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(REVIEW ARTICLE)

Revamping Nigeria's economy through sustainable data governance

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Abstract

Big data technologies have intensified the need for Sustainable Data Governance (SDG). Significant empirical evidence from literature revealed that of the 2.7 zettabytes of data now in the digital universe, only 67% of organizations deployed data governance or data intelligence solutions, 76% of company executives consider information "mission-critical" or most important asset, while 46% including Nigeria had no formal governance strategy in place. Globally, significant relationships exist between SDG and Sustainable Information and Communication Technology (SICT). Data governance (DG) that is driven by SICT is agile, holistic, security-embedded, accurate, high-quality, sustainable, and on a real-time enterprise data pipeline, required in revamping any nation's economy. Despite these global impacts of SDG in revamping the national economy, numerous investigations have shown that DG in Nigeria has remained relatively non-existent or unattended to because its approach is driven by IT that adopted rigid and fragmented processes that were carried out on a system by system basis, lacked a single version of the truth or one single reference for critical master data across geographies, business structure, and wider support of the organization. Poor sustainability of ICT in Nigeria also posed barriers that impede progress related to DG due to corrupt policies and practices, ignorance, and illiteracy that plagued SICT innovations in Nigeria. The authors adopted the Unified Theory of Acceptance and Use of Technology (UTAUT) as the conceptual framework for this study. UTAUT model claimed that users' acceptance behavior towards technology is determined by users' perceived benefits of using technology and the factors that drive users' decision to use it. A narrative review methodology was adopted in this study to review significant information based on the study conceptual framework, and existing systems that enhance SDG in revamping Nigeria's economy. Articles reviewed include peer-reviewed articles and other documentaries within the last 5 years, extracted from electronic databases, using keywords such as "ICT and SDG", "SDG and national economic development", "Trends for SDG", etc. Results from this study revealed that better decision-making, analytics, and regulatory compliance to policies, laws, and guidelines on the adoption of ICT, coupled with good formulation and communication of same, are the major drivers of sustainable DG for revamping the national economy. The result of this study may increase understanding, minimize corrupt practices and encourage trust and regulatory compliance of ICT innovations, adoption, and sustainability that can positively impact SDG for revamping Nigeria's economy.

Keywords: ICT; Sustainable Data Governance; Adoption; Sustainability; Nigeria's Economy; Trust; Corruption

1. Introduction

Data governance (DG) is one of the biggest assets for revamping any nation's economy. The concept of DG has evolved over time and requires a critical skill in today's world of Big Data [17]. With the Internet of Things (IoT), a growing mass of organization data is becoming complex and sophisticated [29]. Data management solutions on their own are becoming very expensive and unable to cope with the reality of ever-increasing data complexity, integrity, and security. Data availability, usability, integrity, and security of the data in enterprise systems, when properly managed coupled

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with its associated analytical algorithms occupy a great position in revamping the economy of any nation. The success of the most valuable companies in the world is now underpinned by a sophisticated capacity to collect, organize, control, disseminate and commercialize data. This is because a data-driven economy for revamping the economy of any nation begins with data [41]. 2.7 zettabytes of data now reside in the digital universe. 67 % of organizations deployed data preparation, DG, or data intelligence solutions, while 46% including Nigeria had no standard governance strategy in place [13]. In this era of big data and artificial intelligence, SDG has become the lead driver of wealth creation, and economic revamping. Data and IP have now become essential drivers of the business strategy of all companies in revamping the economy of their nation. One of the best ways to revamp the economy of any nation is to solve the data problem by implementing effective DG.

Data Governance (DG) is comprised of systems that define decision rights, rules, and protocols for data and data-related processes, performed according to agreed-upon models. These models define the protocol for actions with what, when, and under what circumstances to use what methods for ensuring the effective and efficient use of quality data [12]. DG is a collection of processes, roles, policies, standards, and metrics that ensure the effective and efficient use of quality data for the desired organizational goals. It specifies the decision rights and responsibility systems that ensure appropriate behavior in the valuation, creation, utilization, and control of data and analytics. The issue of data governance has been a global discourse since data was discovered to be the new oil that powers the world economy. Data Governance is all about realizing that data are assets to the national economy and making the most of that asset. DG deals with all the rules, policies, roles, responsibilities, and tools that an organization needs to put in place to ensure that its data are accurate, consistent, complete, available, and secure. It is a quality control discipline for the process of managing, storing, using, improving, and protecting organizational information.

