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Case Report

Localization of SDGs through Disaggregation of KPIs

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Abstract: The United Nation’s Agenda 2030 and Sustainable Development Goals (SDGs) pick up where the Millennium Development Goals (MDGs) left off. The SDGs set forth a formidable task for the global community and international sustainable development over the next 15 years. Learning from the successes and failures of the MDGs, government officials, development experts, and many other groups understood that localization is necessary to accomplish the SDGs but how and what to localize remain as questions to be answered. The UN Inter-Agency and Expert Group on Sustainable Development Goals (UN IAEG-SDGs) sought to answer these questions through development of metadata behind the 17 goals, 169 associated targets and corresponding indicators of the SDGs. Data management is key to understanding how and what to localize, but, to do it properly, the data and metadata needs to be properly disaggregated. This paper reviews the utilization of disaggregation analysis for localization and demonstrates the process of identifying opportunities for subnational interventions to achieve multiple targets and indicators through the formation of new integrated key performance indicators. A case study on SDG 6: Clean Water and Sanitation is used to elucidate these points. The examples presented here are only illustrative—future research and the development of an analytical framework for localization and disaggregation of the SDGs would be a valuable tool for national and local governments, implementing partners and other interested parties.

Keywords: localization; disaggregation; sustainable development goals; data; monitoring and evaluation; international development; statistical analysis

JEL Classification: Q01; Q25

1. Introduction

The Sustainable Development Goals (SDGs), also known as the 2030 Agenda, came into effect on 1 January 2016. With these goals, the United Nations set forth a formidable task for the global community following the Millennium Development Goals (MDGs). The SDGs consist of 17 goals and 169 associated targets that provide an opportunity to integrate development goals, and focus on the sustainable development of not only least-developed countries (LDCs), but all countries around the world ([UN Sustainable Development Goals 2015](#)). The MDGs took step towards multi-tiered development and poverty eradication, but they ignored problems of limited local capacities and poor data management. The adoption of the SDGs is evidence of global commitment to sustainable development post-2015 and is a platform on which to take action. Two years have passed since the kickoff of Agenda 2030 and the attention is now shifting from policy towards implementation. The shift raises concern on how the goals will be implemented and at the same time avoiding some of the major problems observed with the MDGs.

To be a sustained endeavor beyond 2030, the SDGs need a concerted and coordinated effort to move from internationally driven development projects to locally and regionally driven operations. To achieve this, a broader and deeper understanding of the linkage between localization and data disaggregation should be elucidated to avoid the pitfalls of the MDGs. Moreover, greater insight of this connection will translate into local and regional policy interventions grounded in empirical evidence.

Recognizing the MDG implementation impediments and the foci for SDG implementation, many questions surrounding localization and data disaggregation are still not answered: How can these paradigms overcome the issues of the MDGs and achieve the SDGs? What are the costs and benefits for local and regional governments (LRGs)? Who will provide the necessary guidance and how much will it cost? Research conducted in this paper aims to explain localization and data disaggregation in the context of the SDGs, the impact on key performance indicators (KPIs), how to disaggregate data to influence policy, and provide some answers to the highlighted questions through a case study that disaggregates SDG 6: *Clean Water and Sanitation*.

2. Background

The MDGs served as the first unified, global attempt to put sustainable development at the forefront of the world's political agendas. The success of the SDGs is dependent on global leaders and sustainable development advocates not repeating past mistakes. The research presented in this paper focus on the SDGs in relation to two main lessons: localization and data management.

The MDGs globalized international development, but they did not fully localize it. Local governments often lacked the human and financial resources to deliver results required by the targets, as well as the necessary indicators to demonstrate progress. Implemented projects that provided services often didn't reach targeted populations largely because the skills and resources were not available at the local or regional level. In November 2016, United Nations Development Program (UNDP) and the World Bank Group released a joint report that highlighted these as well as other shortcomings and suggested that engagement with local communities and stakeholders is necessary to mitigate and potentially remove roadblocks that may impede SDG implementation (UN Development Program 2016). The SDGs state necessity of localization, but there are questions: what is localization for SDGs; what factors determine the level of localization; what is the relationship between localization and data and the impact on the SDGs?

Broadly speaking, localization is the process of making something local in character or restricting it to a particular place. Many industries incorporate localization. For example, the software industry localizes a product to make it marketable to a specific audience. In the publishing realm, it means to translate a novel into the local language. Reviewing documents related to the SDGs and international development overall, localization (or localizing development) has shifted from meaning the implementation of development projects at the local level, by sub-national actors (i.e., local and regional governments) to something that is more robust. For the purposes of this paper, localization is defined as *the implementation of supranational policy into projects at the appropriate subnational level to ensure the service delivery to the appropriate level population*. In other industries, like the software or publishing, localizing level is determined by the return on investment (ROI). For example, when Microsoft makes new software, its release in languages other than English is based on the total amount of work required to translate and customize necessary to create different language editions (Microsoft Developer Network 2018). Similarly, books are published in a local language and are only published in another language if it is not cost-prohibitive. In each case, the level is determined by risk and return. Determining the level of localization for the SDGs can be found in a similar fashion.

Localization prioritizes subnational planning and resource allocation by local and regional governments in a specific sector based on subnational variations (Lucci 2015). Responsibility for public services related to the SDGs varies across countries because of subsidiarity¹ and national mandates based on constitutions. The localization level determination methodology should not be rigid and understand the linkages between mandates of line ministries and/or sector governance

¹ "The principle that a central authority should have a subsidiary function, performing only those tasks which cannot be performed at a more local level" (Oxford English Dictionary 2018).

within a given country. Per *Localizing the SDGs.org*², the approach to determining the level should be flexible, simple, and adaptive to national variations. Water supply and sanitation, for example, can range from being a delegated responsibility to municipalities to being a state-owned enterprise operated at the national level. To determine the localization level of SDG6, Targets 1 and 2, assessment of state's water, sanitation and hygiene (WaSH) mandate should determine the most appropriate level. Determining the level is not the only question to be answered about localization.

