Chin. Geogra. Sci. 2021 Vol. 31 No. 4 pp. 600−610
https://doi.org/10.1007/s11769-021-1213-9

Springer Science Press
www.springerlink.com/content/1002-0063

Cross-national Perspectives on Using Sustainable Development Goals (SDGs) Indicators for Monitoring Sustainable Development: A Database and Analysis

WANG Xiangyu[1, 2], SONG Changqing[2], CHENG Changxiu[2, 3], YE Sijing[2], SHEN Shi[2]

(1. *Key Laboratory of Environmental Change and Natural Disaster*, *Ministry of Education*, *Beijing Normal University*, *Beijing* 100875, *China*; 2. *Center for Geodata and Analysis*, *Faculty of Geographical Science*, *Beijing Normal University*, *Beijing* 100875, *China*; 3. *National Tibetan Plateau Data Center*, *Beijing* 100101, *China*)

Abstract: Sustainable development is the theme of the 21st century. To monitor the progress of sustainable development, the United Nations launched Sustainable Development Goals (SDGs) in 2015. Subsequently, nations of the world have drawn up a list of localized indicators regarding the United Nations SDGs as a paradigm. We established a database including SDGs indicator systems of 11 economies by collecting and determining a large number of materials. Based on this database, we analyzed SDGs indicators by designing a conceptual framework of comparative analysis that included three views. We found that the SDGs indicator systems of 11 economies are different between the number of indicators, the proportion of different categories, and the connotation of indicators. Although the SDGs indicator systems among economies regarded the United Nations SDGs as a framework and included the major social problems related to sustainability, the inconsistency between SDGs indicator systems is large. It is a major reason why scholars lack the systematic method for developing indicators. There are challenges faced in data accessibility. The framework for comparative analysis could be applied to different economies.

Keywords: Sustainable Development Goals (SDGs); framework; indicator; cross-national; database

Citation: WANG Xiangyu, SONG Changqing, CHENG Changxiu, YE Sijing, SHEN Shi, 2021. Cross-national Perspectives on Using Sustainable Development Goals (SDGs) Indicators for Monitoring Sustainable Development: A Database and Analysis. *Chinese Geographical Science*, 31(4): 600−610. https://doi.org/10.1007/s11769-021-1213-9

1 Introduction

Since the industrial revolution, humans have enjoyed great prosperity and progress by conquering nature. To supply food, water, and a residence for more than seven billion people, humans will change natural vegetation on the land surface. Simultaneously, humans are suffering from some issues, such as global warming, deforestation, pollution, urban expansion, and energy depletion (Foley et al., 2005). If humans continue to change nature irregularly, these issues will influence their survival (Fisher et al., 2019). To solve these issues, stakeholders want to implement measures, but there is less theory to serve as a guide or reference. The concept of sustainable development was systematically defined in the 'Report of the World Commission on Environment and Development: Our Common Future' in 1987. It was defined as 'Development that meets the needs of the present without compromising the ability of future generations to meet their own needs' (World Commission

Received date: 2020-12-04; accepted date: 2021-04-01
Foundation item: Under the auspices of the Second Tibetan Plateau Scientific Expedition and Research Program (No. 2019QZKK0608), Key Laboratory of Environmental Change and Natural Disaster, Ministry of Education, Beijing Normal University
Corresponding author: SONG Changqing. E-mail: songcq@bnu.edu.cn
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on Environment and Development, 1987). The concept of sustainable development (Mitcbam, 1995; Ciegis et al., 2009) is broadly accepted and has received a great response.

Scholars wanted to monitor the degree of sustainable development by applying the sustainability concept. There are many methods to monitor sustainability. We think those methods could be divided into two types: the index and non-exponential methods. First, the index method is a method that aggregates many indicators into a single value by weighting indicators (Gao et al., 2020a; Wang et al., 2020). It can be applied to the assessment of sustainability. Shen et al. (2015) defined 52 indicators to assess urbanization sustainability using a hybrid Entropy-McKinsey Matrix method. Donohue and Biggs (2015) developed a multidimensional livelihood index to monitor sustainable livelihood by selecting 23 socio-environmental indicators. Van de Kerk and Manuel (2008) suggested 22 indicators and five categories to assess sustainable society by proposing the Sustainable Society Index. Pinar et al. (2014) calculated the sustainability index, including 19 indicators. Bravo (2014) presented the human sustainable development index and amended the United Nations' human development index by including education, health, income, and the environment. Other scholars would also like to monitor the sustainability of certain systems, such as ocean development (Rickels et al., 2019), land-use optimization (Gao et al., 2020b), and mining activity (Monteiro et al., 2019). Second, the non-exponential method is a method that compares the change of the indicators values. Huang et al. (2016) assessed urban sustainability by comparing the change of seven indicators in ten Chinese megacities. Tao et al. (2019) measured urban environmental sustainability by comparing the change of eight indicators. These methods have largely focused on formulating suitable indicators (Hák et al., 2016).

