A Proposal on National Reporting Platform for SDGs

By

RYU, Insang

CAPSTONE PROJECT

Submitted to

KDI School of Public Policy and Management

In Partial Fulfillment of the Requirements

For the Degree of

MASTER OF DEVELOPMENT POLICY

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ABSTRACT

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The United Nations set the framework of Sustainable Development Goals as Goals, Targets and Indicators to achieve the 2030 Agenda for Sustainable Development adopted by member countries. All stakeholders around the World try their best to achieve the Agenda, especially National Statistical Offices take a role related to the indicators by providing timely and accurate data to custodian agencies. To fulfil these requirements National Statistical Offices have considered setting up a National Reporting Platform and OpenSDG Platform is most widely using platform in the World. Anyone can access and reuse the source code of OpenSDG on GitHub, so many countries have their own National Reporting Platform originally from OpenSDG. The Republic of Korea also developed a National Reporting Platform by using the United Kingdom's Platform. Although OpenSDG is well-made platform, there are some difficulties in adopting and maintaining the platform. As a proposal for the solution of the problems, ready-made software - Business Intelligence - is recommended. Because Business Intelligence or BI solution provide functions of data management, data visualization and collaboration, it has well-qualified for managing and reporting SDG indicators as an alternative of the OpenSDG platform. Sufficient consideration is needed for adopting BI solution as a National Reporting Platform in the future, and this report suggests a proposal as a trigger for further discussion in the future.

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A Proposal on National Reporting Platform for SDGs

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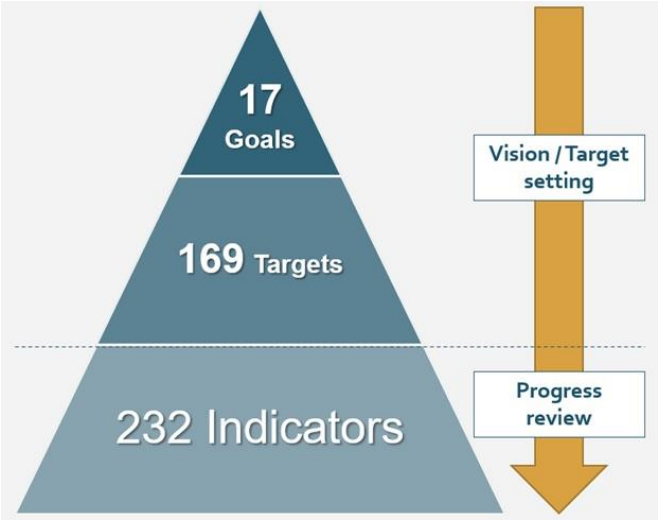
1. Introduction

The Sustainable Development Goals (SDGs) (Figure 1) are the largest goals of the United Nations and member countries, ending the Millennium Development Goals (MDGs) implemented from 2000 to 2015 and newly implemented from 2016 to 2030.

Figure 1. Sustainable Development Goals

It is the largest common goal of the international community to address the universal problems of human, environmental, economic and social problems. The framework of the SDGs consists of three layers - Goals, Targets and Indicators (Figure 2).

Figure 2. Framework of SDGs - Three layers (Taichi Kato, 2020)



The Goals are the vision for sustainable world, the Targets set more detailed numerical targets and deadlines for achieving the Goals. These are vision or mission of all member countries that have agreed to the Agenda, mostly concerned by policy-makers. The Indicators review the progress of SDG actions towards global targets that is supporting tool for achieving Goals and Targets by supplying timely and accurate information mostly concerned by statisticians.

Strong review and follow-up mechanisms for implementing SDGs call for a robust framework of indicators to monitor progress, inform policies for all stakeholders (UNGA, 2017). National Statistical Offices are performing an important role of data provider as a focal point of the countries with the custodian agencies of the SDG indicators.

1-1. Roles of SDG indicators

The framework for SDGs indicators was developed by the Inter-Agency and Expert Group on SDG Indicators (IAEG-SDGs) and agreed by the United Nations Statistical

Commission (UNSC) and the United Nations General Assembly held in 2017. It will be refined annually and reviewed by UNSC and complemented by indicators at regional and national levels, which will be developed by member countries.

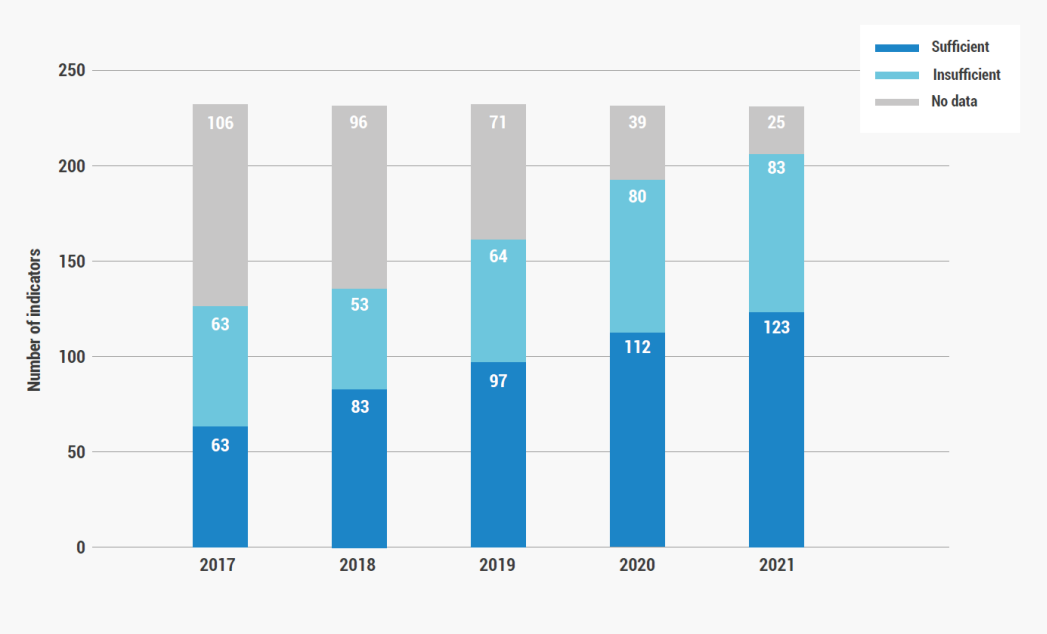
SDG indicators are the backbone of monitoring progress towards the SDGs at the global, regional, national, and local levels. They can be a report of measuring progresses and helping to ensure the accountability of all stakeholders (SDSN, 2015).