Identifying the subnational level to localize will focus attention on local capacity development, building ownership and responsibility. The cost of localizing, however, is still not addressed. Success of the SDGs depends on each country being responsible for their own economic and social development (UN General Assembly 2015). It also calls for an increased emphasis for countries and their subnational governments to move away from allowing or contracting external entities and towards managing local projects themselves. However, one of the shortcomings with the MDGs was limited local capacity to execute projects. Localization is an important element for implementing the SDGs. However, determining localizing level has proven easier than financing localized development. Another lesson learned from the MDGS, data management, is just as complex.

For a long time, data was associated with hard sciences, but it is ubiquitous today, used to analyze everything from sports to policy. In 1989, the first Knowledge Discovery in Databases workshop presented the concepts of data mining and use of data as a predictive tool (Press 2013). The proliferation of the internet and the world's technological capacity grew to 15.8 exabytes,³ giving the world the ability to generate more data about our lives, but also creating the problem of what to do with all this information. At the same time, the Rio Declaration (1992) brought extreme poverty, climate change, and other development issues to the forefront of the global policy agenda. Data analysis is a valuable tool for addressing these problems, allowing stakeholders to collaborate and develop data-driven policy-making. The MDGs also attempted to leverage the power of data, but with mixed results.

Data as it pertains to monitoring, evaluation and management were big concerns for the post-2015 agenda (UN Economic and Social Council 2016). In their 2011 analysis, Poku and Whitman identified several data issues related to the MDGs: the 1990 baseline statistics were not available; the indicators were not being compiled by government agencies within *national statistical systems* (NSS); indicators may not be comparable across countries because of differences in compilation methodologies and/or definitions; some indicators may not be consistent across years because of differences in data sources; and most of the indicators are not compiled at the sub-national level (Poku and Whitman 2011). In some cases, data points on MDG performance have been estimated or modeled by international agencies. The Overseas Development Institute (ODI) also states that the data gaps are more serious than just statistical errors in reporting, they mean the data missing could have been used to improve the lives of those in LDCs and data gaps impact the accuracy of government plans and affect the allocation efficiency of budgets (Stuart et al. 2015).

A few years after the 2000 Millennium Summit that launched the MDGs, the Second International Roundtable on Managing for Development Results agreed upon the 2004 Marrakech Action Plan for Statistics (World Bank 2004). Understanding the shortfalls of the MDGs as they related to data management, SDG targets 17.18⁴ and 17.19⁵ refer directly to capacity building

² The initiative is supported by UN Habitat, UNDP, and the Global Taskforce of Local and Regional Governments. For more information: <http://localizingthesdgs.org/about-us.php>.

³ An exabyte (EB) is the equivalent of 1 billion gigabytes.

⁴ UN SDG 2015: Target 17.18, "By 2020, enhance capacity-building support to developing countries, including for least developed countries and small island developing States, to increase significantly the availability of high-quality, timely and reliable data disaggregated by income, gender, age, race, ethnicity, migratory status, disability, geographic location and other characteristics relevant in national contexts". For more information, please see <http://www.un.org/sustainabledevelopment/sustainable-development-goals/>.

⁵ UN SDG 2015: Target 17.19, "By 2030, build on existing initiatives to develop measurements of progress on sustainable development that complement gross domestic product, and support statistical capacity building in developing countries". For more information, please see <http://www.un.org/sustainabledevelopment/sustainable-development-goals/>.

linked to data, monitoring and accountability. To further reinforce the commitment to data management, the *Cape Town Global Action Plan for Sustainable Development Data* (Cape Town Plan) proposed six strategic areas with its own objectives and implementation actions in January 2017 ([High-Level Group for Partnership, Coordination and Capacity-Building 2017](#)). The Cape Town Plan and its objectives and action items frequently mention data disaggregation and this policy underpins the United Nations (UN) resolution of the SDGs, “to leave no one behind.” Data management is a concern for the SDGs, raising many questions: what does data mean for the SDGs? What is the relationship of localization and data? What are some approaches to manage data for the SDGs? Before these questions can be answered, some basics about data as it relates to this research should be defined.

In 2005, the United States National Science Foundation (NSF) released a report delineating the differences between, and importance of, data science and data management ([National Science Foundation 2005](#)). Data science merges statistics, data analysis and other related fields to understand and analyze actual phenomena as well as establish trends with data ([Hayashi 1998](#)). Data Management is development and execution of architectures, policies, practices and procedures to manage the information lifecycle needs of an enterprise in an effective manner. In the simplest of terms, data science collects, refines and produces data for particular uses, whereas data management is the architecture and governance of data collected, refined and produced.

We are in an era in which the generation of wealth, power, culture and the like is based on technological capacity, with information technologies at its core ([Castells 2000](#)). Data processing as it was traditionally known has now transitioned into *big data* due to the volume and complexity of data since the late 1990s ([Hilbert 2016](#)). Information and communication technology for development (ICT4D) is the application of big data for development and offers many opportunities and challenges ([Unwin 2009](#)). On one hand, recent advances provide cost-effective methods to improve development decision-making and citizen science and information allow for officials to hear the perspective from the customer. On the other hand, the areas that need the most help are where more data is needed and is also where technological infrastructure is lacking the most. The quality and quantity of data in our time presents the problem of how to make the necessary relationships so it is useful. Data disaggregation is one method of doing so.

Data disaggregation refers to numerical or non-numerical inputs that have been (1) collected from multiple sources and/or on multiple measures, variables, or individuals; (2) compiled into aggregate data—i.e., summaries of data—typically for the purposes of public reporting or statistical analysis; and then (3) broken down in component parts or smaller units of data ([The Glossary of Education Reform 2015](#)). Data disaggregation looks to uncover discrepancies that aggregated data can mask by breaking down the data into appropriate groups. This is often done in the fields of education, healthcare, and human rights. For example, understanding graduation rates of high school students in a district by sex and ethnicity in addition to just school or neighborhood. The UN Office of the High Commissioner on Human Rights has shifted from traditional data collection and analysis, which concentrates on national averages and risks the masking of underlying disparities of disadvantaged or marginalized groups, to disaggregated data analysis ([Office of the High Commissioner on Human Rights 2016](#)). In each example, policy interventions can be developed based on the correct statistical evidence for the appropriate audience and the appropriate level. To understand the appropriate level, localization methodology can be implemented. Whereas the issues with the MDGs focused on the data, many feel that disaggregation of data will be the challenge for the SDGs.