To trade-off comprehensive factors, the United Nations launched Sustainable Development Goals (SDGs). It references considerable research results and has been the most authoritative indicator framework in the world. The SDGs regarding top-level design were applied to ameliorate the social condition and guide governments to achieve sustainability when the Millennium Development Goals (MDGs) ended in 2015. SDGs have been embedded in policy planning. Earlier, Easterly (2015) believed the SDGs to be senseless, dreamy, and garbled. However, many kinds of research showed SDGs useful (Moran et al., 2008; Sridhar, 2016; UN. Department of Economic and Social Affairs, 2019). The SDGs framework is authoritative and under a consensus. Every nation pursues sustainable development and designs its indicators based on the SDGs framework. According to the SDGs, scholars and organizations made many applications. The 'SDG Index and Dashboards Report', prepared by the Bertelsmann Stiftung and Sustainable Development Solutions Network (SDSN) since 2016, proposed 88 indicators to assess sustainable development in 2018. The Organization for Economic Co-operation and Development (OECD) measured distance to the SDG targets for OECD countries based on SDGs. There are many applications, such as the European Cities, Africa, and the United States Cities.

Some economies developed a set of SDGs indicators framework to assess sustainability based on the United Nations' SDGs framework. When scholars and stakeholders selected the indicators, there were not uniform principles and standards. This issue has led to large differences in the number and dimension of indicator systems of each country. As far as we know, there is no study to systematically analyze the difference and regularity between SDGs indicators of economies. Thus, we tried to conduct a conceptual framework of analysis for the SDGs indicators among economies. We also tried to provide a principle of constructing an indicator system. When economies update their SDGs indicators in the future, this paper could provide some experience and maybe have potential application in achieving SDGs 2030.

2 SDGs and Its Indicators by the United Nations

The SDGs have been proposed through complex scientific practices. Since the SDGs were launched, most economies have made initial progress in implementing sustainability (Allen et al., 2018). There have been some important milestones paving the way forward for the 2030 Agenda. MDGs were agreed to by the United Nations in 2000. Though the 'Millennium Declaration' expired in 2015, it has spurred advances in the aspects of poverty and hunger. The United Nations Conference on Sustainable Development (Rio+20) in 2012 was the most important milestone because of its progress in sus-

tainable development.

All 193 member states of the United Nations unanimously adopted the 'Transforming our World: the 2030 Agenda for Sustainable Development' in 2015. The agenda provided a set of global SDGs and will be enforced until 2030. The SDGs contain aspects of the economy, society, and environment. They aim to build a global strategic roadmap ending poverty, providing a dignified living, and leaving no one behind. SDGs are building on targets, indicators, and evidence-based frameworks for global sustainable development planning. There are 17 goals, 169 SDGs targets, and 244 SDGs indicators. The relation of the goals is inalienable and competing (Janoušková et al., 2018). The relationship between the SDGs indicators is helpful or confusing (Mainali et al., 2018), and it is complicated. It complements a direction to find a better balance between human beings and nature, which provides a blueprint for shared prosperity in a sustainable world.

The SDGs indicators are not perfect. There are three main issues. First, the indicators for collecting data are difficult. The Inter-Agency Expert Group on SDG Indicators (IAEG-SDGs) suggested that these indicators can be divided into three categories. One of the categories is an explicit concept, the criterion method, and continuous data only accounts for 40%–50%. Second, the indicators are enormous, and the core indicators may be ambiguous. Third, the SDGs are suitable for a world scale and do not completely apply to a national or regional scale (Lyytimäki, 2019).

