

THE ROLE OF DATA-DRIVEN E-GOVERNMENT IN REALIZING THE SUSTAINABLE DEVELOPMENT GOALS IN DEVELOPING ECONOMIES

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ABSTRACT

Since its inception, research and discussions surrounding the United Nations' Sustainable Development Goals, popularly known as the SDGs has been on the rise. Its aim is to end poverty, protect our environment and promote a prosperous livelihood for today and tomorrow. Equivalently, e-Government implementations are targeted at benefiting citizens. This study builds upon the concept of data-driven e-Government which aims at integrating machine learning and artificial intelligence techniques into e-Government systems so as to support the governmental decision making process. This study highlights on the concept of data-driven e-government and its place in accelerating the United Nations Sustainable Development Goals (SDGs). Practical implications for theory and practice are discussed in this paper and recommendations for decision and policy makers are outlined.

KEYWORDS: *Data-Driven e-Government, Electronic Government, Sustainable Development Goals, Information Communication Technology, ICT4D, Policy, Public Administration.*

1. THE SUSTAINABLE DEVELOPMENT GOALS (SDGS)

The United Nations enacted the 2030 Agenda for Sustainable Development in which the popularly known 17 Sustainable Development Goals (SDGs) are enshrined (see [1]). It is based fundamentally on the concept of sustainable development which has been defined as development that meets the needs of the present without compromising the ability of future generations to meet their own needs². Discussions within the past decade have centred on the SDGs and researchers, governments and citizens as well are making tremendous efforts to realize the goals in the shortest possible time [2]. From climate change, to energy, education, agriculture and many other areas of life, the SDGs are aimed towards the facilitating integration and policy coherence across sectors [3]. Fig. 1 illustrates all 17 goals which in itself presents a clear representation of what the SDGs aim at achieving.

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² The Sustainable Development Agenda, Available at:
<http://www.un.org/sustainabledevelopment/development-agenda/>

Today, technology continues to pave the way in propelling development at all levels of livelihood; from personal to national. Countries around the world are increasingly utilizing new ICTs to deliver services and engage people in decision-making processes. Yet still, the issue of bridging the technological divide gap still remains important to policy makers and governments; but researchers are confident that the efficient oversight and implementation of the SDGs will bridge that divide [4].



Figure 1. The Sustainable Development Goals
(Source: Sustainable Development Goals (SDGs) - UNDP¹)

In this paper, the concept of data-driven e-government (DDeG) is amplified and appreciated as an important ingredient in expediting the attainment of sustainable development goals primarily in developing economies. Developing economies are the focus of this study because, the road to development and progress is hindered by certain impediments – such as bureaucracy, corruption, income inequality, unemployment, poverty, lack of necessary infrastructure, and generally low quality public service delivery [5, 6, 7]. But studies reveal that e- Government integration reduces levels of corruption in the public sector [8, 9].

This paper is organized as follows; data-driven e-government is introduced, followed by the convergence of data-driven e-government and the SDGs including recommendations are discussed and finally conclusions are made.

The next section discusses the concept of data-driven e-government (DDeG).

2. DATA-DRIVEN E-GOVERNMENT

Agbozo and Spassov [10] describe DDeG as “a collection of digital public services which channels previously stored data back to citizens as solutions, decisions and reforms for accelerated national growth”. This involves the integration of machine learning and artificial intelligence techniques on an amalgamated of selected or all public service data from e-government systems as well as open data to gather knowledge which in turn is used in supporting the decision making process at all levels of government. The authors describe DDeG as the next phase of public service modernization. The concept of data-driven e-government is drawn from data-driven decision making business-model framework by Hartmann et al. [11] which describes a data-driven business as companies that are using

¹ Sustainable Development Goals (SDGs) – UNDP, Available at:
http://www.undp.org/content/dam/undp/library/corporate/brochure/SDGs_Booklet_Web_En.pdf

data as a key resource for their business model. In data-driven businesses, decisions are made based on the analysis of data rather than purely on intuition [12]. The authors emphasized on the empirical statement that, companies that hugely rely on data-driven decision-making outperform their competitors in terms of productivity and profitability.

