DATA QUALITY MANAGEMENT: A PREREQUISITE FOR SUSTAINABILITY AMONG FIRMS IN RIVERS STATE

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ABSTRACT

The purpose of this paper is to provide understanding about data quality management and sustainability as well as elaborate on the importance of data quality management for organizational sustainability. The baseline theory for this study was job characteristic theory, while the method used was the secondary methods where literatures were reviewed. The study elaborate on the necessity of data quality management for organizational sustainability. The study also found out that data quality management has a huge impact on sustainability as it improve decision-making, increased operational efficiency, and enhanced customer satisfaction. The study concluded that data quality management is a prerequisite for sustainability in any organizations Based on the conclusion, the study suggested that organizations and business firms should facilitate active use of data quality management as it has a positive influence on organizational sustainability.

Keywords: Data quality, data quality management, sustainability, decision making, innovation customer's satisfaction, and operational efficiency.

INTRODUCTION

In recent years, the rapid changes introduced by digitization have impacted all aspects of human life. These changes have propelled organizations to embrace innovative business practices and to improve organizational processes through the implementation of robust systems for improved efficiency that can enhance sustainability (Dulce et al., 2023). Bestman et al (2022) posit that sustainability connotes the ability of organizations to be consistent in their mode of operation in order to survive over a long period of time. Sustainable organizations are the ones whose attributes, activities and actions are projected to bring a desirable future-state for its stakeholders (Funk, 2003). Hence, management of organization have continued to advanced strategies that seeks to improve efficient and excellent services in their respective organization. Therefore, the need for organizations to continually analyse sustainable outcomes becomes very pivotal to ensure it delivers on set objectives. Individuals who see the services of organizations in the lens of efficiency are more likely to come back and patronize or do business with the firm. One way to achieve this is by promoting policies that would positively impact sustainability in organizations through requisite data quality management practices.

The prevalence of data quality management in the organization is pivotal as it ensures an organization holds track of needed insights to efficiently run their business. This is because data quality management culture in the organization impacts the successful administration of the organization's day-to-day operational activities. According to Crosby (2018), researchers are paying more attention to data quality management as it is integral towards maintaining a competitive edge and improving overall organizational outcomes. In this current time of

innovation, the fast development of data has impacted numerous organizations to invest in various digital platforms and solutions which warehouses institutional records, paper-based records, and other electronic archives for improved efficient delivery of service. Data quality management is suggested as a key factor in addressing the challenges of managerial and administrative responsiveness and reliability of data in the organization (Arikekpar & Bestman, 2023). Data quality management is essential for making informed business decisions, improving coordination of resources for work, and ensuring compliance with regulations.

Consequently, as administrators and managers of organizations including profit and non-profit orientated organizations are tasked with efficient utilization organizational resources towards the attainment of organizational goals; a key to realizing these set goals is majorly dependent on not necessarily the data available to them, however how these available data is able to meet the requirements that impacts the decision-making process positively in the organization. According to the U.S. National Institute of Statistical Sciences (2013), the requirements of data quality management involve two key aspects in the data quality framework which includes; data which meets value both quality and worthiness for use, and the processes by which data is produced. Also, data quality management depends on various factors, such as the purpose that the data are used, the user, the time, etc.

Data quality management is a key imperative for organizations to ensure these components are well managed as they are key ingredients in the data quality management process. High-quality data is essential for improving operational efficiency. This is because the organization will have the basic building blocks that it used to drive the programs and policies of the firm. As such, they can take the right steps towards administering to the day-to-day operations of the business. Data quality management is critical to firms as it ensure that further actions and decisions are also made based on already documented data realized overtime across various departments in the organization. According to Alexander and Critic (2018), data should be properly evaluated and examined to ensure that it is appropriate for use, as incomplete or inadequate data impedes the ability of an organization to deliver improved and efficient service.

Studies have advanced different constructs in the context of data quality management. Previous study by Redman and Wang (2020), examined data quality management that can be used to implement activities and the monitoring of data to ensure that it continues to meet quality standards, which is key towards gaining improved organizational outcomes. Also, the Study conducted by Arikekpar and Bestman (2023), investigated data quality management and organizational responsiveness in indigenous oil and gas companies in Rivers State, Nigeria, However, to the best of our knowledge almost none of the reviewed studies examined data quality management that can be achieved through; data profiling, data visualization, data integration and meta data management towards organizational sustainability measures such as improved decision making and innovations. It is upon this background this research intends to fill the gap by exploring data quality management and organisational sustainability among firms in Rivers State, Nigeria.