The Inter-agency Expert Group on SDG Indicators ([UN Statistics Division Inter-agency Expert Group on Sustainable Development Goal Indicators 2015](#)) (IAEG-SDGs) was convened to look at data management for the SDGs overall as well as ensure that, “Sustainable Development Goal indicators should be disaggregated, where relevant, by income, sex, age, race, ethnicity, migratory status,

disability and geographic locations.”⁶ The IAEG-SDGs classified the 244 (232 with nine repeated two or three times) indicators into three tiers on the basis of their level of methodological development and the availability of data at the global level⁷:

- Tier 1: metadata are fully developed and data are available,
- Tier 2: metadata are developed but data is not readily available or sparse,
- Tier 3: methodological work is necessary to further develop the indicator metadata.

The Center for Global Development selected those indicators that have an impact on the SDG mantra of “leaving no one behind” and found that none of them have data disaggregated by income, race, ethnicity, migratory status, or disability status or relevant subgroups (Kalow and O’Donnell 2017). A 2017 meeting of the IAEG-SDGs in Ottawa⁸ provided further guidance on data disaggregation, announcing the *Workplan on Data Disaggregation* as well as defining it for the SDGs:

*Disaggregation is the breakdown of observations within a common branch of a hierarchy to a more detailed level to that at which detailed observations are taken. With standard hierarchical classifications [. . .] categories can be split (disaggregated) when finer details are required and made possible by the codes given to the primary observations.*⁹

In addition, disaggregation dimensions and categories are mentioned but not fully delineated. The question is no longer if data disaggregation, science and management should be done, the questions then are: how much will it cost and who is responsible with respect to the SDGs?

Many subnational governments have limited financial and human resources for day-to-day obligations, let alone complying with national mandates related to the SDGs. Jerven, in a working paper for the Copenhagen Consensus Center, argues that proper monitoring of all 18 MDG targets and 48 indicators would have cost the United Nations approximately \$27bn (Morten 2014). The total cost looks high, but when compared to the total of about \$1.9tn spent globally on development aid over the same period, 1.4% of the total Overseas Development Aid (ODA) is within reason. Jerven and others argue that when it comes to monitoring and evaluation (M&E), there are more estimations than hard numbers with the MDGs, and these estimations are more likely observations with no consistent formulaic approach. Jerven estimates that to accurately monitor for the current SDGs, 17 goals, 169 targets and plethora of indicators, it will cost at least \$254 billion, which is more than the global spend on ODA annually or 12.5% of ODA aid over the SDG timeframe. In addition to the cost of M&E, there was and still is the local capacity issue. About 60 countries have basic data management systems required for M&E at this scale and most LDCs do not have the capacity to collect useful data on a national basis. The \$254 billion estimate also does not account for staffing, operation and maintenance, training and retaining personnel, analyzing, or disseminating the data.

The Addis Ababa Action Agenda (AAAA) emphasizes the importance of high quality, disaggregated data and prioritizes capacity building with the understanding that tracking SDG progress will further strain already stressed LDC’s administrative offices, specifically NSS, to collect and analyze data in new areas (UN 2015). AAAA also understands that this shift to better data management will require increasing resources for data and building capacity, with the support of the international community financially, in-kind, or both as needed. The Cape Town Plan furthers the AAAA, highlighting the principles of *completeness of scope, accountability, and cooperation* in order to accomplish its strategic areas and objectives for better disaggregated data management. At first pass, the IAEG-SDGs could appear to be the custodian but was tasked to develop and implement the global indicator framework for the goals and targets of the 2030 Agenda only. Furthermore, it is a group

⁶ For more information, please see the UN IAEG-SDG website at <https://unstats.un.org/sdgs/iaeg-sdgs/>.

⁷ For more information, please see the UN IAEG-SDG website at <https://unstats.un.org/sdgs/iaeg-sdgs/>.

⁸ For more information, please see <https://unstats.un.org/sdgs/meetings/iaeg-sdgs-meeting-05/>.

⁹ Ibid.

of representatives from member states and not its own entity or bureaucracy within the UN system or SDG-mandated organization. The IAEG-SDGs assigned indicator custodians who work on tier classification only but not for overall goals let alone the SDGs. Appendix A shows the custodians of the indicators for SDG6 and demonstrates that there is no common custodian even within a specific goal and some indicators have multiple custodians. At the fifth and sixth meetings of the IAEG-SDGs there was no mention of an overall SDG data custodian. Review of SDG-related documentation, IAEG-SDG will provide guidance on data disaggregation and indicators and subnational governments are responsible for providing data but data management and a data custodian is not present.

The design of a study is more important than the statistical analysis; a study that is a poorly designed study can never be recouped, but a study that is poorly analyzed can be re-analyzed. Agenda 2030 understands the issues of design and analysis that the MDGs faced with respect to localization and raises the question of how cross-cutting and sector-specific goals, data, and monitoring and evaluation will be executed effectively and efficiently.¹⁰ The SDGs allude to the linkage between localization and data disaggregation but do not elucidate the importance of the relationship: localization determines the level and disaggregation determines how to separate what at that level. The following case study looks at SDG6 *Clean Water and Sanitation* and suggests methodologies to answer some of the outstanding questions.

3. Case Study

Case studies are useful tools to test theoretical models with real world situations. Although it will not answer a question completely, a case study will provide guidance on how to move forward. SDG 6: Clean Water and Sanitation will be the subject of the case study for localization of SDGs through disaggregation of KPIs. The aim of the study is to highlight methodologies for localization, disaggregation, and development of inter-linkages between SDGs to develop new KPIs that unmask discrepancies for more effective and efficient policy interventions.

Water, Sanitation and Hygiene (WaSH) services were high on the priority list in the 2030 Agenda after playing a minor role in the MDGs (MDG 7, Target 10) ([UN Millenium Development Goals 2015](#)). According to the WHO/UNICEF Joint Monitoring Programme for Water Supply, Sanitation and Hygiene (JMP), 89% of the global population used at least a basic drinking water service and 68% of the global population used at least basic sanitation services as of 2015 ([World Health Organization \(WHO\) and the United Nations Children's Fund \(UNICEF\) \(2017\)](#)). In absolute numbers, that is 844 million who lack basic drinking water services¹¹ and 2.3 billion who lack basic sanitation services¹². Furthermore, proper WaSH access has the potential to prevent at least 9.1% of the global disease burden and 6.3% of all deaths ([Prüss-Üstün Annette et al. 2008](#)). Beyond the startling statistics, WaSH provides the opportunity for understanding localization and disaggregation.