DG is a holistic approach to the way data are managed, collected, used, and stored. DG is concerned with the successful management of organizations' big data and metadata assets according to laid down protocols and answerability [40]. According to [12], a shift from informal governance to formal DG is required in all data-driven organizations in order to cope with the following four situations: (a) The organization's activities grows so large that traditional data management processes can no longer address or handle data-related cross-functional activities. (b) The organization's data management systems become complicated that traditional data management processes are not able to address data-related cross-functional activities. (c) The organization's Data stakeholders, database design teams, or other horizontally-focused groups need the support of cross-functional database systems that take an enterprise or ICT view of data concerns and choices. (d) Regulation, compliance, or contractual requirements call for formal DG driven by ICT rather than IT.

DG framework driven by IT will fail because IT platforms are built on fixed procedures that run on a step-by-step basis, void of ICT-driven methodologies that support broader business goals [12]. DG is all about realizing that data that are accurate, consistent, complete, available, and secure, when driven by SICT, are the asset for revamping any nation's economy [30]. ICT defines physical frameworks, structures, and devices used for the collection, storage, processing, and disseminating of data and data items in embedded connections for the dispatch of desired goals [34] and [35]. The global aim of DG is to encourage a single version of the truth and to allow one single reference for critical master data, across geographies and business units. This is achieved through good metadata and data integrity that combines elements of data quality and security, data management, and SDG. SDG is of significant importance in driving sustainable national economic growth in Nigeria. A very important and striking association exists between SICT and SDG [7].

On the other hand, SICT is what defines SDG [34], and occupies a significant key position in leveraging SDG [35]. Technological innovation value is measured by its adoption, acceptance, and sustainability [23]. It is a sustainable ICT platform that drives or serves as a major enabler of SDG tasks [34] and [44]. Despite the significant importance of ICT technological innovations in Nigeria, the SDG that drives national economic growth has been crippled because its enabler (SICT) has been destabilized by poor adoption, usage, corrupt practices, and sustainability, which ravaged virtually every system in Nigeria.

1.1. Problem Statement

DG is ICT driven system that is meaningfully aligned with ICT policies, rules, goals, and values in a sustainable manner. Our purpose in this study was to identify the challenges of SICT that negatively impact SDG and economic development in Nigeria. The general IT problem postulated in this study was the poor performance or sustainability of DG majorly due to corrupt ICT policies, standards, and practices, ignorance, and illiteracy that plagued SICT innovations in Nigeria required for SDG for revamping Nigeria's economy. The specific IT problem is that some ICT policies, standards, laws, guidelines, and value systems on the adoption and sustainability of ICT coupled with formulation and communication

of same, posed barriers that impede progress related to SDG and revamping of the economy because such policies and practices are rendered impotent by corrupt practices, ignorance, illiteracy, and bad ICT governance.

1.2. Research Question

What are DG processes, roles, policies, standards, strategies, and metrics driven by SICT that ensure the effective and efficient use of data and information in revamping Nigeria's economy?

2. Literature Review

The global aim of DG is to encourage a single version of the truth and to allow one single reference for critical master data, across geographies and business units. This is achieved through good metadata and data integrity that combines elements of data quality and security, data management, and SDG [26]. The benefits of DG are far-fetched in Nigeria because its enabler (ICT) is not adequately valued, adopted, or used. Hence SICT designed to drive SDG is crippled [30]. The value placed on ICT is measured by its sustainability. Organizations are motivated to use ICT based on their perceived level of trust, and value [2]. Therefore, failure to value and use ICTs can undermine even the strongest DG policies, because what contributes to non-sustainable ICT innovations has proven to cause or be related to non-sustainable DG [44]. SICT has significant importance in leveraging SDG [7]. Empirical findings from researchers claimed that major key determinants of SICT are the content and functional values that interact positively to affect its sustainability and the implementation of appropriate policies and guidelines that significantly interface with users to impact sustainable technology adoption [7], [34], [35], and [44]. Other determinants of SICT are perceived trust, value, and provision of security platforms that significantly influence its enablement for SDG [3].