It has been nearly six years since the implementation of the agenda for sustainable development. According to the SDGs report 2018, the rate of global progress could not achieving the SDGs. To achieve greater sustainability, countries and stakeholders should accelerate action. In addition, some nations could attempt to construct their own sustainable development indicator frameworks by regionalizing and localizing according to the global SDGs frameworks. The global SDGs framework is shown in Table 1.

3 Establishing a Database of SDGs Indicator Systems by Different Economies

3.1 Establishing a database

We established a database of SDGs indicator systems

Table 1 Description of SDGs connotation

Goal		Description
Goal 1	No poverty	End poverty in all its forms everywhere
Goal 2	Zero hunger	End hunger, achieve food security and improved nutrition and promote sustainable agriculture
Goal 3	Good health and well-being	Ensure healthy lives and promote well-being for all at all ages
Goal 4	Quality education	Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all
Goal 5	Gender equality	Achieve gender equality and empower all women and girls
Goal 6	Clean water and sanitation	Ensure availability and sustainable management of water and sanitation for all
Goal 7	Affordable and clean energy	Ensure access to affordable, reliable, sustainable and modern energy for all
Goal 8	Decent work and economic growth	Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all
Goal 9	Industry, innovation, and infrastructure	Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation
Goal 10	Reduced inequalities	Reduce inequality within and among nations
Goal 11	Sustainable cities and communities	Make cities and human settlements inclusive, safe, resilient and sustainable
Goal 12	Responsible consumption and production	Ensure sustainable consumption and production patterns
Goal 13	Climate action	Take urgent action to combat climate change and its impacts
Goal 14	Life below water	Conserve and sustainably use the oceans, seas and marine resources for sustainable development
Goal 15	Life on land	Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss
Goal 16	Peace, justice, and strong institutions	Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels
Goal 17	Partnerships for the goals	Strengthen the means of implementation and revitalize the global partnership for sustainable development

for economies based on three principles. First, this database should contain all economies, but this is very difficult to do because there are more than 190 economies in the world. Therefore, the economy in the database should be representative. Second, the SDGs indicator systems of the economy should be authoritative and official. To assess the progress of sustainable development, some scholars also constructed some indicator systems. Although these indicator systems are meaningful, they are not accepted by everyone. Third, the SDGs indicator systems of the economy should be timely and accessible. In other words, the SDGs indicator systems of the economy must be launched in recent years because the time span for publishing indicators in each economy is different. The SDGs indicator systems of the economy must contain specific indicators.

According to the three principles, we established a database of SDGs indicator systems, including 11 economies. First, we collected the economies based on the member of Group 20 (G20). G20 is among the most important international economic cooperation organizations. The members of G20 produce more than 85% of the world's gross domestic product and have 65% of the world's population. The G20's policies regarding political, economic, and social issues are always imitated by other economies. According to Principle two and three, we selected 11 economies, namely, Australia, Argentina, Brazil, Canada, China, the European Union (EU), India, Italy, Germany, South Africa, and United States (US). We used Google search and set some keywords, that is, Sustainable Development Goals, report, and each member of G20. In the process of searching, we screened out the SDGs indicator system in the past five years. Therefore, we selected 11 samples based on the three principles. Although we did not collect the SDGs indicator system of all G20 countries, the samples we have collected are representative. The published organization of each economy is listed in Table 2.

3.2 Data sources

We collected the SDGs indicator systems of economies from the latest national report. The SDGs indicator system of Australia comes from the 'Transforming Australia: SDG Progress Report' (https://www.sdgtransformingaustralia.com/). The SDGs indicator system of Argentina comes from the 'Sustainable Development Goal Report Argentina 2018' (https://www.ar.undp.org/content/argentina/es/home/library/Agenda2030/informe-pais-ods-2018.html). The SDGs indicator system of Brazil comes from the 'Sustainable Development Goal Report: Brazil 2030' (https://pardee.du.edu/sustainable-development-goals-report-brazil-%E2%80%AF2030). The SDGs indicator system of China comes from the 'China SDGs Indicators and Progress Assessment Report 2018' (http://www.wwfchina.org/publications). The SDGs indicator system of Canada comes from the 'Towards Canada's 2030 Agenda National Strategy' (https://www.canada.ca/en/employment-social-development/programs/agenda-2030/national-strategy.html). The SDGs indicator system of the EU comes from the 'Sustainable Development in the European Union-Monitoring Report on Progress towards the SDGs in an EU Con-