WaSH as a formal service delivery tends to be a natural monopoly due to high sunk costs related to infrastructure and other economies of scale. In addition, the governance of this sector has many subnational variations that are directly related to national constitutions, line ministry mandates and sector governance. For example, responsibility for WaSH in Zambia is shared by the Ministry of Local Government and Housing (policy), National Water Supply and Sanitation Council (economic regulation), and local government-owned commercial utilities (supply), whereas in neighboring Uganda responsibility is shared by the Ministry of Water and Environment (policy and regulation), National Water and Sewerage Corporation (supply) and local governments with populations of 5000

¹⁰ Supra 6.

¹¹ Basic drinking water service is defined as *Drinking water from an improved source, provided collection time is not more than 30 minutes for a round trip, including queuing*. For more information, see http://www.who.int/water_sanitation_health/publications/jmp-2017/en/.

¹² Supra 11. Basic sanitation services is defined as *Use of improved facilities that are not shared with other households*.

to 30,000 (supply) (Patole 2010). These factors, scale, scope, governance, and national mandates impact how to localize SDG 6 relative to each subnational government, indicating responsibilities at each level.

The two examples used for this research are SDG 6 disaggregated in relation to SDG 3: Good Health and Well Being and SDG 11: Sustainable Cities and Communities. Table 1 breaks down the metadata of SDG 6 by tier and identifies the indicators. Indicator 6.1.1 and 6.1.2 criteria, for example, would draw metrics from the JMP (global leader in monitoring WaSH), Indicator 6.3.1 from WHO and 6.3.2 from UN Environment for SDG 6. A similar exercise would be done for SDG 3 and 11 to identify potential relationships such as Indicator 3.9.2¹³ and 11.1.1¹⁴ for SDG 3 and 11, respectively. Table 2 shows the analysis that results in identifying common criteria and variables that can be used form KPI development. It is important to note the importance of data disaggregation at the local level to account for local variations in the design and implementation of projects, especially for WaSH. However, this was beyond the scope of this particular study.

Table 1. SDG 6 targets and indicators (excerpt from Appendix A, Table A1).

Goal 6. Ensure Availability and Sustainable Management of Water and Sanitation for All			
Target	Indicator	Tier	Custodian
6.1 By 2030, achieve universal and equitable access to safe and affordable drinking water for all	6.1.1 Proportion of population using safely managed drinking water services	I	WHO UNICEF
6.2 By 2030, achieve access to adequate and equitable sanitation and hygiene for all and end open defecation, paying special attention to the needs of women and girls and those in vulnerable situations	6.2.1 Proportion of population using safely managed sanitation services, including a hand-washing facility with soap and water	I	WHO UNICEF
6.3 By 2030, improve water quality by reducing pollution, eliminating dumping and minimizing release of hazardous chemicals and materials, halving the proportion of untreated wastewater and substantially increasing recycling and safe reuse globally	6.3.1 Proportion of wastewater safely treated	II	WHO UN-Habitat UNSD
	6.3.2 Proportion of bodies of water with good ambient water quality	III	UN Environment

Source: IAEG-SDG (2016).

WaSH has many qualitative and quantitative measures that can be disaggregated. The JMP 2017 progress report, for example, breaks down service by level, by global region, by proportion of household income, and vulnerable populations to name a few.¹⁵ The report disaggregates the data to highlight discrepancies that the aggregated data hides. For example, although 89% of the world has access to *at least* basic drinking water, only 71% of the world has access to safely managed drinking water. Disaggregating that 71%, only 24% Sub-Saharan Africa currently satisfy SDG 6.1.1., where the UN anticipates population to double by 2050 (UN Population Division 2017). The simple disaggregation exercise shows how a relatively positive KPI is masking major problems and at the same time highlights where efforts can do the most to improve a situation.

The case study presents a simple methodology for localization of SDGs through disaggregation of KPIs. Below are the main steps:

- Understand SDG metadata by tier,
- Derive criteria and variables,

¹³ Supra 1. Indicator 3.9.2: Mortality rate attributed to unsafe water, unsafe sanitation and lack of hygiene (exposure to unsafe Water, Sanitation and Hygiene for All (WaSH) services).

¹⁴ Supra 1. Indicator 11.5.1: Number of deaths, missing persons and directly affected persons attributed to disasters per 100,000 population.

¹⁵ Supra 42.

- Understand IAEG-SDGs Indicator Custodian metadata for SDG,
 - Additional global/regional standards related to SDG if possible,
- Understand secondary SDG metadata to identify common criteria and variables,
- Develop common KPI for primary/secondary SDG for disaggregation analysis.

Table 2. Related Goals and Targets to SDG 6 (Excerpt from Appendix B, Table A2).

Disaggregated SDG 6		
SDG 6 Target	Related SDG Target	Potential Common Criteria and Variables
6.1 By 2030, achieve universal and equitable access to safe and affordable drinking water for all	11.1 By 2030, ensure access for all to adequate, safe and affordable housing and basic services and upgrade slums	Criteria: Age, Sex, Income, Location, Vulnerable Population Variable: Distance to drinking water point, Hours of drinking water service
6.2 By 2030, achieve access to adequate and equitable sanitation and hygiene for all and end open defecation, paying special attention to the needs of women and girls and those in vulnerable situations	11.1 By 2030, ensure access for all to adequate, safe and affordable housing and basic services and upgrade slums	Criteria: Age, Sex, Income, Location, Vulnerable Population Variable: Distance from Domicile to Sanitary Facility
6.3 By 2030, improve water quality by reducing pollution, eliminating dumping and minimizing release of hazardous chemicals and materials, halving the proportion of untreated wastewater and substantially increasing recycling and safe reuse globally	3.9 By 2030, substantially reduce the number of deaths and illnesses from hazardous chemicals and air, water and soil pollution and contamination	Criteria: Mortality rate, Pollution type, Variable: Percent water treated, water-related child mortality rate

Figures 1 and 2 are the visual representation of the final step, the development of a new KPI. Figure 1 shows the disaggregation of SDG 3, Target 9, Indicator 2 intersecting with SDG 6, Target 3, and Indicators 1 and 2 creating the KPI *Total number and Proportion of deaths related to water bodies with improved ambient water quality*. A similar exercise was done in Figure 2, creating the KPI *Proportion of housing with safely managed water supply and sanitation services*.

