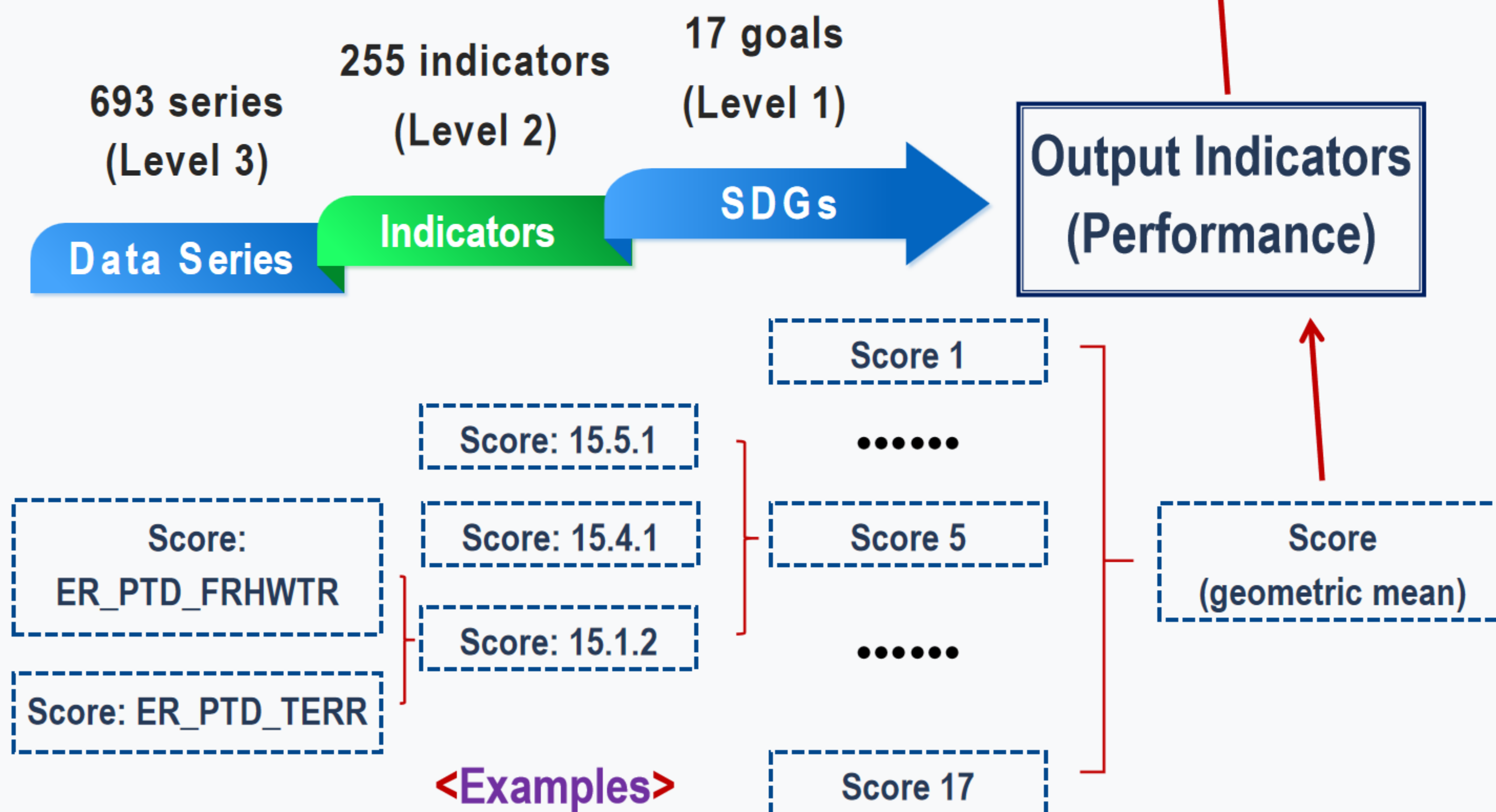
Data Source: SDG Indicators Database of the United Nations

Raw data: 125,876 observations for 16 countries in 2013–2022

Processing:

1. Data filtering (Indicators not related to country-level efforts were removed, such as natural endowment; indicators with less than 75% complete data were removed).
2. Data filling (Unavailable values are filled with the average values of surrounding years or other countries).
3. Data scoring (Different methods are used according to different attributes, with a score of 0-100).

