

Data literacy integration into development agenda. A catalyst to achieving the Sustainable Development Goals (SDGs)

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Abstract

The 'Fourth Industrial Revolution' (4IR) era characterized by 'Information Communication Technology' (ICT) based data literacy with respect to research data collection, documentation, preservation, intellectual protection/control and dissemination is a functional catalyst. It enables the realization of the SDGs of the United Nations (UN) global agenda. The objectives of this study were to identify the role of data literacy in catalyzing the achievement of the Sustainable Development Goals (SDGs); identify challenges faced; and provide recommendations to the challenges faced. The study, employed a desk bound literature review research design, conceptualized that ICT based digital data literacy can catalyze an enabling of the realization of the SDGs of the United Nations (UN) global agenda. According to the literature reviewed, global government 'Ministries, Departments and Agencies (MDAs) are managing voluminous (big) digital data to support strategic decision making, policy implementation and operational optimization towards realizing the SDGs'. This however, requires effective competence (literacy) in digital data analytics to facilitate SDGs based data processing to enable global government MDAs to accurately utilize data for policy implementation and decision making towards effectively realizing the SDGs. The study findings recommend a scaling up of digital data literacy and internet infrastructure development as well as power accessibility especially in developing countries among others.

Keywords

Data literacy, SDGs, catalyst, 4IR, Integration

1.0 Introduction

1.1 Background

Scientific research data literacy describes a growing global trend of skills required to support research data services (Qin and D'Ignazio, 2010; Carlson *et. al.*, 2013; Schneider, 2013; Koltay, 2015). Data (information) literacy is often referred to as science data literacy and described as the ability to understand, use and manage data (Qin & D'Ignazio, 2010). Stakeholders pertinent to the global development agenda often rely on the skills of data (information) literate professionals (experts) for their information needs to search for, find, curate, organize, cite, and use data (information). According to Zins (2017) with the explosion of data and data-intensive research, the need to preserve and curate data for long-term access, reproduce research and comply with funding agency policies has become a critical component of the research lifecycle. These critical global sustainable development prerequisite needs present to information professionals and any and all pertinent stakeholders, several unique opportunities in fitting traditional old age (now obsolete) information literacy into the new digitally inclined 21st century 'Fourth/4th Industrial Revolution' (4IR) era (ACRL, 2013). In addition to subsequent inherent challenges in establishment, acquisition and development of new skill/knowledge/competency sets/ models and technical/logistical infrastructural as well as financial support as noted by ACRL (2013). Taking the initiative to impart Africa with new 4IR based skills and knowledge in data (information) literacy management could not have come at a more opportune moment as Africa embarks on collecting, organizing, analyzing, monitoring, and presenting data around SDGs and targets as highlighted by the (United Nations General Assembly, 2015). As data-intensive (big data) research increases around SDGs and targets with required compliance to mandates from funding agencies to make datasets available,

data-driven decision making to inform policy and practice grows; expanding the responsibilities for researchers, information scientists and development policy professionals (experts) to support SDGs' data management services. Didham and Ofei-Manu (2015) affirmed that data literacy (education) is a critical key to the global integrated framework of SDGs that serves as an important means of implementation for sustainable human development due to the number of positive benefits it brings across the development goals and targets. Additionally, quality basic education is a necessary formation for learning throughout life in a complex and rapidly changing world (Bokova in UNESCO, as cited in Didham & Ofei-Manu, 2015:96). Quality basic education is about how and what is learned and its influence on personal and collective choices for sustainability (Ibid). This allows every human being to acquire knowledge, skills, attitudes and values necessary to shape a sustainable future as pristinely articulated on by McKeown et al. (2002) and Nascimen (2016).

1.2 Problem statement

The '4th Industrial Revolution' (4IR) - based data literacy (education) in today's 21st century digital world was by majority consensus approved, from the literature reviewed, as key in catalyzing the achievement of the global Sustainable Development Goals (SDGs). But sadly however, the literature reviewed was also telling of many African developing countries' challenge to harness this potential. A critical problem exists in Africa's lower compliance degree to current data literacy integration mandates into development agenda as mandated by SDGs' funding agencies relative to the developed world. Current scientific SDGs funding agencies' mandated research data management applications' utilization, a critical factor in catalyzing the achievement of the global SDGs is especially low on the African continent with many development challenges subsequently poorly understood and managed, a problem that the study attempted to examine.

1.3 Aim

The aim of the study was to examine the integration of data literacy into the development as a catalyst in achieving the Sustainable Development Goals.

1.4 Objectives

The objectives of the study were to:

- i. Identify the strategic significant value/role of data literacy (education) in catalyzing the achievement of the Sustainable Development Goals (SDGs) within the 4th Industrial Revolution (4IR) era.
- ii. Identify the inherent challenges faced.
- iii. Identify the solution-based recommendations to overcome the identified inherent challenges faced.

1.5 Research Questions

- i. What is the strategic significant value/role of data literacy (education) (dependent variable) in catalyzing the achievement of the Sustainable Development Goals (SDGs) within the 4th Industrial Revolution (4IR) era)?
- ii. What is the inherent challenge faced?
- iii. What is the solution-based recommendation (remedial action) to overcome the inherent challenge faced?