Table 2 A database of SDGs indicator systems by different economies

Economy	Publication year	Publication organization
Australia	2018	National Sustainable Development Council
Argentina	2018	National Social Policy Coordinating Committee
Brazil	2017	Frederick S. Pardee Center for International Futures & Josef Korbel School of International Studies University of Denver
China	2018	Chinese Academy of Environmental Planning & World Wild Fund for Nature
Canada	2019	Government of Canada
European Union	2019	Statistical Office of the European Communities
India	2018	The National Institution for Transforming India Aayog
Italy	2018	The Italian Alliance for Sustainable Development
Germany	2018	The Federal Statistical Office of Germany
South Africa	2017	Statistics South Africa
United States	2018	SDG USA and Sustainable Development Solutions Network

text (2019 edition)' (https://ec.europa.eu/eurostat/web/products-statistical-books/-/KS-02-19-165). The SDGs indicator system of India comes from the 'SDG India Index Baseline Report 2018' (https://in.one.un.org/sdg-india-index-2018/). The SDGs indicator system of Italy comes from the 'Italy and the Sustainable Development Goals 2018' (https://corporate.enel.it/en/media/news/d/2018/10/report-asvis-2018-development-sustainable). The SDGs indicator system of Germany comes from the 'Sustainable Development in Germany-Indicator Report 2018' (https://www.destatis.de/EN/Themes/Society-Environment/Sustainable-Development-Indicators/Publications/Downloads/indicator-report-2018.html). The SDGs indicator system of South Africa comes from the 'Sustainable Development Goals Indicator Baseline Report 2017-South Africa' (http://www.statssa.gov.za/MDG/SDG_Baseline_Report_2017.pdf). The SDGs indicator system of the United States comes from the 'Sustainable Development Report of the United States 2018' (https://www.sustainabledevelopment.report/reports/sustainable-development-report-of-the-united-states-2018/). These reports are publicly available.

4 A Framework for Comparative Analysis of the Indicators among Economies

To comprehensively analyze the indicators of economies, we need to establish a framework for comparative analysis of those indicators. Scholars believe that it is a consensus solution to classify the complex objectives (Song et al., 2018). The SDGs indicators include two different dimensions, that is, goals and indicators. By observing the database of SDGs indicators, we found that specific indicators could be used to monitor the targets and policies. Accordingly, we proposed three different views: 1) goal categories, 2) indicator occurrences, and 3) highlights for considering targets and policies by the economy. The framework for analyzing SDGs indicators among economies can be expressed by the flow chart (Fig. 1).

We proposed two assessment criteria based on the framework and database. First, it is assumed in this paper that the greater the number of indicators is, the more accurately the connotation of the corresponding goals is explained. Second, to eliminate the impact of the difference in the number of indicators, we compare the proportion of goal category indicators in an economy's SDGs indicator system.