In Nigeria, the major factors militating against SICT include corrupt policies and practices, ignorance, illiteracy, and a bad economy. Strict obedience to ICT principles, policies, and protocol have been claimed by a significant number of empirical researchers as the major enablers of SICT [34], [35], and [44]. Violations of established ICT policies and safeguards by users have led to poor DG, especially in Nigeria. Data Governance is a set of policies, procedures, and processes that guide the use of data to deliver quality decisions [8] and [19], and ensures that metadata and data lineage information is up-to-date, which in turn assists the data discovery process [31]. DG provides control mechanisms such as policies, rules, standards, processes, practices and structures, roles and responsibilities, controls, and decision rights to oversee the management of data [26] and [31] that results in the establishment of standards around data elements and data entities [32]. According to the data governance institute, Data Governance (DG) is a collection of systems that define decision rights, ethics, and values for data and information-related processes, executed according to agreed-upon models that define the protocol for actions with what, when, and under what circumstances to use what methods for ensuring the effective and efficient use of organization data and information. [12]. The concepts of data governance are sometimes abstract [6], Omnipresent [31], challenged by the highly dynamic, digitally rich educational ecosystem [21], with implementation processes that follow a non-linear path or formula [32] and [40]. Nevertheless, the fundamental concepts, tools, and techniques of data governance are interdisciplinary [9], interdependent, interrelated, and interconnected with SICT [21], economy, business, leadership, regulatory and compliance issues, privacy and security, and data quality, accessibility, and reliability [32]. Data governance is related to data management in the sense that data governance is considered a core capability for data management and economic revamp [11]. Data management ensures that relevant organization stakeholders can have available high-quality data to deliver organization value vision, and strategy [4] and [10].

With about 2.7 zettabytes of data now in the digital universe, and about 67 % of organizations adopting data preparation, data governance, or data intelligence solutions, while only 46% including Nigeria engaged in formal governance strategy [13], DG has become a critical skill in today's world of Big Data [17]. Quality data-driven at the right time enhances the right and timely decision-making process [45] and helps reveal opportunities to encourage a single, same, and unique version of the information or one single reference from critical master databases, across all geographical and organization units. Regulatory compliance initiatives are one of the biggest business drivers of data governance and serve as stewards responsible for data sets, the meaning of the data, and the purposes for which the data are used. However, the quality of data collected and its governance affect its compliance. It is the right data-driven by SICT that results in the creation of processes for resolving data quality issues and ensuring that data is of high quality [32] and [39]. With good data governance and good quality data-driven by SICT, organizations can drive excellent data requirements for regulatory compliance and economic revamping.

SDG is driven by SICT, whose functions include, among others, the assurance that all operational functions of data management contribute to the achievement of the organization's vision, mission, and strategy, and maintain consistency between SICT operations and data governance in their functions, goals, activities, and responsibilities. In Nigeria, SICT

innovations that should drive SDG for economy revamping are visited with non-international standard protocols embedded with corrupt policies and practices, ignorance, illiteracy, that rendered decision rights, ethics, and values for data and information-related processes attitudinal and impotent for driving SDG. These appear to be the major factors militating against SICT required to drive SDG. Where policy measures, laws, and infrastructures required to handle ICT sustainability become attitudinal, implementation and adherence to policy control over policy enforcement, and enterprise definitions are no longer reliable or efficient in sustaining ICT innovations [1], [34], and [35]. Technological innovations in Nigeria have been made to be dispositional or feeling-motivated, thereby rendering its sustainability unsuccessful, useless, and worthless [1]. Globally, significant relationships exist between human adherence to ICT protocols and policies required for the adoption of ICTs and SICT [7], [34], [35], and [44]. Violations of established ICT policies and safeguards are the major challenges of poor sustainable data governance and economy revamping in Nigeria. No nation can revamp its economy without SDG.