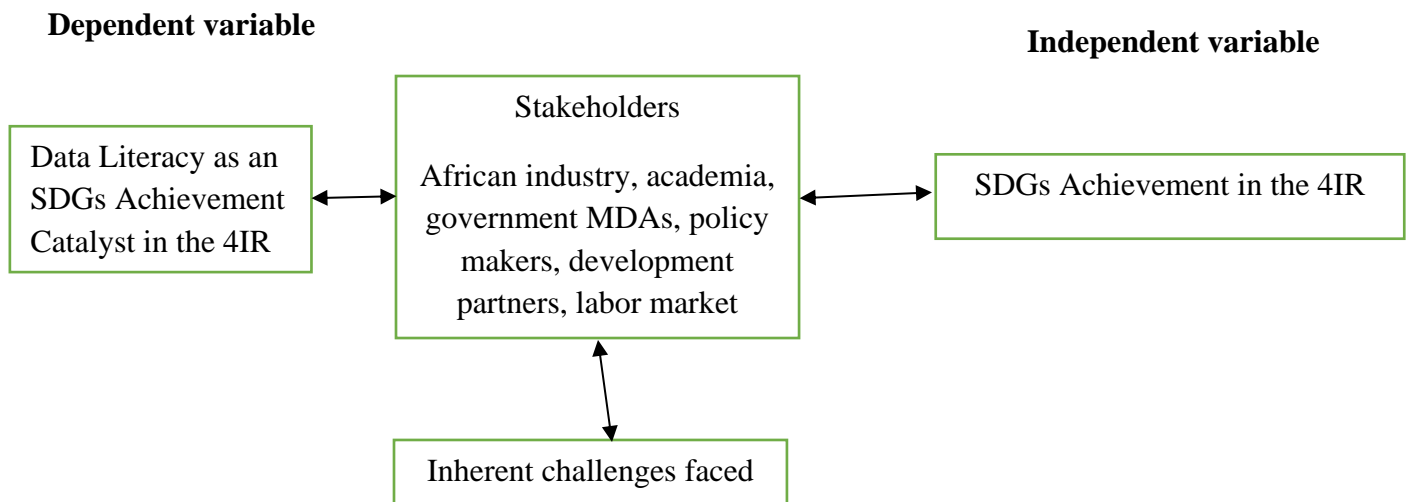
1.6 Significance

Manda and Backhouse (2017) envisioned an onset of 4th Industrial Revolution (4IR) based data literacy disruptive change to the labor market in their projected increased demand for data literate labor. Their key indicator for data literacy catalyzed Sustainable Development Goals (SDGs) achievement of literacy quality and how effectively it was used for development (personal, social, physical, cognitive, moral, psychological and emotional). The study strived to trigger an increased supply of a data literate labor force in Africa to increase the continent's labor market force's compliance to SDGs funding agencies' mandated research data management applications' utilization, a critical factor in catalyzing the achievement of the global SDGs. The study outcome bares significant implications for information professionals, academia, government Ministries, Departments and Agencies (MDAs), development policy makers, development partners, the civic community and the labor market navigating the highly dynamic 21st century world of work within the 4th industrial revolution (4IR) era today.

1.7 Conceptual framework

The study conceptualized 'data literacy' (dependent variable) as being a significant catalyst in the 'achievement of the Sustainable Development Goals (SDGs) in the 4th industrial revolution (4IR)' (independent variable) and the 'inherent challenges' (intervening variable) as an impediment to both the dependent and independent variables. The study further conceptualized that the dependent, independent and intervening variables affected stakeholders pertinent to sustainable development.

Schematic illustration of conceptual framework



2.0 Literature review

2.1 Role of Data Literacy in achieving SDGs

The United Nations Educational, Scientific and Cultural Organization (UNESCO) (2018) asserts that achieving sustainable development requires a change in the way we think and act. Consequently, a transition to sustainable lifestyle, consumption and production patterns which is enhanced through education for all. The 2030 Incheon Declaration on Education recognizes the important role of education as a catalyst in achieving SDGs (Incheon Declaration, 2015 as cited in UNESCO, 2018, p.34) adding that education empowers people of all ages to take personal responsibility for creating a sustainable future through data literacy.

Libraries, especially academic and research libraries are increasingly taking on the task of supporting their community of users in data collection, analysis, management, and preservation an area of charge that came to be known as research data management (Tenopir and et al, 2014). Through the SDGs Library Guide portal a one-stop shop was established for resources on the SDGs, which enable researchers to locate key information easily. The portal has, among other contents, key internet sites, open-access reports and statistics, open education resources, books, journal articles among others (Nhamo &Malan, 2021).

Namhila and Niskala (2013) noted that access to information was an essential strategy in achieving the SDGs and that information professionals and centers like librarians and libraries were not only key government partners but were already contributing towards achievement of the 17 SDGs by supporting their implementation in regards to providing access to (data) information. The National Library of Uganda (NLU) provides Information Communication Technology (ICT) training to female farmers in weather forecast, crop price and online market access in their local languages, increasing their economic wellbeing (IFLA, 2015). In addition, Makerere University has been at the forefront in providing health information services to health professionals and local communities in Uganda (Musoke, 2014).