It can provide information on the **performance** of different countries on different SDGs and in general.





Results: Performance (Score 2013–2022)

Year	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	Growth
Armenia	61.75	61.72	61.97	61.65	64.51	66.33	67.54	65.1	67.53	70.52	14.20%
Belarus	70.62	70.81	71	72.19	74.47	75.28	75.84	76.35	77.54	77.22	9.35%
Brazil	65	64.84	65.04	65.72	67.47	68.52	70.58	70.94	71.8	71.97	10.72%
China	63.72	64.03	65.5	67.28	68.36	69.8	70.55	71.39	72.83	73.19	14.86%
Egypt	63.93	63.79	64.17	64.9	65.72	66.73	66.82	66.04	68.27	69.45	8.63%
Ethiopia	46.51	47.37	48.76	50.35	51.43	52.21	52.99	53.1	53.76	54.59	17.37%
India	52.87	52.92	54.16	54.64	56.28	56.28	57.67	56.96	59.35	59.82	13.15%
Iran	58	58.51	57.86	59.78	62.81	62.21	62.64	63.06	63.12	63.39	9.29%
Kazakhstan	65.78	66.23	67.58	68.25	69.33	70.37	70.55	66.3	69.68	70.63	7.37%
Kyrgyzstan	66.1	65.7	65.71	66.29	67.48	67.6	68.88	65.31	68.01	68.9	4.24%
Pakistan	53.99	53.28	53.88	54.83	54.12	55.34	55.47	55.26	56.43	57.31	6.15%
Russia	66.43	65.38	65.51	66.69	68.01	67.71	67.9	65.52	69.85	68.11	2.53%
South Africa	63.32	63.24	63.17	64.34	64.78	64.8	65.36	63.11	64.15	63.34	0.03%
Tajikistan	60.19	59.27	60.22	60.87	63.01	64.09	64.49	64.74	66.61	67.27	11.76%
Emirates	68.77	68.05	68.76	69.91	71.3	71.66	72.39	75.76	77.71	78.59	14.28%
Uzbekistan	62.39	62.79	62.41	63.37	64.32	65.49	65.68	68.87	69.87	70.24	12.58%
AVE	61.84	61.75	62.23	63.19	64.59	65.28	65.96	65.49	67.28	67.78	9.61%

Performance

1. The overall score in 2022 increased by 9.61% compared to 2013, averaged across all countries.

2. The top three countries with the largest increases were: Ethiopia (17.37%), China (14.86%), Emirates (14.28%).

3. Average growth by organization:

EAEU (7.54%)

BRICS (10.10%)

SCO (9.13%)

Although almost all developing countries have made contributions, they are still far from achieving the SDGs.



Results: Performance (Score 2022, by goals)