Government officials, civil society, non-governmental organizations can derive issues about their concerns for achieving SDGs and also monitor the progress of their interests about the Agenda, analysts can identify priority issues that require further studies and International Organizations can monitor the status about SDGs on their thematic or regional sectors.

«Asia and the Pacific SDG Progress Report» by Economic and Social commission for Asia and the Pacific (ESCAP) of the United Nations is a good example of using SDG indicators in Asia and the Pacific region. ESCAP Statistics Division has tried to obtain and make a database called *'SDG Gateway (data.unescap.org)*'. SDG Progress charts, Country SDG profiles, Country Comparison and National SDG tracker are provided on the website and «*Asia and the Pacific SDG Progress Report»* is main feature of ESCAP's effort that was using the SDG indicators mainly from SDG Gateway and UN Global database.

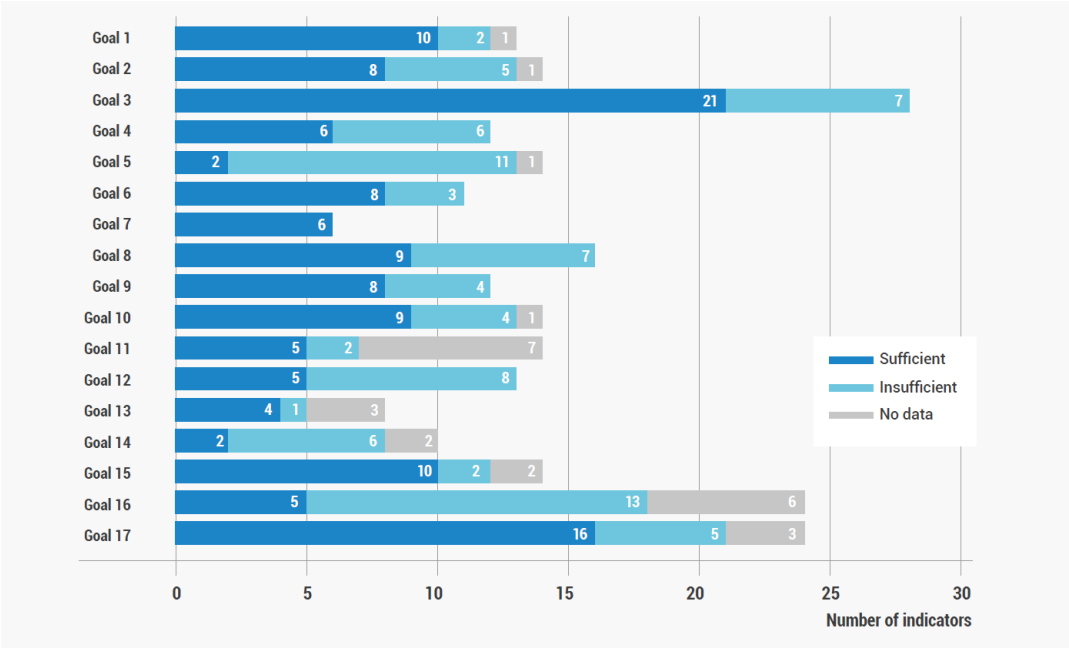
Based on the recent issue, «*Asia and the Pacific SDG Progress Report 2022 - Widening disparities amid COVID-19»,* the data availability has increased since the first benchmark in 2017 (Figure 3).

Figure 3. Data availability for SDG indicators in Asia-Pacific region (ESCAP, 2022)



More than half of indicators without data are under two goals (Goal 11 and 16), calling for greater attention in filling data gaps. 25 indicators without data and 83 indicators with insufficient data, represent 47% of all SDG indicators (Figure 4).

Figure 4. Data availability for SDG indicators in Asia-Pacific region, 2021 (ESCAP, 2022)



Based on all of these indicators, ESCAP provide Goal-by-goal SDG status, sub-regional analysis and a thematic chapter *«Vulnerabilities and the pandemic: Risk of widening disparities»* on the 2022 issue and also many other meaningful outcomes.

Voluntary National Review (VNR) is also a good example of using SDG indicators in a country level. VNR is a process through which countries assess and present national progress made in implementing the 2030 Agenda, including achieving its 17 SDGs and the pledge to leave no one behind. The purpose of VNRs is to present a snapshot of where the country stands in the implementation of the SDGs, with a view to help accelerate progress through experience sharing, peer-learning, identifying gaps and good practices, and mobilizing partnerships (OHCHR).

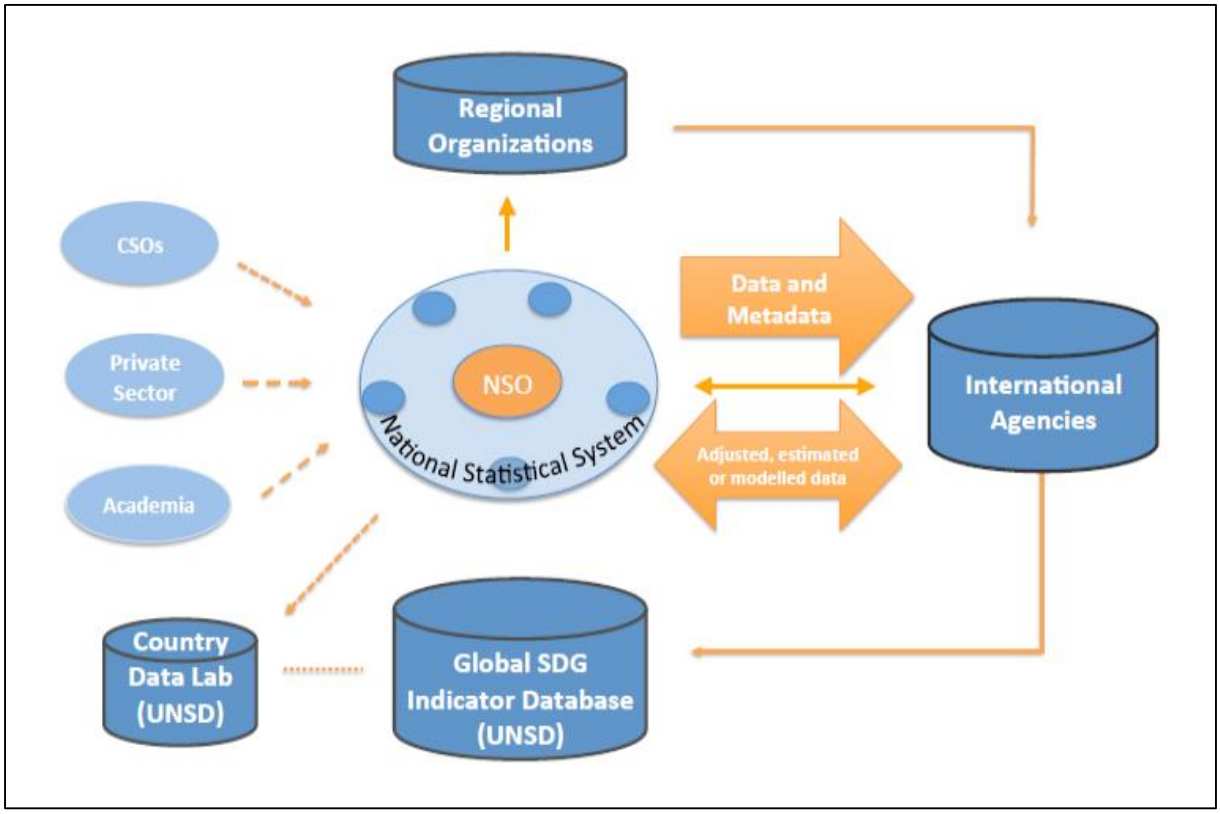
Voluntary reviews (at national – VNR; local – VLR; and subnational – VSR – levels) are reports compiled by governments about their contribution towards the SDGs. These are voluntary, but have been submitted extensively, by a different level of government, across the globe. The VLRs are good framing documents to refer to when implementing the SDGs. Indeed, some governments (at subnational and local levels) have gone as far as defining which indicators they would report on to monitor their local achievements in localizing the Agenda. For those, the indicators they have selected and want to report on becoming the core of the voluntary review (RFSC).