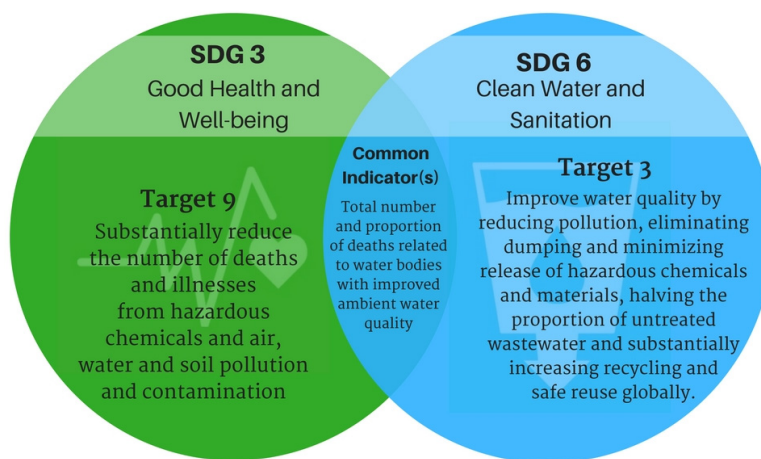


Figure 1. Disaggregation Analysis of SDG 3 and SDG 6.

The relationship in Figure 1 quantifies “substantial” for 3.9.2 in terms of total number and overall proportion. Water quality can increase but in relation to what is not as useful if water quality increases and reduces disease burden and death. Through disaggregation, the relationship identifies the World Health Organization as a common data custodian and therefore lower cost for big data harmonization. If Zambia implements a project to reduce mortality rate of water-borne illness and investment in secondary or tertiary water supply treatment, resources can be coordinated to augment both projects due to the relatedness of KPI.

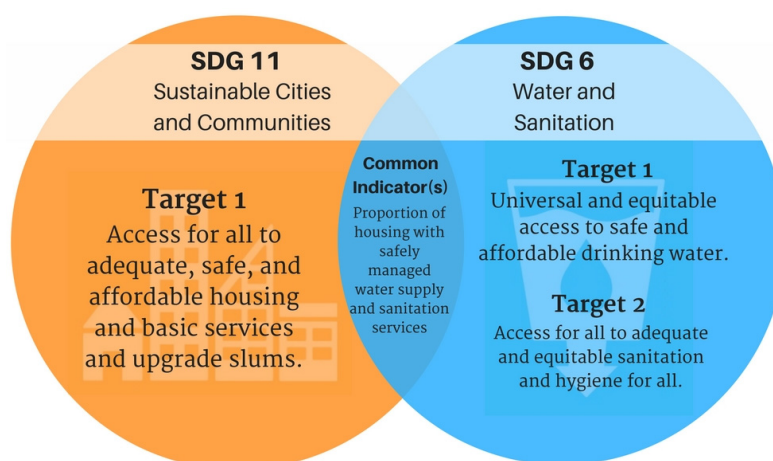


Figure 2. Disaggregation Analysis of SDG 11 and SDG 6.

The relationship in Figure 2 provides a qualifying value for inadequate housing with respect to water and sanitation. Without disaggregation, 11.1.1 would satisfy the access to water or sanitation requirement as per SDG 11 metadata with “improved” access. However, additional resources would be needed to then upgrade the project so that it satisfies SDG 6, which is one full level above SDG 11, requiring safely managed water supply and sanitation on site as per SDG 6 metadata. In the case of Uganda, NWSC can coordinate with the respective authority and level administering SDG 11 projects for housing to ensure it is in compliance with SDG 6 requirements for water and sanitation.

The examples of disaggregation provided in the case study demonstrate the potential of such a technique. Deeper understanding of the SDGs, their targets and indicators can facilitate development of project design toolkits. The frameworks provided can improve the design and implementation of more effective and efficient projects at the local level, thus achieving the SDGs faster. The metadata generated through disaggregation can improve the quality and impact of localized projects and increase the value per development dollar. Moreover, the involvement of local stakeholders will build local ownership and capacity that can lead to the operationalization of projects. Further discussion related to localization, data, disaggregation and the case study are provided in the following section.

4. Discussion

The research conducted aims to further the discussion on localization and data disaggregation in the context of international development. It raises other concerns about the potential shortcomings of the implementation of SDGs related to localization and data management. Many points worth highlighting specifically related to responsibility were uncovered during the course of this research.

Localization was one of the major shortcomings of various international development agendas prior to the SDGs. Being viewed as a panacea, the questions of what and why for localization have been widely documented but no formal guidance on how and who will do it. One suggested approach that was mentioned in the case study is the development of a localization analysis toolkit. Similar to the analysis conducted by the IAEG-SDG to identify the data custodians, an analytical framework could be developed to create an international clearinghouse on sector responsibilities. An inventory of governments can be disaggregated relative to SDGs and linked to factors that influence sector KPIs such as national mandate, economies of scale, sector governance, stakeholder roles and responsibilities, etc. The exercise will also mitigate resources wasted on initial stakeholder analysis and standardizing the process.

The IAEG-SDG released its *Guiding Principles Of Data Reporting And Data Sharing For The Global Monitoring Of The 2030 Agenda For Sustainable Development (Guiding Principles)* and is holding

consultation on the inter-linkages for SDG indicators in late 2017.¹⁶ The broader issue of who is responsible for data management, governance and related fields appears to remain a burden for NSSs and resource-poor subnational governments. MDG data issues such as data gaps for baseline country data, standard data formats and integration, data integrity and access are bound to be repeated if the international development community remain on the same path. The suggestion is to formalize the responsibility of the UN Statistical Division and IAEG-SDG to being the global custodians of development data, responsible for management and governance of the data. Looking at the case study, WaSH industry standards can be harmonized, such as users per connection or employees per connection and normalized based on the results of the localization analysis toolkit by data custodians. The responsibility for the subnational governments would be to provide updates on a formal NSS that feeds into the global statistical system. Although it may appear to be easier said than done, the IAEG-SDG has already laid the foundation and ICT4D has a framework for organizing big data for development. Who is willing to be responsible for this task is still yet to be determined.