Likewise, should such innovative analytical methods be implemented at the public sector level, Agbozo and Spassov [9] stated that, governments' will benefit with respect to return on investment (ROI), optimized quality service delivery, improved national programs, building smarter cities and refocused resource allocation. Citizens will then be the beneficiaries of all of the above progressive innovations, thereby improving citizen trust in government.

In their study, Chen et al. [13] described the application of Business Intelligence and Analytics methods into the e-government and political sphere as follows: e-government data is made up of fragmented information sources and legacy systems, rich textual content, and unstructured informal citizen conversations where analytics methods (Information integration, Content and text analytics, Government information semantic services and ontologies, Social media monitoring and analysis, Social network analysis, and Sentiment and affect analysis) are incorporated to impact society (Transforming governments, empowering citizens, improving transparency, participation, and equality). Improved Trust and Accountability are solutions to the already existing distrust and privacy issues which are stumbling blocks to adoption of standard e-Government; thus making the transition to a data-driven eco-system where citizen data is the lifeblood is dependent on governments at all levels producing optimally citizen-centred results. Hence, a DDeG approach aims at improving transactions and outcomes, reducing costs and enhancing citizen satisfaction [14]. Overall, a data-driven e-government approach seeks to achieve – a citizen-centric approach of governance.

From literature presented in this paper, it is evident that both DDeG and the SDGs are targeted at reaching a similar destination and this paper interconnects the two so as to expedite the attainment of the desired SDGs by governments. Hence, the main research question addressed in this article is: *How can data-driven e-Government play a role in attaining the Sustainable Development Goals?*

3. THE CONVERGENCE OF DDEG AND THE SDGS

According to the UN e-Government Survey which is the only global report that assesses the e-government development status of all 193 Member States of the UN, e-government has been marked as “an effective tool to help support the implementation of the 2030 Agenda for Sustainable Development and its 17 Sustainable Development Goals (SDGs)” [15]. Similarly, DDeG aims at promoting positive citizen livelihood, optimizing and improving resource allocation and most important, supporting the decision making process at all levels of government. Data mining techniques and artificial intelligence in a DDeG framework extract knowledge from aggregated e-Government data with the capability of achieving the SDGs in parallel to DDeG's goals. In exploring the link between what both DDeG and SDGs aim at achieving, Table 1 lists all 17 SDGs and illustrates the means by which DDeG is capable of attaining the desired goals.

Table 1.

Sustainable Development Goals	Data-Driven e-Government Solution
1. No Poverty	Gathering socio-economic data from aggregated data from government hospitals, districts and municipalities as indicators for measuring the levels and standards of living. Thereby informing the government on which deprived localities can be catered for by reforming policies and developing national programs.
2. Zero Hunger	This is possible by harnessing big data from agricultural ministries, open data and private sector farmers related to animal disease overseas and locally, breeding-farm surveys, livestock migration, and workers in the livestock industry [16]. This will improve and optimize farming techniques as well as advise government agencies involved in this sphere on allocating agricultural extension officers to certain areas. These actions will prevent low farm produce and post-harvest loss.
3. Good Health and Well-Being	Building reservoirs of data can be an inexhaustible source of knowledge to fuel a learning health care system which is powered by next-generation analytics [17]. A good example will be to track the number of disease outbreaks and anomalies in order to build a proactive and preventive healthcare system. This will benefit the decision making process with respect to efficient spending on R&D, and quality healthcare policy formation.
4. Quality Education	Periodic extraction knowledge from educational data from the educational ministries/departments at all levels (local and central) based on student performance, enrolment levels, research and development (R&D), and innovation. Data from the educational system stakeholders can be extracted to obtain useful trends, models and using them to offer better and more enhanced education [18]. These actions will set the tone for what percentage of funds in the national budget should be allotted to education as well as which educational policies and reforms must be put in place.
5. Gender Equality	Implementing digital inclusion programs and restructuring of educational systems to empower women and bring balance into society. Data from the criminal and judicial services to identify localities and areas which experience such issues due to tribal and cultural practices and mindsets can be made use of by governmental institutions in partnership with non-profit organizations. This is possible by providing equal employment opportunities guidelines, including the principle of equal pay for work of equal value and taking action against violence against women and girls [19].
6. Clean Water and Sanitation	Real-time monitoring, collection and analysis of data from water bodies and sources of drinking water by authorities to prevent toxicity which is caused by illegal activities such as illegal small scale mining, chemical spillage and improper sewage disposal [20].
7. Affordable and Clean Energy	The transition to smart metering systems and smart distribution systems that are overseen by the energy or power departments can support the sustainable usage of electric power [21].
8. Decent Work and Economic Growth	Opening up government data to the general public is capable of assisting entrepreneurs in starting up new businesses as a result of taking advantage of the newly disclosed government data. It has been discovered that information sharing (the removal of barriers existing among government ministries for better collaboration with the general public) contributes to the increase in job creation and incites the potential economic growth [22].
9. Industry, Innovation and Infrastructure	