1-2. Roles of National Statistical Office

The main role of a National Statistical Office (NSO) is *"to collect, compile and release official statistics"* (UNSD).

NSO has very important role as a data provider among government, private sector, UN and many other international agencies (Figure 5) by smoothly supplying timely and accurate information that can support many other stakeholders to make decision or to publish reports about SDGs. NSO is the focal point of voluntarily providing contact information for designated SDG contact persons to help facilitate communication between international agencies and NSOs regarding the SDGs.

Figure 5. Data Flow in SDG Reporting, 2017 (Park & Lee, 2017)



The Conference of European Statisticians (CES) on statistics for SDGs adopted a *«Declaration on the Role of NSOs in Measuring and Monitoring the SDGs»* in 2015. And the Steering Group on Statistics for SDGs announced *«Roadmap on statistics for SDGs»*. The Roadmap recommends that *"NSOs serve as national focal points for the measurement of SDGs,*

collaborating closely with policy makers so that countries can meet the reporting requirements under the 2030 Agenda in accordance with national priorities". Some key elements of the role of NSOs in SDG monitoring by the CES can be summarized below.

Preparing assessments of readiness to provide data on the SDG indicators

The exact nature of this role will vary depending on national circumstances. Some NSOs will coordinate the whole set of global indicators working closely with all national data producers and identifying possible data sources. Others will provide data only for indicators from official statistics. Countries could assess availability of data for global indicators through mapping data providers to statistical (and non-statistical) indicators.

Planning and proposing data flow models at the national level

Depending on the role given to NSOs, they could evaluate which data flow model best fits their national circumstances and which provides the most transparent and efficient transfer of data from the national to regional and global levels.

Considering reporting approaches and data dissemination mechanisms

Reporting statistics for SDGs is understood as providing data to a given organization and can be implemented in many ways. Regarding global SDG indicators, reporting means providing data to custodian agencies. To fulfil these requirements NSOs may consider setting up a National Reporting Platform (NRP) and consider what kind of NRP will meet their needs.

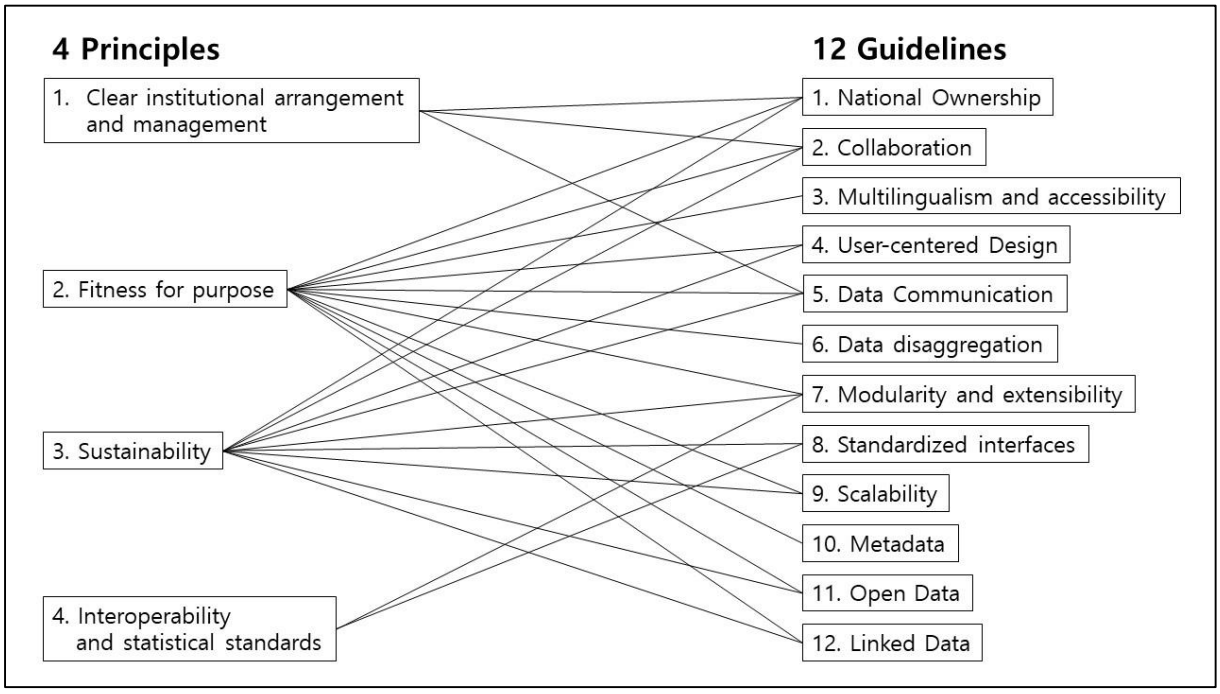
When the CES listed up the key elements of the role of NSOs in SDG monitoring, *National Reporting Platform* was mentioned on the third element about data dissemination mechanisms for SDG indicators.