<i>country</i>	<i>V1</i>	<i>V2</i>	<i>V3</i>	<i>V4</i>	<i>V5</i>	<i>V6</i>	<i>V7</i>	<i>V8</i>	<i>V9</i>	<i>V10</i>	<i>V11</i>	<i>V12</i>	<i>V13</i>	<i>V14</i>	<i>V15</i>	<i>V16</i>	<i>V17</i>	<i>Score</i>
Armenia	96.97	97.5	92.2	99.61	69.16	49.17	69.01	76.35	47.66	79.44	78.74	62.3	75	59.59	47.65	69.22	62.01	70.52
Belarus	99.37	97.5	98.3	97.51	80	75.51	69.31	68.49	66.77	84.21	81.79	40.56	96.25	59.59	73.46	93.09	63.35	77.22
Brazil	95.24	96.1	88.7	97.88	29.62	64.6	80.99	56.8	63.5	59.87	87.08	88.7	94	81.61	61.67	65.95	58.22	71.97
China	96.77	97.5	95.2	98.13	49.88	67.72	67.67	78.98	89.33	66.12	67.77	89.3	99.9	47.07	31.93	82.89	70.14	73.19
Egypt	98.15	91.5	86.2	96.65	55.4	61.26	68.67	71.9	61.78	79.36	66.5	42.6	79.78	71.44	45.24	93.71	48.4	69.45
Ethiopia	30.42	77.8	63.35	76.8	82.98	27.09	51.61	65.09	49.82	68.3	56.95	28.63	99.58	59.59	44.45	76.66	34.84	54.59
India	85.84	86.3	76.4	96.68	29.88	54.18	69.54	71.79	67	69.32	54.19	43.55	99	37.88	28.18	59.29	52.99	59.82
Iran	94.03	93.5	90.2	96.26	11.18	64.77	65.57	73.77	58.2	63.14	61.85	49.81	73.88	83.19	51.9	85.03	52.55	63.39
Kazakhstan	96.65	97.5	92.8	99.74	54.72	64.49	65.03	67.64	44.41	87.5	86.36	53.74	66.73	55.24	55.67	87.24	62.03	70.63
Kyrgyzstan	94.33	93.9	85.45	99	40.9	67.5	68.11	65.82	46.73	84.95	79.99	49.57	81.88	59.59	53.02	83.01	56.75	68.9
Pakistan	80.58	79.3	50.1	72.35	40.94	51.58	63.05	68.43	51.8	73.15	46.95	41.4	78.33	54.4	45.36	61.97	41.64	57.31
Russia	93.24	97.5	96.7	99.71	32.44	64.31	67.65	59.29	58.05	72.14	94.25	67.96	95.9	28.11	54.16	85.41	59.55	68.11
South Africa	86.06	91.9	77.25	90.28	93.44	64.99	61.87	50.32	51.9	59.32	78.03	51	48.75	69.41	45.97	38.21	56.01	63.34
Tajikistan	89.34	91.3	78.3	92.46	53.96	54.17	73.66	64.55	48.11	71.58	64.65	64.81	99.8	59.59	46.75	82.48	43.53	67.27
Emirates	99.55	97.3	96.05	99.06	100	87.66	67	90.05	66.48	68.11	79.07	71.01	68.65	67.53	50.12	80.43	71.8	78.59
Uzbekistan	96.46	97.5	89.55	99.07	66.66	64.22	59.6	72.47	47.45	76.23	75.96	40.31	99.93	59.59	50.17	81.98	58.92	70.24

1. The top three countries with the highest scores (**geometric mean**): Emirates (78.59), Belarus (77.22), China (73.19).

2. Average scores by organization: EAEU (71.08) BRICS (66.94) SCO (67.61).



Input Indicators: Failures of Performance

Failres of Performance

There are several drawbacks to using scores or score growth rates to assess a country's efforts towards the SDGs:

1. Endogenous factors: We can find that the higher the score, the lower the growth rate of the score is usually.
2. Exogenous factors: Countries with more developed economies, more advanced technologies, and more developed societies will always get better scores.





Methodology: DEA-Malmquist Index

Data envelopment analysis (DEA) is a nonparametric method to **empirically measure productive efficiency** of decision-making units (DMUs).

The **DEA-Malmquist Index** is a productivity measure that combines the concepts of DEA and the Malmquist productivity index to **assess the changes in productivity over time**.

Malmquist Index Formula: The DEA-Malmquist Index between two time periods t and $t + 1$ can be expressed as follows:

$$M_i = \sqrt{(TE_{i,t} \cdot TE_{i,t+1}) \cdot \left(\frac{D_0^t(y_{i,t+1}, x_{i,t})}{D_0^{t+1}(y_{i,t+1}, x_{i,t+1})} \cdot \frac{D_0^t(y_{i,t}, x_{i,t+1})}{D_0^{t+1}(y_{i,t}, x_{i,t})} \right)}$$

Where:

- M_i is the Malmquist productivity index for DMU i .
- $TE_{i,t}$ is the technical efficiency score of DMU i at time t .
- $D_0^t(y, x)$ is the distance function at time t .

If $M_i > 1$: The productivity of the DMU has increased from time t to $t+1$.
If $M_i < 1$: The productivity has decreased during the same period.
If $M_i = 1$: The productivity has remained stable.