The resource burden of the SDGs has an added layer of complexity for international development with the push for localization and data. Who is responsible to pay for all of this? The World Bank insists that local governments find a way to pay to achieve the SDGs rather than work on local capacity because the finance gaps are too high to implement SDGs. Stated earlier, the estimate to accurately monitor all 17 goals, 169 targets and plethora of indicators may cost \$254 billion. What is the right proportion of resources spent on M&E of the SDGs versus the proportion spent on projects and programs that contribute to the SDGs? The suggested coordinating unit at the supranational level that is responsible for standardization, integration, and governance of data can reduce redundancies and lessen the financial burden across the board due to economies of scale. Moreover, it will allow for subnational actors to increase their capacity at a more sustainable rate without the sacrificing their other local responsibilities. Furthermore, indicator disaggregation can improve the return on development investments, freeing up resources for additional projects or capacity development.

The case study used in this is a demonstration of disaggregation. The methodology suggestion is one of the numerous ways of disaggregating the SDGs. However, who would be responsible for this is a cause for concern. Disaggregation needs the context of scale and scope of localization. The variability due to subsidiarity can be overcome with guidance from data organizations or toolkits that provide steps to conduct localization exercises for disaggregation.

5. Conclusions

The SDGs look to overcome the mistakes of the MDGs while forwarding the cause. The importance of data and the desire to have numbers drive policy in recent years has been a concern for many groups and one for the international community implementing the SDGs. What is the right proportion of resources spent on M&E of the SDGs versus the proportion spent on projects and programs that contribute to the SDGs? Will the indicators provide the guidance necessary for subnational actors to operationalize the SDGs on the ground? Understanding the shortcomings, data disaggregation and localization combined may provide the necessary answers but are not without their own issues.

Agenda 2030 is daunting but not insurmountable to achieve. The utilization of localization and data disaggregation of key performance indicators are valuable assets towards achieving sustainable development. The case study used aims to highlight the advantages of these two points while exploring how to bridge the gaps therein. For SDG 6 and others, the best chance of success comes if cities and subnational actors work to improve performance, not necessarily in comparison to each other, but in comparison to their own status from when they began. The SDGs, their targets and indicators can and will influence decisions on the ground. The data is important, but decisions should have a mix of

¹⁶ For more information, please see the proceedings of the Sixth Meeting of the IAEG-SDGs at <https://unstats.un.org/sdgs/meetings/iaeg-sdgs-meeting-06/>.

quantitative and qualitative analysis that understands that the heart of international development is to improve the quality of life, not quality of data.

Recommendations

The feasibility of a central or supra-national data management unit should be further investigated. The economies of scale that could be achieved may provide some answers on how to alleviate the resource burden tied to M&E of international development. Furthermore, the inclusionary practice of an entity may foster better governance and standardization of practices that could accelerate development by unmasking data discrepancies. Questions such as the cost of bureaucracy, technology and energy requirements for ICT4D at the global level, impact of complete versus sampling in data drive policy interventions and the like should be investigated further.

Further research on the development and implementation of localization and disaggregation frameworks should be conducted. How to disaggregate and localize the SDGs would be a valuable tool for local governments, implementing partners and others to appropriately develop projects that properly address the indicators of the SDGs and avoid duplication of efforts resulting in wasted resources. The methodology used in the case study was a rudimentary approach, given the limited resources, but can be used as a springboard for further study. The framework for disaggregation is in the early stages of development as observed in the proceedings of the Sixth Meeting of the IAEG-SDGs in Bahrain. However, it should be vetted by independent third parties.

Although not part of the scope of this study, it is necessary to understand the local variations of any SDG related sector when establishing local context of disaggregation. The development of projects based on data disaggregation should understand this as part of the process. The case study utilized SDG 6 and the WaSH sector has many national and subnational variations, such as hydraulic capacity, population, pollution, and competing users and uses, which can provide local context in disaggregation at the local level. For example, reviewing SDG 3 in relation to SDG 6, local interventions to improve water quality can vary based on the chemical or biological pollutants, availability of water sources and/or population density.

Conflicts of Interest: The author declares no conflict of interest.

Appendix A

Table A1. SDG 6 Targets and Indicators.

Sustainable Development Goal 6. Ensure Availability and Sustainable Management of Water and Sanitation for All			
Target	Indicator	Tier	Custodian
6.1 By 2030, achieve universal and equitable access to safe and affordable drinking water for all	6.1.1 Proportion of population using safely managed drinking water services	I	WHO UNICEF
6.2 By 2030, achieve access to adequate and equitable sanitation and hygiene for all and end open defecation, paying special attention to the needs of women and girls and those in vulnerable situations	6.2.1 Proportion of population using safely managed sanitation services, including a hand-washing facility with soap and water	I	WHO UNICEF
6.3 By 2030, improve water quality by reducing pollution, eliminating dumping and minimizing release of hazardous chemicals and materials, halving the proportion of untreated wastewater and substantially increasing recycling and safe reuse globally	6.3.1 Proportion of wastewater safely treated	II	WHO UN-Habitat UNSD
	6.3.2 Proportion of bodies of water with good ambient water quality	III	UN Environment
6.4 By 2030, substantially increase water-use efficiency across all sectors and ensure sustainable withdrawals and supply of freshwater to address water scarcity and substantially reduce the number of people suffering from water scarcity	6.4.1 Change in water-use efficiency over time	III	FAO
	6.4.2 Level of water stress: freshwater withdrawal as a proportion of available freshwater resources	II	FAO

Table A1. Cont.