2. National Reporting Platform

«Principles of SDG Indicator Reporting and Dissemination Platforms and guidelines for their application» by the United Nations Statistics Division (UNSD) in 2019, define the National Reporting Platform (NRP) as a means to report and disseminate national statistics, including SDG indicators and metadata, and refers to an IT infrastructure (website, databases).

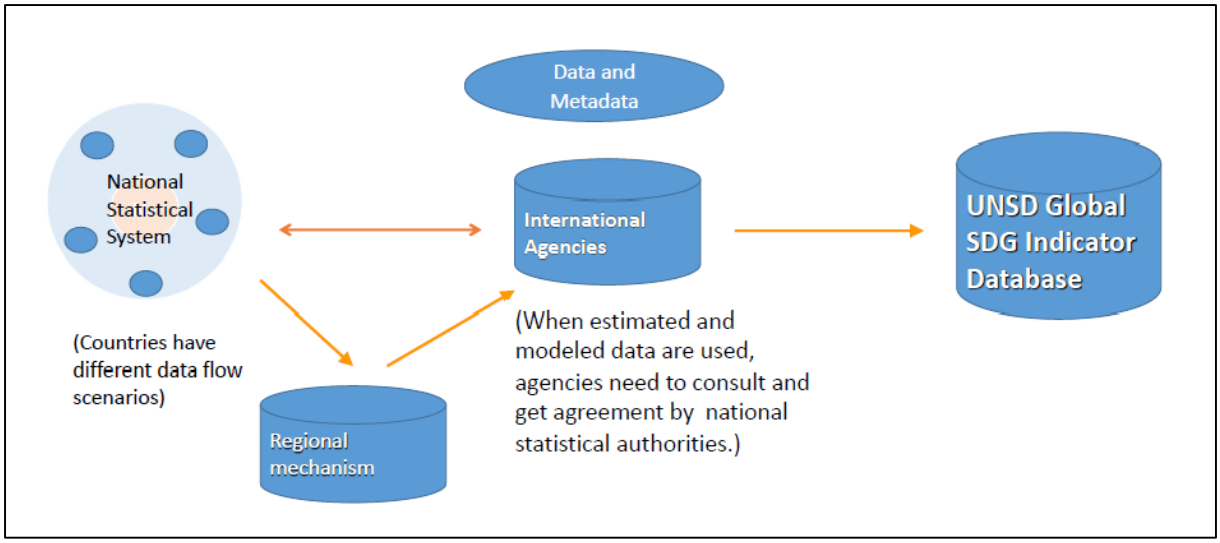
Based on the achievements and lessons learned from monitoring the MDGs, NSOs have stressed the need for national SDG indicator reporting platforms to improve access to data on key national development priorities and the transparency of official statistics, in compliance with *«Fundamental Principles of Official Statistics»* by UNSD. Figure 6 is the keywords of 4 main principles and 12 guidelines for implementing NRP.

Figure 6. 4 Principles and 12 Guidelines of NRP



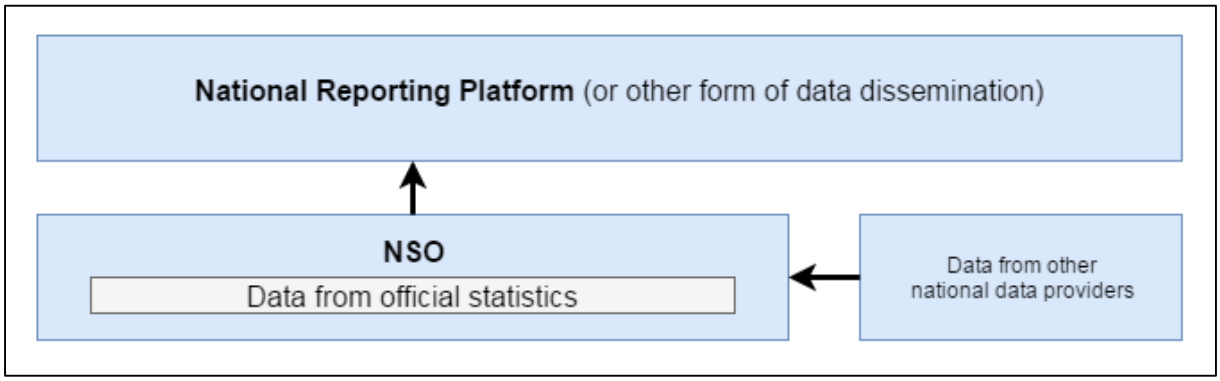
Compare to the 2016 Data Flow from national to global level (Figure 7), the roles of National Statistical System in 2017 (Figure 4) are much more specified (Youngshil Park & Youngmi Lee, 2017).

Figure 7. Data Flow from national to global level, 2016 (Park & Lee, 2017)



Data reporting models at the national level can have different scenarios depending on whether the national statistical system is centralized or decentralized. Model 1 (Figure 8) is a model that National Statistical Office collects all data related to indicators and provides through National Reporting Platform.

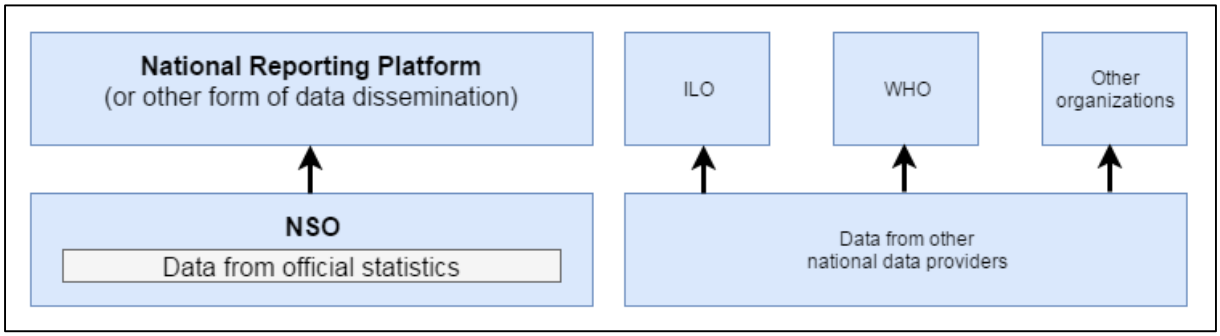
Figure 8. Centralized statistical system



International organizations take all of the indicator data directly through the platform, reducing the burden of data reporting in countries, enabling transparent reporting and international comparisons of data. However, significant resources are needed to play the role of NSO's data management and coordination.

Model 2 (Figure 9) is a model in which NSO is responsible for only statistics produced directly in relation to SDGs indicators, and the rest are under the responsibility of data production institutions that meet the indicators. Rather than building a separate system for SDGs indicators, it relies on existing mechanisms for providing data to custodian agencies, where it is necessary to seek ways to provide data for indicators that are not included in existing mechanisms.