2.1. Conceptual Framework

The analytic tool adopted to illustrate the theories that this study intends to present is the Unified Theory of Acceptance and Use of Technology (UTAUT), proposed by [47] which was adopted as the conceptual framework. UTAUT model claims that the benefits of using technology and the factors that drive users' decision to use it are what determine users' acceptance behavior. The theory considers factors: user adoption behavior toward intention to use ICT, and users' usage behavior of ICT. These factors are collectively affected by four constructs: performance expectancy (PE), effort expectancy (EE), social influence (SI), and facilitating conditions (FC), and four moderators: gender, age, experience, and voluntariness of use. UTAUT model in recent times has been widely adopted [37]. The theoretical foundation to study ICT sustainability as the driver or enabler of SDG, the benefits: data consistency, Improving data quality, data accuracy, Maximized usage of data for decision making, Improving organization planning and Profit, and revamping of economy, is built on UTAUT.

2.2. Tools for Sustainable Data Governance (SDG).

DG is between 80% and 95% communication [24]. Many of the objectives of DG programs are accomplished within appropriate ICT tools. Clearly, DG is not a typical IT project but is driven by appropriate and sustainable ICT tools. SDG is exemplified by sustainable ICT policies that are designed to (a) simplify and make more efficient decision making with minimized asymmetric information, (b) automate many intangible activities connected with SDG, (c) collect, process and use large data sets of various formats obtained from many sources require for SDG, (d) provide immediate and very cheap communication protocols, (e) set into motion new ideas and dissemination mechanism (e-commerce) for SDG, and distribute same products as well, and (f) creating new business models and virtual entrepreneurship for sustainable SDG.

3. Research Methodology

The research methodology used in this study is driven by the narrative review research approach. The narrative review approach, according to [20], is adopted where analysis and synthesis of different and related research findings are essential to draw comprehensive expositions and conclusions based on the reviewers' own exploit, and existing theories. Narrative research methodology is evaluated by reviewing significant information based on the study conceptual framework, and existing systems that enhance DG and ICT sustainability. We also reviewed, analyzed, and synthesized prior research findings, and explicitly explained the methodological commitments of narrative inquiry. Our search criteria and the criteria for inclusion were explicitly identified by including in our review process, keywords and term identification, article identification, quality assessment, data extraction, and data synthesis. Methodological triangulation, a method to ensure the reliability and validity of data collected, and justification for resultant interpretations were adopted. According to [15], methodological triangulation is used by researchers when multiple sources of data are collected to gain multiple perspectives, and build a coherent justification of data interpretation that relates to the study case or phenomenon. We adopted methodological triangulation to ensure the reliability and validity of data, and justification of interpretations of same.

4. Data Collection

We reviewed the research findings from peer-reviewed journals and other information relevant and related to our study objectives that are consistent with our research question and conceptual framework. Our key search words were tailored toward identifying how a nation's economy can be revamped through sustainable data governance. Such phrases and terms included the relationship between sustainable ICT and sustainable data governance, adoption, sustainability, major determinants of ICT and Data Governance sustainability, how Sustainable data governance affects

the national economy, and many others. Our reviews incorporated 47 references. Forty-three (91%) of the total references incorporated in the study are peer-reviewed.

5. Analysis, Synthesis, and Discussions

The approach to DG procedures is dynamic and has no one-size-fits-all style. [10]. DG formats in any nation or organization are often peculiar and specific to such nation or organization [10]. However, DG generally goes with well-defined organizational roles, policies, responsibilities, and a unique behavior that sustains the organization's culture [27] and [36]. There is a consensus among some researchers on initial frameworks for data governance, and the attendant influencing structural factors. These researchers postulated four data governance key concepts or principles: (a) Organization, which included sound decision making [43], good judgment [5], management oversight [43], right of possession [5], Separation of duties and concern [33], and enhanced and synchronized decision making [36]. (b) The agreement that involved meeting organization needs [14], synchronizing ICT protocol with DG [42], advancing excellent data strategy [33], defining data quality necessities [26] and [36], minimizing the error of use [38], and efficient policies and procedures [25]. (c) compliance and enforcing data accountability [28] and [43], procedure enforcement [42], expected diligence [25], Privacy [5], ingenuousness [28], Security [5], data quality assessment [25] and [26], and (d) shared understanding, based on shared data utilization [5], and [36], standards and metadata management usability [27], [36], and [43], standardized data models and operations [36] and [43], and sustainable enhanced communication [33].