Sustainable Development Goal 6. Ensure Availability and Sustainable Management of Water and Sanitation for All			
Target	Indicator	Tier	Custodian
6.5 By 2030, implement integrated water resources management at all levels, including through transboundary cooperation as appropriate	6.5.1 Degree of integrated water resources management implementation (0–100)	II	UN Environment
	6.5.2 Proportion of transboundary basin area with an operational arrangement for water cooperation	II	UNESCO UNECE
6.6 By 2020, protect and restore water-related ecosystems, including mountains, forests, wetlands, rivers, aquifers and lakes	6.6.1 Change in the extent of water-related ecosystems over time	III	UN Environment
6.a By 2030, expand international cooperation and capacity-building support to developing countries in water- and sanitation-related activities and programmes, including water harvesting, desalination, water efficiency, wastewater treatment, recycling and reuse technologies	6.a.1 Amount of water- and sanitation-related official development assistance that is part of a government-coordinated spending plan	I	WHO UN Environment OECD
6.b Support and strengthen the participation of local communities in improving water and sanitation management	6.b.1 Proportion of local administrative units with established and operational policies and procedures for participation of local communities in water and sanitation management	I	WHO UN Environment OECD

Source: IAEG-SDG (2016).

Appendix B

Table A2. Related Goals and Targets to SDG 6.

Disaggregated SDG 6	
SDG 6 Target	Related SDG Target
6.1 By 2030, achieve universal and equitable access to safe and affordable drinking water for all	1.4 By 2030, ensure that all men and women, in particular the poor and the vulnerable, have equal rights to economic resources, as well as access to basic services, ownership and control over land and other forms of property, inheritance, natural resources, appropriate new technology and financial services, including microfinance
	2.2 By 2030, end all forms of malnutrition, including achieving, by 2025, the internationally agreed targets on stunting and wasting in children under 5 years of age, and address the nutritional needs of adolescent girls, pregnant and lactating women and older persons
	3.2 By 2030, end preventable deaths of newborns and children under 5 years of age, with all countries aiming to reduce neonatal mortality to at least as low as 12 per 1000 live births and under-5 mortality to at least as low as 25 per 1000 live births
	3.3 By 2030, end the epidemics of AIDS, tuberculosis, malaria and neglected tropical diseases and combat hepatitis, water-borne diseases and other communicable diseases
	3.8 Achieve universal health coverage, including financial risk protection, access to quality essential health-care services and access to safe, effective, quality and affordable essential medicines and vaccines for all
	4.1 By 2030, ensure that all girls and boys complete free, equitable and quality primary and secondary education leading to relevant and effective learning outcomes
	4.5 By 2030, eliminate gender disparities in education and ensure equal access to all levels of education and vocational training for the vulnerable, including persons with disabilities, indigenous peoples and children in vulnerable situations
	5.4 Recognize and value unpaid care and domestic work through the provision of public services, infrastructure and social protection policies and the promotion of shared responsibility within the household and the family as nationally appropriate
	10.3 Ensure equal opportunity and reduce inequalities of outcome, including by eliminating discriminatory laws, policies and practices and promoting appropriate legislation, policies and action in this regard
	11.1 By 2030, ensure access for all to adequate, safe and affordable housing and basic services and upgrade slums

Table A2. Cont.

Disaggregated SDG 6	
SDG 6 Target	Related SDG Target
6.2 By 2030, achieve access to adequate and equitable sanitation and hygiene for all and end open defecation, paying special attention to the needs of women and girls and those in vulnerable situations	1.4 By 2030, ensure that all men and women, in particular the poor and the vulnerable, have equal rights to economic resources, as well as access to basic services, ownership and control over land and other forms of property, inheritance, natural resources, appropriate new technology and financial services, including microfinance
	2.2 By 2030, end all forms of malnutrition, including achieving, by 2025, the internationally agreed targets on stunting and wasting in children under 5 years of age, and address the nutritional needs of adolescent girls, pregnant and lactating women and older persons
	3.2 By 2030, end preventable deaths of newborns and children under 5 years of age, with all countries aiming to reduce neonatal mortality to at least as low as 12 per 1000 live births and under-5 mortality to at least as low as 25 per 1000 live births
	3.3 By 2030, end the epidemics of AIDS, tuberculosis, malaria and neglected tropical diseases and combat hepatitis, water-borne diseases and other communicable diseases
	3.8 Achieve universal health coverage, including financial risk protection, access to quality essential health-care services and access to safe, effective, quality and affordable essential medicines and vaccines for all
	4.a Build and upgrade education facilities that are child, disability and gender sensitive and provide safe, non-violent, inclusive and effective learning environments for all
	4.1 By 2030, ensure that all girls and boys complete free, equitable and quality primary and secondary education leading to relevant and effective learning outcomes
	4.5 By 2030, eliminate gender disparities in education and ensure equal access to all levels of education and vocational training for the vulnerable, including persons with disabilities, indigenous peoples and children in vulnerable situations
	5.2 Eliminate all forms of violence against all women and girls in the public and private spheres, including trafficking and sexual and other types of exploitation
	8.8 Protect labour rights and promote safe and secure working environments for all workers, including migrant workers, in particular women migrants, and those in precarious employment
6.3 By 2030, improve water quality by reducing pollution, eliminating dumping and minimizing release of hazardous chemicals and materials, halving the proportion of untreated wastewater and substantially increasing recycling and safe reuse globally	10.3 Ensure equal opportunity and reduce inequalities of outcome, including by eliminating discriminatory laws, policies and practices and promoting appropriate legislation, policies and action in this regard
	11.1 By 2030, ensure access for all to adequate, safe and affordable housing and basic services and upgrade slums
	3.3 By 2030, end the epidemics of AIDS, tuberculosis, malaria and neglected tropical diseases and combat hepatitis, water-borne diseases and other communicable diseases
	3.9 By 2030, substantially reduce the number of deaths and illnesses from hazardous chemicals and air, water and soil pollution and contamination
	9.4 By 2030, upgrade infrastructure and retrofit industries to make them sustainable, with increased resource-use efficiency and greater adoption of clean and environmentally sound technologies and industrial processes, with all countries taking action in accordance with their respective capabilities
	11.6 By 2030, reduce the adverse per capita environmental impact of cities, including by paying special attention to air quality and municipal and other waste management
	12.4 By 2020, achieve the environmentally sound management of chemicals and all wastes throughout their life cycle, in accordance with agreed international frameworks, and significantly reduce their release to air, water and soil in order to minimize their adverse impacts on human health and the environment
15.1 By 2020, ensure the conservation, restoration and sustainable use of terrestrial and inland freshwater ecosystems and their services, in particular forests, wetlands, mountains and drylands, in line with obligations under international agreements	

Table A2. Cont.