Figure 9. Decentralized statistical system



Countries around the world have different statistical system between centralized and decentralized, but for SDG indicators, the Model 1 will be used for this report to explain according to the original purpose of NRP.

Among many other organizations, NSOs have important role about all kind of SDG indicators. Emerging issue on National Reporting Platform is natural because it is essential to

find out efficient dissemination and reporting way for NSOs to deal with all of this complicated situation. Almost every country has their own data portal but specialized platform for SDG indicators and metadata is needed to develop, and OpenSDG Platform is the most widely using platform all over the world.

2-1. OpenSDG Platform

The United States launched an open-source platform[1] for the SDGs in 2016. The United Kingdom's Office for National Statistics (ONS) forked (copied or reused) it on GitHub[2] and added a range of custom features, including disaggregation support, maps, high-contrast mode, and a separate web service for data. As part of its SDG National Reporting Initiative, the Center for Open Data Enterprise (CODE) connected with US and UK to support information sharing about open-source reporting platform (OpenSDG). Teams from US, UK, and CODE began working together in 2017.

Many countries around the world adopted the US and UK's platforms (Table 1). As more countries adopted the platforms, and as new features were being developed, there was a need to better share capacity and reduce duplication of efforts. This growing need was met through the development of OpenSDG, which merged early versions of the US and UK platforms into a shared codebase.

[1] sdg.data.gov
[2] GitHub is a cloud-based web service that helps users save, manage and track the changes of their source code (KINSTA).

Table 1. List of OpenSDG Platform users (OpenSDG)

Country	Link
Armenia	armstat.github.io/sdg-site-armenia
Bosnia	sdg.bhas.gov.ba
Canada	sdgcif-data-canada-oddcic-donnee.github.io
Democratic Republic of the Congo	In development
Faroe Islands	sdg.hagstova.fo
Germany	sustainabledevelopment-germany.github.io
Ghana*	sustainabledevelopment-ghana.github.io
Iceland	visar.hagstofa.is/heimsmarkmidin
Kazakhstan	In development
Kyrgyzstan	sustainabledevelopment-kyrgyzstan.github.io
Lao PDR	www.lsb.gov.la/sdg
Moldova	In development
Montenegro	montestat.github.io/site
Nepal	In development
Poland*	sdg.gov.pl
Rwanda	sustainabledevelopment-rwanda.github.io/
Republic of Korea	**kostat.go.kr/sdg**
Tajikistan	In development
Turkey	Launching soon
Ukraine	sdg.ukrstat.gov.ua
United Kingdom	sdgdata.gov.uk
United States	sdg.data.gov
Vanuatu	In development

* Using older version of platform that OpenSDG is based on.

OpenSDG is built exclusively with open-source libraries and tools and can be hosted and maintained using free services - GitHub. The platform itself is free, can be modified to fit a variety of user needs, and offers many customizable features.

The UK SDG National Reporting Platform has feature branches, a staging and live website, allowing web/data developments to be tested on our unadvertised feature branches before being merged into the staging site for final checks. The code for these websites is split across 5 repositories which ensures the NRP is modular and inter-operable.

2-2. Case of adopting UK's OpenSDG Platform - Republic of Korea

The national statistical office of Korea, *Statistics Korea (KOSTAT)*, adopted OpenSDG platform[3] in 2019 and used United Nations Global SDG Database[4] for dataset. Thanks to OpenSDG, developing a platform itself doesn't take long but verification of data and metadata was challenging (Insang Ryu & Youngshil Park, 2020). The Global Database provides an access to data compiled through UN System in preparation for an annual report. Everyone can get the SDG indicator data from this website, but it doesn't provide any details on metadata for country level. System requirements and step-by-step installing guidelines are provided on the website (open-sdg.readthedocs.io), so any country can have their own NRP by following up the instruction. KOSTAT also carried out the guidance and this chapter is the summary of the project in 2019[5].

***System requirements**:*

- Operating System: Windows 10 (64-bit)
- Software: Ubuntu app, Travis, Ruby for Linux

[3] kostat-sdg-eng.github.io/sdg-indicators
[4] unstats.un.org/sdgs/indicators/database
[5] All of the contents of adopting OpenSDG Platform in this chapter can be slightly different from current situation, because it is written based on the 2019 project result.

Developing Process (Figure 10):

1. Creating a Korean platform by cloning UK’s platform

2. Download all indicator data from UN Global Database

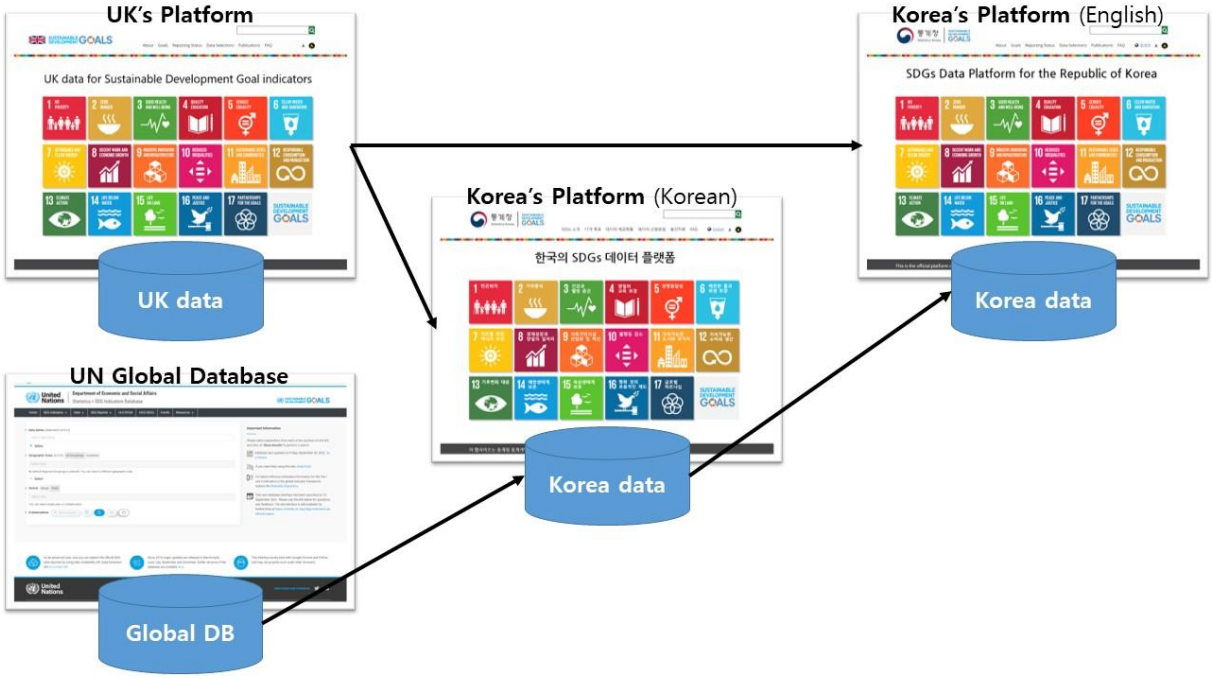
3. Transforming data format into OpenSDG's format