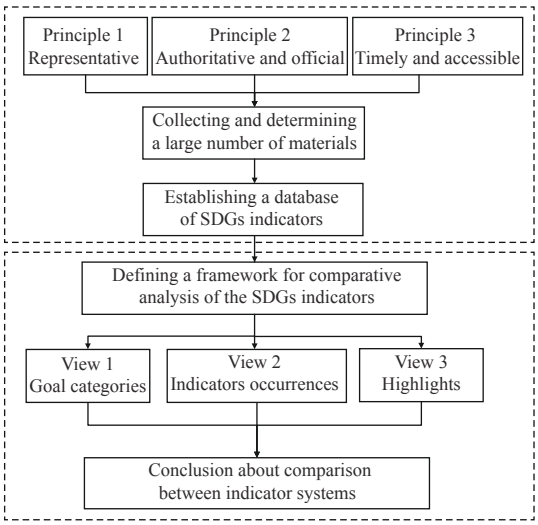

Fig. 1 The process for analyzing the SDGs indicator systems

4.1 View 1: Goal categories

To understand the relationship between SDGs, it is important for each economy to classify them suitably. The more objective the goal categories are, the easier it is for stakeholders to evaluate the level of national development and design pathways for accomplishing SDGs. Many scholars study the nexus of goals between synergy and conflict. For example, Guijarro and Poyatos (2018) indicated that the composite SDGs index could account for the relationship of indicators using the Goal Programming Model. To more readily understand the interactions of goals, the 17 goals could be divided into three types, five types (United Nations, 2015), or seven possible types (Nilsson et al., 2016). Zhou et al. (2017) constructed a node between SDGs targets to describe the SDGs interlinkages by network analysis. They considered the indicators with natural attributes. However, Fu et al. (2019) divided the 17 SDGs into three categories, namely, essential needs, objectives, and governance. For the essential needs category, it expresses the basic guarantee of people and requires minimum inputs. It includes Goal 2, Goal 6, Goal 7, Goal 14, and Goal 15. For the objectives category, it represents maximum realization or output. It includes Goal 1, Goal 3, Goal 4, Goal 5, Goal 8, Goal 10, and Goal 16. For the governance category, it could tradeoff and coordinate essential-needs and objectives category. It include Goal 9, Goal 11, Goal 12, Goal 13, and Goal 17. These categories are complementary and independent. Sustainable de-

velopment can be realized, if we keep minimal inputs and maximum outputs by governance measures. Therefore, we think that the goal categories (Fig. 2) are more objective than the other categories. Goal categories (Fig. 2) are suitable for comparative analysis of indicators among economies.

Under each category, we calculate the proportion that the indicators of a category are divided by the total number of indicators of economies. According to the proportion of a category among economies, we want to find the difference among economies and analyze the reasons for the difference. Considering the case of duplicate indicators (indicators that are the same), we do not eliminate duplicate indicators during the calculation.

4.2 View 2: Indicator occurrences

An indicator may have multi-dimensional meaning, and it could be repeated when stakeholders select their indicators. Duplicate indicators can express the interlinkages of goals by using an indicator in multi-dimensional goals. It is assumed in this paper that the more indicators occur, the more indispensable they are. These indicators can be used to monitor multiple goals, and there is considerable practice. For example, for the United Nations, since nine indicators are repeated under two or three different targets, the actual total number of individual indicators is 232. We wished to select the same or nearly the same indicators among economies and analyze the reason for choosing them. In addition, according to the indicators' occurrences, there are two scales for comparative analysis: 1) the multi-goal indicators within an economy and 2) occurrences among economies.

At the first scale, this section emphasizes the indicator or occurrences in an economy. An indicator can monitor different goals. At the second scale, this section must consider the economic volume among economies. Thus, we divide the sample into developed and developing economies. Developed economies include the US, the EU, Australia, German, Canada, and Italy. Developing economies include Argentina, Brazil, South Africa, India, and China. If an economy does not include some goals, we would not consider these economies when we compare the corresponding goals among economies.

4.3 View 3: Highlights

Scholars could have special demands and aims when they considered indicators (Fitchett and Atun, 2014). For example, de Oliveira Neto et al. (2019) considered the relation between cleaner production and environmental gains for Goals 9, 12, and 15. Abualghaib et al. (2019) justified that disability is a major commitment by the 'Leave-No-One-Behind (LNOB)' agenda. The 2030 Agenda suggested three principles when the United Nations created the framework of SDGs indicators, namely, LNOB, Circularity, and Decoupling. The decision-makers perhaps focus on different principles. We wished to study the database of SDGs indicators among economies and finds out special indicators with corresponding principles. Thus, we also wanted to explain the reason why the indicators can reflect the principles.

LNOB is central and promise of the United Nations SDGs. It represents the determination of people to eliminate poverty, discrimination, and inequalities. LNOB generally focuses on specific groups. Although there are some specific SDGs (for example, Goal 1: No Poverty and Goal 5: Gender Equality) to focus on equality and non-discrimination, the concept of LNOB should be in-

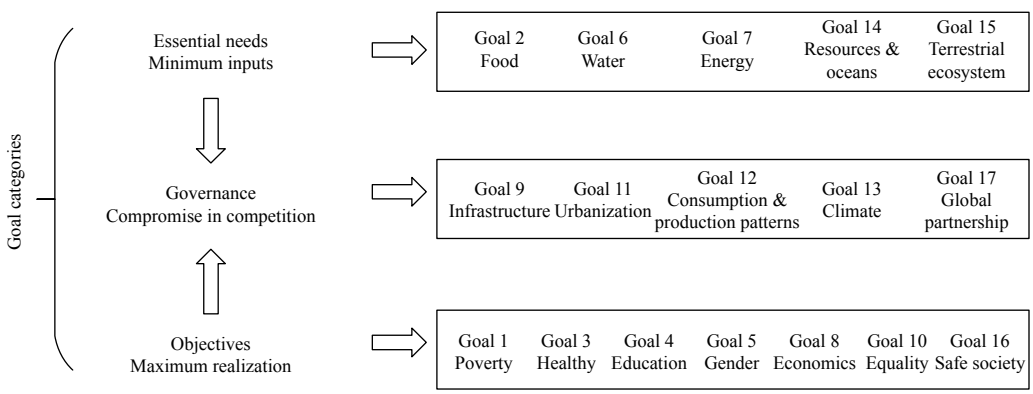

Fig. 2 The framework of the three SDGs categories (Fu et al., 2019)