Thus, education in any form provides transferable skills relevant to collaborative problem solving. This means that, access to basic education emphasizes socio-emotional skills for achieving positive life outcomes and reducing educational and social disparities that would have hindered Sustainable Development Goals (SDGs) (World Education Forum, as cited in UNESCO, 2018).

2.2 Challenges

Data literacy faces the curriculum development change process which passes through different subsequent steps that demand effective and efficient monitoring and control of each process (Nevenglosky, 2019). Accordingly, curriculum development is not a simple process that can be accomplished without multi-stakeholder collaboration and this negatively affects the implementation of data literacy in achieving sustainable development goals in Uganda (Sintayehu *et al*, 2017).

The main challenge facing the successful achievement of the United Nations Agenda 2030 based SDGs in the 4IR 21st century digital world is to manage the data revolution in support of sustainable development; prioritizing the broadening and deepening of production; dissemination and use of statistical data and identification of those population groups which are most vulnerable and making governments more accountable to their citizens (Eele, 2015).

Although ideas on their diverse participation in the curriculum development process that ensure its most effective and efficient execution have emerged in research papers published in scientific journals and presented at conferences (Veselin et al., 2014). Curriculum development remains a complex and iterative process with a great number of activities involving many stakeholders whose roles are most commonly associated with evaluation of complete activities.

2.3 Solutions

According to Abbott *et al.* (2008), there is a need to explore the role that the states can play in setting future policy and developing and mandating licensure and certification requirements for all educators on data literacy as a catalyst to achieving SDGs in addressing the following concerns:

- I. Will states require education institutions to offer data literacy programs?
- II. Will education institutions be held accountable to show evidence of graduate data literacy?
- III. How will graduate data literacy be measured?

IV. How will such requirements stimulate change throughout the education system and impact practice on the development of SDGs?

Therefore, there is a clear need for a scientific and comprehensive survey and inventory of the existence of courses and the extent to which data-driven practices are integrated into existing courses (Mandinach et al., 2011). Additionally, it is necessary to understand how states are dealing with the issue. Researchers and policy implementers need to know what accreditation and licensure requirements around data literacy have been issued by the states, how those requirements are being implemented, and how institutions of higher education are responding. The information from such a comprehensive survey and inventory will provide fundamental data from which policy organizations and education schools can build and respond. Currently, there is only anecdotal information that is insufficient and even inappropriate, given the policy and practice emphasis on the importance of data-driven practice and this affects the achievement of the SDGs (Amunga, 2011).

Inclusion and equity in and through education and training are vital to ensuring a transformative education agenda and the right to safe quality education and learning throughout life based on the principles of non-discrimination, gender equality and equal opportunity for all must be ensured to improve on data literacy to achieve the SDGs (Banisa, 2015). Commitments are needed to support lifelong learning opportunities for all to ensure necessary competencies for personal development, decent work and sustainable development, with attention to climate change, adaptation and mitigation (EFA Global Monitoring Report, 2015: 294).

Education institutions must provide children, youth and adult learners with the competences to be active citizens in democratic and sustainable societies. This includes efforts to promote education for sustainable development and sustainable lifestyles, democracy and human rights, gender equality, age-appropriate comprehensive sexuality education, physical education and sports, education in native language, peace and non-violence (Bradley, F. 2016).

3.0 Discussion and conclusion

Given that data literacy is still a major challenge in Africa, greater efforts are needed to eradicate illiteracy through formal and non-formal education and training and ensure equitable access to digital literacy, as well as media and information literacy as a continuum of proficiency levels within a lifelong learning perspective. Various extant and emergent forms of academia (education), state (public) and industry (private), sector cooperation (collaboration) on data (information) literacy promotion with special emphasis on curriculum development must take center stage moving forward. Concrete approaches to support developing countries in the area of specific instruments and requirements provisions for data literacy and data ecosystems capacity building and development should take on a stronger efficient service delivery, transparency, and accountability narrative. The success of the SDGs should not be measured by a head count of cities with better data, but by how many cities have used data to solve the problems their citizens face. Data governance and data literacy are indispensable for managing data quality, and thus by their overarching nature, making use of them is a prerequisite of effective and efficient data services as a catalyst in achieving sustainable development goals (Association of College and Research Libraries, 2015). It is important for information professionals to acquire and provide effective data literacy (education) skills and services irrespective of the fact that these competencies extend beyond the knowledge and skills of typical information professionals. Paying attention to the SDGs is an important step towards making all audiences accept the information professionals' mission to provide data literacy skills and services to their full satisfaction as opined by ACRL (2000). The success of the 4th industrial

revolution depends on leadership from all sectors working together to leverage the opportunities and address the challenges of the 4th industrial revolution in achieving the sustainable development goals. Political leadership, for example, is responsible for developing and implementing an enabling environment for digital transformation and innovation. Hence information centers are coping with this new and emerging arena of data services through professional development and re-skilling efforts as a few are able to hire specialized staff as noted by Christensen-Dalsgaard *et al.* (2012).

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Endnotes

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