4. Creating English platform by cloning UK’s platform

5. Copying transformed data from Korean platform to English platform

6. Add a button that can change a Korean platform with English platform and vice versa

Figure 10. Developing process of adopting UK's platform



Main repositories*:*

- ONSdigital/sdg-indicators: This repository contains main source code for webpage. When there are changes in 'sdg-data' or 'sdg-translations' repository, this repository must be built for applying the changes on the website.

- ONSdigital/sdg-data: SDG indicators' data files (.csv) and metadata files (.md) (Figure 11) are stored on this repository.

- open-sdg/sdg-translations: This repository is for the purpose of multilingual service, but only contains 6 official languages of UN[6].

Figure 11. Metadata file(.md) format

```
---
layout:
sdg_goal:
target_id:
permalink:
published:
target:
indicator:
indicator_name:
national_indicator_available:
national_indicator_description:
un_designated_tier:
un_custodian_agency:
goal_meta_link:
goal_meta_link_text:
national_geographical_coverage:
computation_units:
computation_definitions:
computation_calculations:
reporting_status:
data_non_statistical:
data_footnote:
graph_type:
graph_title:
data_show_map:
source_active_1:
source_organisation_1:
```

[6] Arabic, Chinese, English, French, Russian and Spanish

```
source_periodicity_1:
source_earliest_available_1:
source_geographical_coverage_1:
source_url_1:
source_url_text_1:
source_release_date_1:
source_next_release_1:
source_statistical_classification_1:
source_contact_1:
source_active_2:
source_active_3:
source_active_4:
source_active_5:
source_active_6:
indicator_sort_order:
comments_limitations:
---
```

***Builder**:* Source code must go through 'build' process, so that it can be properly applied on the website. Especially sdg-indicators repository must be built even if there's no changes when other repositories are modified - except data file (.csv) updates. Linking GitHub and Builder (Travis CI and Circle CI) is needed by generating 'Key' from GitHub.

- Travis CI (travis-ci.org): sdg-indicators, sdg-data

- Circle CI (circleci.com): sdg-translations

***Data and Metadata modification**:* Data files (.csv) in /data folder and metadata files (.md) in /meta folder in sdg-data repository can be modified by various ways - by using Ubuntu, GitHub and Prose (prose.io)[7]. Data (.csv) and metadata (.md) are text files that have their own

[7] Prose is a web-based contents editor serviced by GitHub.

format and separator. The rules of data format effects the outcomes on the website, so users should follow the proper rules to get the proper result they originally intended.

2-3. Problems

IT professionality: Adopting OpenSDG platform is complementary because it is open-source but IT specialists who have sufficient ability and experience are needed for performing a project. Considering the personnel expenses for them, OpenSDG is not free actually. That's why many developing countries who urgently need to have NRP for achieving SDGs, still don't have it and need others' help.

In 2016, UNSD agreed to conduct a project with the UK's *Department for International Development (DFID; now part of Foreign, Commonwealth and Development Office (FCDO))* supporting 20 countries in Africa and Asia in strengthening their capacity in the compilation and use of SDG indicators (UNSD-FCDO Project on SDG Monitoring). One of the main activities of the project is development or upgrade of national data and metadata platforms.

General contents: All member countries have the same Goals, Targets and Indicators, so most of the contents on the platforms are duplicated except country data and metadata. If there's commonly usable platform that can accommodate country data and metadata, it can prevent the same developing process for updating the general contents.

Platforms are almost same just right after they first forked from original platform but they are not synchronized together. So, if there's some updates on the original platform, copied platform also updates the functions to have the same service with it. OpenSDG provides its

updates on the website, but follow up of these updates also need IT specialists just the same as its first development.

File-based data management: Text format's data files have their own rules for data themselves and for the platform's outlook. Developers don't need to modify source code for adding drop-down menus, checkboxes and radio buttons for breaking down the data to sub-categories like sex (male, female), age and area (urban, rural). The first and the last column of data file must be 'Year' and 'Value', other sub-categories can be located between these two essential columns by using a separator - comma. This simple rule is easy to understand but need a data transforming step to the requested format because the statistical data managed by Database Management System (DBMS) like Oracle in most of the countries now. Direct use of data from the DBMS can guarantee a data consistency between national statistical system and national reporting platform.

Different data between NRP and Global Database: Various kind of custodian agencies collect SDG indicators from all member countries. NSOs have a role of providing country data to the International Organizations but if there's difference between country data and global data, it's hard to verify the exact value of each indicators. Although NSO is a focal point of national SDG indicators, it is impossible to be well-informed about all the field of SDGs.

Country's representative values of SDG indicators must be reported from NRP and Global Database. To achieve this, UN's Global Database would be used for not just a global service but for NRP. Verification and agreement must be needed of course.

3. Proposal

As information technology advances, software is also rapidly developing nowadays. The Fourth Industrial Revolution, popular expression describes 21st century that represent the ICT based recent era which include IoT, cloud computing, cognitive computing, and artificial intelligence (Heiner Lasi et al., 2014). Data is not only a one important field of Fourth Industrial Revolution as Big data, but also fundamental component of most of other technologies. Various ways of collecting, integrating and transferring data are using in information technology sector. Data management and analysis software is also developing simultaneously with this environment circumstances. Among many other outstanding software, Business Intelligence is suitable as a National Reporting Platform for managing data and metadata, visualizing the value of indicators and collaborating with many other stakeholders.

3-1. Business Intelligence (BI)

Business intelligence refers to the process of integrating and analyzing data that enables businesses to make actionable decisions, and comprehensively defines an environment in which users can collect, organize, and provide the information they need in a timely manner.

BI consists of the strategies and technologies that businesses use to analyze and manage data from business information to support decision-making (Dedich N. & Stanier C., 2016). Commonly BI includes reporting, online analytics processing, dashboard, data mining, business performance management, prescriptive analytics, and predictive analytics.