tegrated into each SDGs. Thus, we screened the samples based on one principle under View 3. This principle is that the SDGs indicators system of an economy must have LNOB indicators in goal, and it should be identified. According to the principle, we only found that the SDGs indicator system of the US focused on LNOB indicators.

5 Results

5.1 View 1

Referencing the eleven SDGs indicator systems in this database, the distribution between three categories of goals varies. According to Fig. 3, we analyzed the discrepancy among economies.

As shown in Fig. 3, objectives indicators account for the most proportion of the three categories across all eleven samples. It indicates that every economy thinks the output is the most important in the production process. The number of objectives indicators varies between eleven samples. In Argentina and Brazil, the number of objectives indicators is 166 and 202, accounting for 68.6% and 66.67% of the total number of indicators, and they are the maximum across all eleven SDGs indicator systems. The level of social development in Argentina and Brazil is not high. With the development of society, they could want to obtain maximum benefits by productions.

The proportion of essential-needs and governance indicators is more or less the same in the three categories across all 11 samples. In essential-needs categories, all economies desire to minimize production input by technological innovation. Governance is a pattern of management. The number of essential-needs and governance indicators varies between 11 samples. In China, the number of the two categories indicators is 53 and 50, accounting for 32.52% and 30.67% of the total number of indicators, and China is the maximum across all 11 SDGs indicator systems. There are nearly 1.4 billion

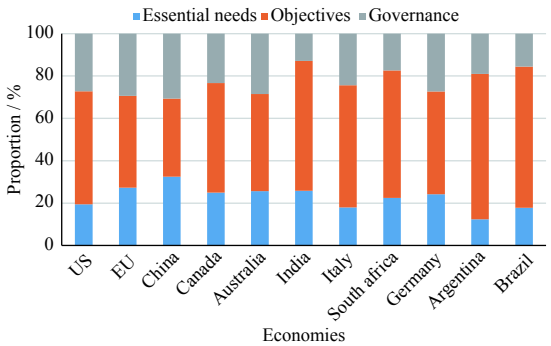

Fig. 3 The proportion of the three SDGs categories

people in China, and the contradiction of the human-environment interaction is marked. Thus, the government of China focuses on people's livelihood and ecological protection. The government of China has vigorously implemented a series of strategies, such as Poverty Alleviation and Ecological Civilization Construction. The government of China implements economic development by policy management and market intervention because of special social configuration.

5.2 View 2

5.2.1 Multi-goal indicators within an economy

We selected the EU's SDGs indicators as the special indicator systems in the multi-goal indicators scale. The number of indicators for a special economy needs to be explained. In particular, in Italy, since one indicator is repeated under two different targets, the actual total number of individual indicators in the indicator system is 77. In Argentina, since two indicators are repeated under different targets, the actual total number of individual indicators in the indicator system is 240. In the EU, since 37 indicators are repeated under two or three different targets, the actual total number of individual indicators in the indicator system is 99. The repetition ratio is 37.37%. The repetition ratio of the EU is the most in the database of the SDGs indicators. We extracted the indicators with the most appearances (Table 3).

An indicator can commonly address different issues.