Disaggregated SDG 6	
SDG 6 Target	Related SDG Target
6.4 By 2030, substantially increase water-use efficiency across all sectors and ensure sustainable withdrawals and supply of freshwater to address water scarcity and substantially reduce the number of people suffering from water scarcity	1.4 By 2030, ensure that all men and women, in particular the poor and the vulnerable, have equal rights to economic resources, as well as access to basic services, ownership and control over land and other forms of property, inheritance, natural resources, appropriate new technology and financial services, including microfinance
	1.5 By 2030, build the resilience of the poor and those in vulnerable situations and reduce their exposure and vulnerability to climate-related extreme events and other economic, social and environmental shocks and disasters
	2.4 By 2030, ensure sustainable food production systems and implement resilient agricultural practices that increase productivity and production, that help maintain ecosystems, that strengthen capacity for adaptation to climate change, extreme weather, drought, flooding and other disasters and that progressively improve land and soil quality
	4.7 By 2030, ensure that all learners acquire the knowledge and skills needed to promote sustainable development, including, among others, through education for sustainable development and sustainable lifestyles, human rights, gender equality, promotion of a culture of peace and non-violence, global citizenship and appreciation of cultural diversity and of culture's contribution to sustainable development
	7.1 By 2030, ensure universal access to affordable, reliable and modern energy services
	7.2 By 2030, increase substantially the share of renewable energy in the global energy mix
	9.4 By 2030, upgrade infrastructure and retrofit industries to make them sustainable, with increased resource-use efficiency and greater adoption of clean and environmentally sound technologies and industrial processes, with all countries taking action in accordance with their respective capabilities
	9.a Facilitate sustainable and resilient infrastructure development in developing countries through enhanced financial, technological and technical support to African countries, least developed countries, landlocked developing countries and small island developing States
	12.2 By 2030, achieve the sustainable management and efficient use of natural resources
	15.1 By 2020, ensure the conservation, restoration and sustainable use of terrestrial and inland freshwater ecosystems and their services, in particular forests, wetlands, mountains and drylands, in line with obligations under international agreements
6.5 By 2030, implement integrated water resources management at all levels, including through transboundary cooperation as appropriate	9.1 Develop quality, reliable, sustainable and resilient infrastructure, including regional and trans-border infrastructure, to support economic development and human well-being, with a focus on affordable and equitable access for all
	9.4 By 2030, upgrade infrastructure and retrofit industries to make them sustainable, with increased resource-use efficiency and greater adoption of clean and environmentally sound technologies and industrial processes, with all countries taking action in accordance with their respective capabilities
	11.a Support positive economic, social and environmental links between urban, peri-urban and rural areas by strengthening national and regional development planning
	11.b By 2020, substantially increase the number of cities and human settlements adopting and implementing integrated policies and plans towards inclusion, resource efficiency, mitigation and adaptation to climate change, resilience to disasters, and develop and implement, in line with the Sendai Framework for Disaster Risk Reduction 2015–2030, holistic disaster risk management at all levels
	11.5 By 2030, significantly reduce the number of deaths and the number of people affected and substantially decrease the direct economic losses relative to global gross domestic product caused by disasters, including water-related disasters, with a focus on protecting the poor and people in vulnerable situations
	12.2 By 2030, achieve the sustainable management and efficient use of natural resources
	16.1 Significantly reduce all forms of violence and related death rates everywhere
16.8 Broaden and strengthen the participation of developing countries in the institutions of global governance	

Table A2. Cont.

Disaggregated SDG 6	
SDG 6 Target	Related SDG Target
6.6 By 2020, protect and restore water-related ecosystems, including mountains, forests, wetlands, rivers, aquifers and lakes	17.6 Enhance North-South, South-South and triangular regional and international cooperation on and access to science, technology and innovation and enhance knowledge-sharing on mutually agreed terms, including through improved coordination among existing mechanisms, in particular at the United Nations level, and through a global technology facilitation mechanism
	17.7 Promote the development, transfer, dissemination and diffusion of environmentally sound technologies to developing countries on favourable terms, including on concessional and preferential terms, as mutually agreed
	17.8 Fully operationalize the technology bank and science, technology and innovation capacity-building mechanism for least developed countries by 2017 and enhance the use of enabling technology, in particular information and communications technology
	9.4 By 2030, upgrade infrastructure and retrofit industries to make them sustainable, with increased resource-use efficiency and greater adoption of clean and environmentally sound technologies and industrial processes, with all countries taking action in accordance with their respective capabilities
	11.5 By 2030, significantly reduce the number of deaths and the number of people affected and substantially decrease the direct economic losses relative to global gross domestic product caused by disasters, including water-related disasters, with a focus on protecting the poor and people in vulnerable situations
	12.2 By 2030, achieve the sustainable management and efficient use of natural resources
	12.4 By 2020, achieve the environmentally sound management of chemicals and all wastes throughout their life cycle, in accordance with agreed international frameworks, and significantly reduce their release to air, water and soil in order to minimize their adverse impacts on human health and the environment
	12.8 By 2030, ensure that people everywhere have the relevant information and awareness for sustainable development and lifestyles in harmony with nature
	13.3 Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning
	14.1 By 2025, prevent and significantly reduce marine pollution of all kinds, in particular from land-based activities, including marine debris and nutrient pollution
	15.1 By 2020, ensure the conservation, restoration and sustainable use of terrestrial and inland freshwater ecosystems and their services, in particular forests, wetlands, mountains and drylands, in line with obligations under international agreements
	15.3 By 2030, combat desertification, restore degraded land and soil, including land affected by desertification, drought and floods, and strive to achieve a land degradation-neutral world
	15.8 By 2020, introduce measures to prevent the introduction and significantly reduce the impact of invasive alien species on land and water ecosystems and control or eradicate the priority species
	15.9 By 2020, integrate ecosystem and biodiversity values into national and local planning, development processes, poverty reduction strategies and accounts

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