The software that supports these BI processes is called 'BI tools'. BI tools are being used to support and solve problems in many areas of business activity, including improving productivity, reducing costs, and satisfying customers. The advantage of integrated BI information and communication technology is that it enables rational decision-making based on objective information through extensive data collection and analysis techniques. This helps companies avoid relying solely on human intuition for important decisions.

BI tools aim to make it easier to interpret big data, and by processing this massive amount of data, users can identify and create new strategic business opportunities. All of these processes based on insight can give companies a competitive market advantage, long-term stability, and enable strategic decision-making (Olivia Rud, 2009).

BI tools can collect and analyze data by time period, area, and task, as well as suggest future changes through built-in predictive algorithms. Therefore, it can be conveniently used in making plans or making decisions to deal with future problems. Since the data collected inside and outside the company can be analyzed from various perspectives, it can provide the information necessary for the company's marketing, sales, and customer service tasks, so it has a variety of uses.

Business intelligence tools serve a variety of purposes, allowing organizations to gain insight into new markets, assess the suitability and demand for products and services in different markets, and measure the impact of their marketing efforts (Chugh R. & Grandhi S., 2013).

It is not necessary to emphasize the importance of 'data utilization' in corporate management now that we are living in the era of the 4th industrial revolution. The type and

amount of data that needs to be processed increases, and businesses need faster and more accurate analytics to survive and develop. BI tools enable businesses to make quick decisions, manage accurate numbers, and analyze in-depth data through detailed and accurate analysis. The instrumental nature of quantifying anything and presenting the work process as an image output allows you to improve problems and respond quickly to changes in the environment. In addition, it can be used to reduce maintenance and operating costs, so there is a lot of room for various uses in terms of improving corporate activities.

In the sea of information, there are clearly limits to the ability to collect and organize data by human power. BI tools help users make informed decisions by organizing, analyzing, and presenting results in an easy-to-view way, even a lot of data that users have never seen. In these days when data analysis is necessary to survive, it's smart to borrow the power of tools.

3-2. Possibility of Using BI for National Reporting Platform

BI can be defined as a system whose components are data gathering, data storage, and knowledge management (Solomon Negash, & Paul Gray, 2008). The following is a review of whether BI can be used as NRP or not having these three components.

Data gathering*:* Data gathering refers to the collection of data through user experiments or investigations in order to achieve the purpose. The data collection method can be divided into questionnaire, observation and interview. SDG indicators are collected in such a way that the international organizations responsible for each indicator receive from individual countries. In 2017, the United Nations Statistics Committee asked the custodian agencies (Table 2) to provide a list of national focal point and to share data collection schedule. To satisfy this request,

the governing body provided information about the data collecting procedure and designated the focal point of each indicator for questions about definitions, methodologies, data, or other issues (UNSD).

Table 2 Custodian agencies for 17 SDGs

Goals	Custodian agencies
Goal 1	ILO, World Bank, ILO, UN-Habitat, UNDRR, OECD, UIS
Goal 2	FAO, UNICEF, WHO, OECD, WTO
Goal 3	WHO, UNICEF, UNAIDS, UNODC, DESA, WHO-FCTC, OECD
Goal 4	UIS, UNICEF, ITU, UNESCO, UIS, OECD
Goal 5	UN-Women, World Bank, OECD, WHO, UNICEF, UNFPA, UNODC, UNDP, UNSD, UNICEF, ILO, FAO, ITU
Goal 6	WHO, UNICEF, JMP, UN-Habitat, UNSD, UNEP, FAO, UNECE, UNESCO, Ramsar Convention, OECD
Goal 7	World Bank, WHO, UNSD, IEA, IRENA
Goal 8	UNSD, IMF, World Bank, ILO, UNEP, UNICEF, UNWTO, OECD
Goal 9	World Bank, ICAO, UNIDO, IEA, UIS, OECD, ITU
Goal 10	World Bank, OHCHR, ILO, IMF, DESA, IOM, UNHCR, ITC, OECD
Goal 11	UN-Habitat, UIS, UNSD, WHO, UNODC, UNFPA
Goal 12	UNEP, FAO, UNESCO, UNWTO, UNFCCC, UNESCO-IOC, UIS
Goal 13	UIS, UNESCO
Goal 14	FAO, UNEP-WCMC, UNEP, UNESCO-IOC, DOALOS
Goal 15	FAO, UNEP-WCMC, UNEP, UNCCD, IUCN, CBD, UNODC, CITES, OECD
Goal 16	UNODC, WHO, OHCHR, UNODC, UNESCO, UNICEF, UNDP, OECD, UNCTAD, UNODA, World Bank, IPU, UNICEF
Goal 17	IMF, ITC, UNCTAD, World Bank, UNEP, OECD, UNDP, PARIS21, UNSD, UNODA, UNCTAD, ITU, UNEP

Data storage: The indicator data collected by the custodian agencies are gathered into the UN Statistics Division and stored in global database. Custodian agencies provide internationally comparable data on data collected from countries, and UNSD strives to ensure transparency and accessibility by updating database. Users from all over the world can access

the latest SDG indicators data through the Global SDG Indicators Database website[8]. The progress of achieving SDGs is measured by a number of indicators that make up the global indicator framework. Users can search for data by region or time period, compare current progress with past results, and download results to an Excel spreadsheet. The accompanying metadata repository provides specific definitions, justifications, methodologies, and data sources for each indicator for which data is available.

Knowledge management*:* Reports about SDG reporting or assessment by national, regional and international level like VNR by country, SDG Progress Report by ESCAP and The SDGs Report by UN are the result of SDG knowledge management. Contributors for the reports try to abstract the core contents of their efforts for achieving SDGs by using the information of the SDG indicators and the causes and effects of their policies. They can get the insights from the indicators about the visions, masterplans and policies to achieve Sustainable Development Goals. And this knowledge based on data, statistics and indicators can be managed on the National Reporting Platform.