Table 3 Indicators with the most appearances in the EU

Indicator	Goal
Nitrate in groundwater	Goal 2, Goal 6, and Goal 15
Average CO_2 emissions per km from new passenger cars	Goal 9, Goal 12, and Goal 13
Energy consumption	Goal 7, Goal 12, and Goal 13
Share of renewable energy in gross final energy consumption	Goal 7, Goal 12, and Goal 13

There are four indicators in the list involving groundwater, greenhouse gases, and energy. These indicators can express the meaning of goals. They are all hot issues internationally. The 'nitrate in groundwater' indicator is important for the terrestrial ecosystem (Goal 15) and can improve crop yield as nitrogen fertilizer (Goal 2). According to the 'European waters-Assessment of status and pressures 2018', 26% of the groundwater does not have good chemical status. The main significant pressures on groundwater are agriculture and pollution (Goal 6). 'Greenhouse gas emissions' result in global warming. Climate action (Goal 13) aims to relieve CO_2 emissions. It mainly focuses on production and consumption (Goal 12). Technological innovation can reduce CO_2 emissions (Goal 9). 'Primary energy' is critical for social and economic development, for example, oil, natural gas, and coal. Humans need to take steps to offset CO_2 emissions via energy consumption. Thus, scientists want to find renewable energy to substitute for primary energy, for example, the solar, wind, and geothermal energy. According to the 'BP Statistical Review of World Energy 2019 (68th edition)', there are less total proven reserves for the EU. The government of the EU focuses on energy consumption because of a lack of resources. The purpose of the indicators is to reduce primary energy consumption and improve energy efficiency.

5.2.2 Occurrences among economies

We extracted the indicators at two scales (Tables 4 and 5). The result of this view is regularity between the developed and developing economies.

The developed economies focus on health, education, society, and the environment (Table 4). They have a higher level of economics and infrastructure. Compared to the developing economies (Table 5), the developed economies do not have issues, such as undernourishment, hunger, and poverty. Thus, the developed economies focus on well-being and environmental sustainability. The developing economies focus on people's livelihood, such as income, food, health, and social safety. Compared to the developed economies, they focus on the basic guarantee of human survival.

In addition, developed and developing economies all focus on gender equality, forest protection, economic development, and social safety. Pace and development are the two major themes in the current world. People also pursue social equality and homage. However, it is a challenge to achieve these goals.

5.3 View 3

In the database, the US is special because of its designed indicators to focus on specific groups that are the furthest behind. The US highlights LNOB (Leave-No-One-Behind) by selecting specific indicators (Table 6).

Table 4 Aligned indicators among the developed economies

Goal	Indicator
3	Prevalence of tobacco use
4	People aged 30 to 34 who have completed tertiary education
5	Proportion of women in managerial positions
7	Renewable energy share in the total final energy consumption
8	Real GDP per capita
13	Greenhouse gas emissions
14	Ocean biodiversity
15	Forest area as a percentage of total land area
16	Incidence of certain types of crime
17	Official development assistance as share of gross national income

Table 5 Aligned indicators among the developing economies

Goal	Indicator	Goal	Indicator
1	Percentage of population living below national poverty line	6	Anthropogenic wastewater that receives treatment
2	Prevalence of undernourishment	8	Adults (15 yr and older) with an account at a bank or other financial institution or with a mobile-money-service provider
3	Maternal mortality ratio	8	Real GDP per capita
3	Mortality rate, under 5 (per 1000 live births)	11	Proportion of urban population living in slums
3	Incidence of tuberculosis (per 100000 population)	14	Mean area that is protected in marine sites important to biodiversity
3	Births attended by skilled health personnel	15	Forest area as a percentage of total land area
5	Seats held by women in national parliaments	16	Homicides (per 100000 population)
6	Population using at least basic drinking water services		

Table 6 LNOB indicators in each SDGs in the US

Goal	Indicator
1	Affordable housing / per 100 extremely low income renter households
2	Elderly food insecurity / %
	Rural infrastructure index / 0–100
5	Contraceptive deserts / % of persons in need located in a desert
	LGBT inclusion in hate crime laws / worst 1–4 best
7	Low-income energy burden / % of income spent on energy for people living at 50% of the poverty line
8	Employment discrimination / per 100000 people
10	Case for Inclusion Index / 0–100 score on services for adults with intellectual or developmental disabilities
	Pollution burden / percentage point difference of exposure for people of color

The US chooses nine indicators (Table 6) to express and evaluate the progress of LNOB. According to the indicators of Table 6, we found the US wanted to improve the vulnerable groups, that is, the poor, elderly, women, LGBT (Lesbian, Gay, Bisexual, and Transgender), and disabilities. The LNOB indicator is the distinguishing feature in the design of SDGs indicators for the US. The progress of LNOB is a major social issue in the US. At the same time, the US has long been plagued by racism and unilateralism. In summary, the listed indicators imply that the US government should prioritize the needs of the most marginalized, discriminated against, impoverished, and vulnerable, ensuring that public policies support human dignity and guaranteeing basic human needs are met for all.