10. Reduced Inequalities	Providing policies that create equal opportunity for all is what DDeG seeks to achieve. Accessible internet, education, and empowerment of entrepreneurs by in-depth analytics of e-government data of areas which lack. The demographic and socio-economic layout of regions and the country as a whole gives an overview of the level of inequality.
11. Sustainable Cities and Communities	Leveraging on data from city and town planning departments and open data (maps) for restructuring cities, optimizing transportation and decongesting slums. Likewise, a citizen-centric initiative will be to integrate participatory platforms for urban planning projects on which citizens can express their opinions to improve their communities [21].
12. Responsible Consumption and Production	Extracting data from Geographic Information System (GIS) and e-government systems which monitor resources, infrastructure for facilitating intelligent management of infrastructures and natural resources [18].
13. Climate Action	Climate change is a hot topic in this current time we live in and governments can take action to suppress its effects. Aggregating all public sector derived data to perform in-depth analysis extract intelligent strategies to tackle climate change in areas such as agriculture, public health, energy, and transportation [23]. Likewise, ensuring the proper disposal of waste material on landfills via drones, satellite imaging technology and GIS [20]. Thus preventing climate disasters and the extinction of certain plant and animal species.
14. Life Below Water	
15. Life on Land	
16. Peace, Justice and Strong Institutions	Predictive Policing – An intelligence-led policing paradigm that involves data from disparate sources, analyzing them and then using results to anticipate, prevent and respond more effectively to future crime; to equip decision-makers with better information for better decision-making [24, 25, 26]. Its effect is evident in crime reduction [27].
17. Partnerships for the Goals	Coherency in policies is attainable when there is a formidable interoperable system and this is made possible by DDeG. Accountability, capacity building and transparency are benefits of integrating DDeG and in order for the SDGs to become a reality these indicators must be positively significant. DDeG provides that platform for partnership towards sustainable development.

4. CONCLUSION

Research and discussions on the Sustainable Development Goals (SDGs) have been prevalent within recent years due to the benefits these goals aim achieving so as to impact human livelihood and promoting social equity for the better. In this wise, this paper investigated the concept of data-driven e-government and the potential role it can play in expediting the attainment of the SDGs. The benefits of data-driven e-government are immense and relevant for decision and policy makers in supporting the governmental processes as well as impacting the development and livelihood of citizens who are the main beneficiaries of such public sector innovations.

With respect to research significance, the study contributes towards future research by identifying the means by which the aims of data-driven e-Government work in tandem with the realization of the SDGs.

Regarding the significance to policy and practice, this paper provides a framework and guidelines to policy and decision makers at all levels of governance as well as individuals on the essence of integrating a data-driven approach in their e-government implementations.

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