3-3. Microsoft Power BI[9]

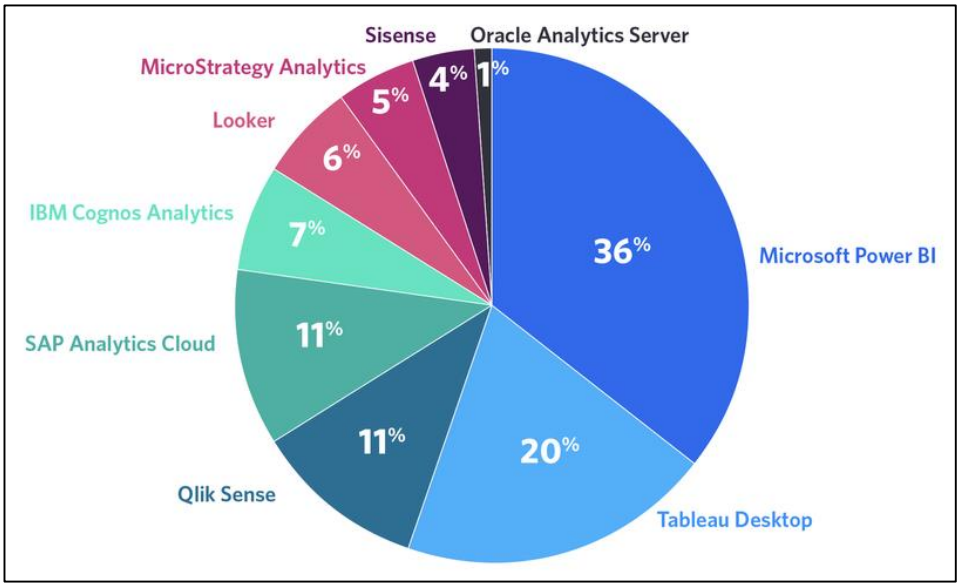
Microsoft Power BI is a collection of software services, apps, and connectors that work together to transform users' irrelevant data sources into consistent, visually immersive, and interactive insights. Power BI is the most popular BI tool among BI market (Figure 12). Data format can be an Excel spreadsheet or a collection of cloud-based and on-premises hybrid data

[8] unstats.un.org/sdgs/dataportal

[9] Microsoft Power BI is an example for additional explanation, any BI solutions can be an alternative for the proposal on SDG National Reporting Platform.

warehouses. Power BI allows users to easily connect to data sources, visualize and search what's important, and share it with anyone.

Figure 12. Market Share of Business Intelligence Software in 2021 (TrustRadius)

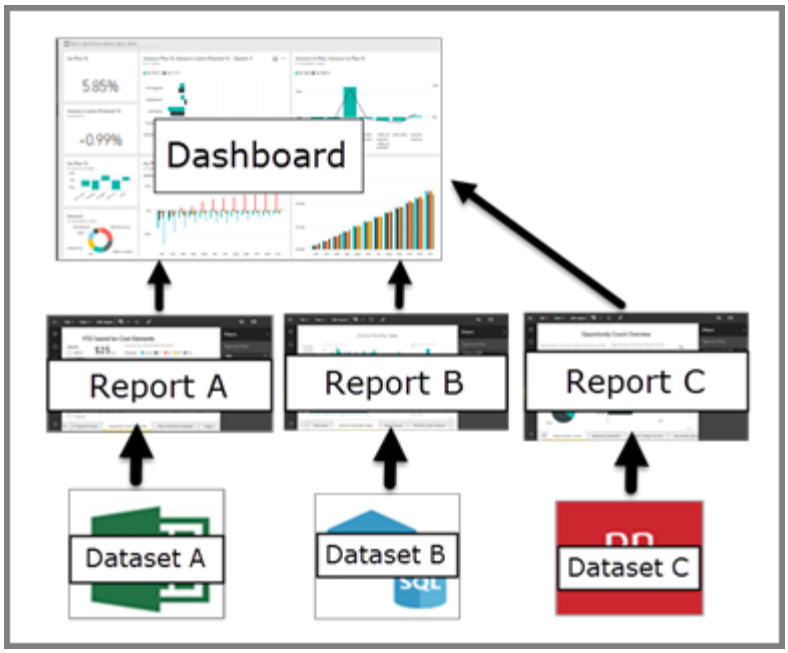


Power BI consists of several elements that all work together, starting with three basics: A Windows desktop application called Power BI Desktop. Online Software as a Service (SaaS) is called a Power BI service. Power BI mobile apps for Windows, iOS, and Android devices. These three elements are designed to enable users to create, share, and consume business insights in a way that best serves themselves and their roles.

Connection with Database: As well as many kinds of data files can be used in Power BI, users can also connect their DBMS server with Power BI. Almost every kind of venders' DBMS in the market can be connected with Power BI by clicking some buttons. The dataset from a relational database can be refreshed as scheduled. But large tables with many rows and columns can cause a load both on DBMS and Power BI, macrodata like SDG indicators are suitable for maximizing this function.

Data visualization: Power BI is sometimes introduced as a data visualization tool on web portal because it has powerful visualization functions. Users can create reports based on a dataset and summarized information can be displayed on a single page of dashboard (Figure 13). Selecting a visualization takes users to the report and dataset that it's based on. Charts and numbers on dashboard and reports are highly interactive with each other.

Figure 13. Diagram for visualization on Power BI (Microsoft)



Collaboration: Users can share generated reports, dashboards, and datasets with colleagues and many others in a variety of ways. Working together, working team can share ownership and management of dashboards, reports, datasets, and workbooks in the Power BI workspace. Power BI users may organize workspaces based on their organizational structure or create workspaces for specific projects. However, different organizations use different workspaces to store different versions of reports or dashboards. The workspace provides a role in determining the privileges that a colleague has. Users can use these roles to determine who can manage your workspace, edit or distribute content, or access only.

4. Conclusion

Indicators, the lowest component of Sustainable Development Goals (SDGs) framework, offer numerical output that can review the progress of upper components, Goals and Targets. National Statistical Offices (NSOs) have the roles of coordinator for SDG Indicators data and metadata. To facilitate the roles of NSOs for reporting and disseminating data among custodian agencies, National Reporting Platform was recommended by the United Nations Statistics Division, and some years later, OpenSDG became the most popular platform all around the world. OpenSDG is a great platform that follows the principles and guidelines of National Reporting Platform by the United Nations. Thanks to the effort of OpenSDG team members, National Reporting Platform with OpenSDG has dramatically developed and still updating. But based on the experience in Republic of Korea, there's some challenges on adopting the platform. The proposal started with this point, and Business Intelligence solution can be recommended for the alternative in this 4th Industrial Revolution era.

Half of the 15 years of project has passed already. How many Goals and Targets have we achieve until now? Can we successfully achieve all the Sustainable Development Goals until 2030? If we want to perfectly evaluate the 15 years of efforts in 2030, appropriate indicators and accurate measurements are needed. We already have an experience Millennium Development Goals until 2015 and we agreed to achieve Sustainable Development Goals until 2030. Whether another Development Goals launch after then or not, what is for sure is that we have 30 years of experiences and it's gradually upgrading until then. National Reporting Platform is also need to be upgraded in step with the ultimate goals. Although my suggestion is just a small idea until now, I hope active discussions about National Reporting Platform will be taken based on this proposal in the future.

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