6 Discussion

6.1 The comprehensiveness of the existing SDGs indicator systems of economies

The 11 SDGs indicator systems under the database are compared according to the number of goals and indicators in the following discussion (Table 7).

The evaluation of regional sustainable development should include all aspects of the social economy. It must be comprehensive. The 17 SDGs are the most comprehensive for assessing the progress of regional sustainable development. Based on the 17 SDGs, the SDGs indicator system of economies should include as many goals as possible. As shown in Table 7, there are seven economies to cover all SDGs, namely, the EU, China, Canada, Australia, South Africa, Germany, and Brazil. The US SDGs indicator system does not include Goals 14 and 17. The India SDGs indicator system does not include Goals 12, 13, 14, and 17. The Italy SDGs indicator system does not include Goals 13, 14, and 17. The Argentina SDGs indicator system does not include Goal 13. It does not imply that these nations are not relevant to these goals. These goals were not included because of data limitations and indicator comparability. To obtain complete data and indicators, these economies need to add to cooperation with different government departments and include all SDGs.

It is a great principle to select the appropriate number of indicators for assessing the progress of regional sustainable development. For constructing an indicator system, there is no consensus as to how many indicators are best. As shown in Table 7, on the one hand, for Brazil, the number of indicators is 303. It is the most. It is difficult to collect data of indicators if the number of indicators is too large. On the other hand, for Canada, the number of indicators is 60. It is difficult to express the meaning of sustainable development if the number of indicators is insufficient.

Table 7 The number of goals and indicators contained different economies

Economy	US	EU	China	Canada	Australia	India	Italy	South Africa	Germany	Argentina	Brazil
Number of goals	15	17	17	17	17	13	14	17	17	16	17
Number of indicators	103	143	163	60	144	62	78	98	66	242	303

6.2 Considering indicators related to LNOB, circularity, and decoupling

According to View 3 (Highlights), we found that SDGs indicator systems of economies set few indicators related to LNOB. The UN's SDGs mentioned three principles: LNOB, Circularity, and Decoupling. Although the LNOB is central to sustainable development, the two other principles are equally important. On the one hand, we suggested that economies should add indicators related to these principles, and it should be made explicit likely US in the future. On the other hand, we tried to add samples of the database and found other SDGs indicators of economies, including LNOB, circularity, and decoupling.

7 Conclusions

The United Nations SDGs indicators are a general system, but special economies need to modify those using local SDGs indicators. SDGs indicator system is essential for decision-makers to guide sustainable development. We identified 11SDG indicator systems and established a database of SDGs indicators among economies for analysis. According to the database, we analyzed SDGs indicators using three perspectives, that is, the goal categories (View 1), indicator occurrences (View 2), and highlights (View 3). According to the analysis, we proposed three major conclusions as follows.

(1) The existing SDGs indicator systems in the database are different in the views of the number of indicators, proportion of different categories, and connotation of indicators. According to View 1, China had a great proportion of the essential-needs category and governance category. China focused on people's livelihood and governmental intervention. Argentina and Brazil had a great proportion in the objectives category. According to View 2, the same indicator can express different goals.

(2) The existing SDGs indicator systems in the database contain the main problems related to sustainable development. According to View 2, developed economies emphasized equality and sustainability, but developing economies wanted to achieve essential needs. All sample economies focused on the environment, pace, and development. According to View 3, the government of the US focused on LNOB.

(3) The inconsistency between the existing SDGs indicator systems is obvious. According to View 1, India, Italy, and the US should do more work regarding data collections on Responsible Consumption and Production (Goal 12), Climate Action (Goal 13), Life below Water (Goal 14), and Partnerships for the Goals (Goal 17). It implied that we could cooperate with different government departments when scholars conducted the indicators systems.

This framework of comparative analysis can be used in other countries and on a larger scale. In the future, we want to build a database of SDGs indicator systems of each economy that covers all economies of the world and keeps updating. According to the database, we want to continue to analyze SDGs indicators.

Acknowledgments

We would like to thank the high-performance computing support from the Center for Geodata and Analysis, Faculty of Geographical Science, Beijing Normal University (https://gda.bnu.edu.cn/). We would like to thank the advice from Gao Peichao.

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