Lately, applicable and wide kinds of important literature have linked ICT as an important invention-enablers of sustainable data governance, cloud computing, big data, and other mobile and internet-dependent interfaces [34]. Despite the perpetration of ICT inventions in Nigeria, SDGs have remained frail and defenseless. This is because there is substantiation that suggests that loose practices and non-adherence to programs and rules are decreasingly exploiting ICT sustainability, and negatively affecting SDG. Reasons for non-sustainable ICT that negatively impact SDG included problems associated with corruption and attitudinal behaviors toward ICT usability, not placing the required value on ICT [18], and poor perception of the value and usability of ICT innovations [2].

ICT innovations in Nigeria are not adequately implemented or used. This is because most technological innovations in Nigeria lack solid and proper implementations because they often end with IT leaving off the “information and communication” aspect of ICT [1]. The non-sustainability of ICT in Nigeria is the significant cause for a non-revamped economy and low economic increase in Nigeria. Nigeria’s economic adventures including data governance are not ICT driven; hence their sustainability is crossly endangered, especially now that ICT innovations are widely integrated into ambient or ubiquitous environment. A good scenario of the extent to which SICT can drive SDG is demonstrated in the implementation of the traffic lights system in Nigeria. Technological inventions like traffic tight systems must involve “information and communication” that employ databases rather than databanks. A sustainable traffic light system or economy must be built on SDG which is driven by SICT and sustainable databases. Nonavailability of data or poor quality data puts Nigeria’s economy at a risk.

Nigeria is most likely the only country with cameras mounted on their traffic lights without corresponding ICT machinery to checkmate culprits. This resulted from poor or no quality data, resulting from poor ICT adoption that manifested in non-integration of databases, corrupt or inconsistent data capture protocols, weak data migration, and integration, and decayed and no updated data. SICT is found in quality database management, storage, and communication. No nation runs an automated traffic system without proper data governance and documentation of vehicles and their owners. In the alternative, policemen and other touts are being used to check traffic light offenders, when the traffic lights are embedded or supposed to be embedded with monitoring cameras. What a waste of resources, and a display of corruption, ignorance, and illiteracy.

About 14% of Nigerian adults see corruption as a significant challenge to ICT usability in Nigeria [46]. When ICT innovations are attitudinal and driven by corrupt practices, human emotions, behaviours, and thoughts, they become useless, un-impactful, and their outputs nonsensical, resulting in loss of revenue, inaccurate analyses, damaged reputation, and economy, including the DG that is intended to revamp the economy. Factors contributing to non-sustainable ICT have been classified into four groups by [16]: (a) operation of ICT processes, programs, and guidelines, (b) knowledge position of ICT druggies, and how it impacts operation and relinquishment, (c) well-defined ICT design size, pretensions, performance, robustness, and perpetration, and (d) technology failures performing from ICT use and abuse. On the other hand, [22] suggested three major strategies to ameliorate or manage ICT relinquishment, operation, and sustainability (a) adherence to usability guidelines and programs, (b) process control, and (c) information and data transmission and dispersion.

6. Conclusion

With the best ICT policy-driven facilities, Nigeria may start to reap the gains of SDG and economic revamping as witnessed in the developed nations. Without SDG, it will be difficult, if not impossible to reconcile data inconsistencies across the various organizational systems within the economy of a nation. Implementing SICT in Nigeria should be given urgent and top priority attention for SDG and revamping of Nigeria's economy.

Compliance with ethical standards

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Disclosure of conflict of interest

There are no conflicts of interest.

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