Results: Total Factor Productivity Change

Mi	2013~2014	2014~2015	2015~2016	2016~2017	2017~2018	2018~2019	2019~2020	2020~2021	2021~2022	AVE	Year (+)
Armenia	0.9962	1.0037	0.9862	1.0317	1.0209	1.0029	0.9775	1.0300	1.0315	1.009	6 years
Belarus	1.0018	1.0077	1.0462	1.0400	1.0201	0.9627	1.0178	1.0102	0.9972	1.0115	7 years
Brazil	0.9945	1.0061	1.0108	1.0217	1.0099	1.0269	1.0100	1.0092	0.9954	1.0094	7 years
China	0.9944	1.0130	1.0181	1.0069	1.0104	1.0005	1.0056	1.0118	0.9988	1.0066	7 years
Egypt	0.9930	0.9994	1.0650	1.0077	0.9850	0.9909	1.0478	0.9999	1.0625	1.0168	4 years
Ethiopia	1.0001	1.0085	1.0108	1.0105	1.0033	1.0048	1.0745	1.0059	1.0708	1.021	9 years
India	0.9872	1.0128	0.9947	1.0214	0.9958	1.0198	0.9888	1.0401	0.9920	1.0058	4 years
Iran	1.0400	0.9417	0.9840	1.0366	0.9919	1.0180	1.0071	0.9987	0.9970	1.0017	4 years
Kazakhstan	1.0021	1.0345	1.0066	1.0128	1.0147	1.0052	0.9656	1.0503	1.0663	1.0176	8 years
Kyrgyzstan	0.9871	1.0021	1.0137	0.9972	1.0032	1.0054	0.9963	1.0323	1.0628	1.0111	6 years
Pakistan	0.9735	1.0208	1.0190	0.9697	1.0164	0.9826	1.0259	1.0172	1.0081	1.0037	6 years
Russia	0.9828	0.9997	1.0156	1.0164	0.9851	0.9971	0.9739	1.0643	0.9711	1.0007	3 years
South Africa	0.9899	0.9921	1.0275	0.9940	0.9964	1.0002	0.9831	1.0140	0.9874	0.9983	3 years
Tajikistan	1.0308	0.9654	1.0079	1.0304	1.0146	0.9968	1.0656	1.0064	1.1032	1.0246	7 years
Emirates	0.9837	1.0083	1.0126	0.9959	0.9887	1.0062	1.0631	1.0220	0.9992	1.0088	5 years
Uzbekistan	0.9745	0.9776	1.0277	1.0147	1.0158	1.0011	1.0627	1.0018	0.9971	1.0081	6 years
AVE	0.9957	0.9996	1.0154	1.013	1.0045	1.0013	1.0166	1.0196	1.0213	1.0097	max=9

Ethiopia's productivity increased in all nine change cycles.

The average productivity change in South Africa was negative.

Average productivity by organization:
EAEU (1.0100)
BRICS (1.0077)
SCO (1.0091).

Since the sustainable development goals were proposed in 2015, productivity has increased every year.



Conclusion and Discussion

Organisations	EAEU	BRICS	SCO
Score (2013)	66.14	60.95	62.01
Score (2022)	71.08	66.94	67.61
Growth	7.54%	10.10%	9.13%
Productivity	1.0100	1.0077	1.0091

Countries	Top 1	Top 2	Top 3
Score (2013)	Belarus (70.62)	Emirates (68.77)	Russia (66.43)
Score (2022)	Emirates (78.59)	Belarus (77.22)	China (73.19)
Growth	Ethiopia (17.37%)	China (14.86%)	Emirates (14.28%)
Productivity	Tajikistan (1.0246)	Kazakhstan (1.0176)	Egypt (1.0168)

Limitation

Data availability: Although the UN has set up as many as 693 data series for the SDGs, at least 90% of them are extremely incomplete (less than 50%).

Conclusion

1. Although developing countries are generally working hard to implement the Sustainable Development Goals, they are still far from achieving them. For developing countries, the priorities have to be: promoting economic growth, technological progress and social development.
2. Russia and China are leading powers in developing countries, but their performance in the SDGs is not outstanding. The two countries should incorporate sustainable development elements into their cooperation frameworks, especially in the EAEU, BRICS, SCO and the Belt and Road Initiative.

Contribution

1. The study scores 17 Sustainable Development Goals, allowing the countries' progress and performance to be determined.
2. The study used the DEA-Malmquist Index to assess changes in the efficiency of these countries in achieving the SDGs.



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