Statement of the Problem

Data quality management is a critical factor for sustainability in any orgaization. Without data quality management, organizations may srtuggle to carry out efficient services and administrative duties which could lead to poor decision making and inadequate service delievery. Lack of proper data quality management in businesses may result inaccurate data that could affect the business decisions, loss of customers and waste of resources. However, in recent times, there has been a growing concern about the level of data quality management

among firms in Rivers State, Nigeria. The present-day firms in Rivers State, Nigeria are confronted with diverse difficulties of dealing with their records. These difficulties range from dubious documentation processes, huge record control, unfortunate information filing, as well as unfortunate data recovery. The difficulties represent an obstacle on the appropriate and efficient administration of how services are rendered. Data quality management is a critical component for organizations as it ensure that organizatons make use of all strategies, methods and tools that ensure the delivery of accurate and complete data to enchance susitanability.

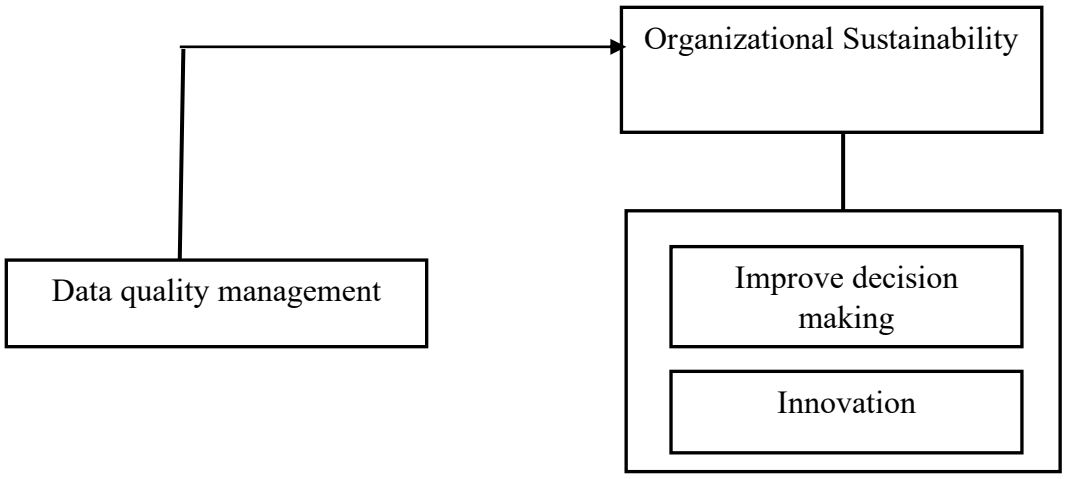

Figure 1: *Conceptual framework of data quality management and organizational sustainability among organizations in Rivers State.*
Source: Research desk (2024)

LITERATURE REVIEW

Theoretical Framework

The theoretical foundation of this study is hinge on the job characteristic theory, the theory was propounded by Richard Hackman and Greg Oldham in 1976. The job characteristics theory describe the relationship between job characteristic and individual response to work. The theory identify factors that make a job motivating, satisfying and engaging for workers. The theory ensure proper management of relevant knowledge for improved work delivery. Thus, when team's productivity and individual employee out-comes are on the decline and most times this decline can be attributed to lack of requisite information and knowledge needed to produce desired results, the model can be used to the work content. Hackman and Oldham maintained that Job characteristics influences employees' attitude, which then brings about work outcomes and consequently job performance. The theory highlighted the task condition that ensures individuals are predicted to prosper in their work. The job characteristics theory emphasizes that the job itself should be crafted in a manner that ensures it comprises essential characteristics necessary to result in high level of work motivation, fulfillment, and efficiency.

This theory has a commanding influence on this study Data quality management and organizational sustainability, as it will enable managers and administrators of the organizations to model the job and drive the needed influence that will allow for the collective realization of data quality management for improved efficiency that will enhance sustainability.

Consequently, the employees will be aware of this role as it pertains maintaining standards in the data management process as part of the job that they are been employed into. And because of this, employees feel well carried along, interested, and happy to perform various task, and that realizing data that possesses the needed data quality requirements which in turn serves as the building blocks for continuous improvement and outcomes of teams and individual employees, resulting in overall efficiency in the delivery of organizational services.

Concept of Data Quality Management

The management of data quality is essential for any business in today's contemporary business landscape, as it is integral for effective administration and efficient services delivery. Data quality management (DQM) is regarded as an essential aspect of any business process. Pipino, Lee and Wang, (2002), Wang maintained that data quality management can be a powerful asset for businesses. They defined data quality management as the ability of data to meet the needs of the consumer and that it is a measure of integrity, accuracy, and completeness of the data. Furthermore, Arikekpar and Bestman (2023), defined data quality management can as the accuracy, completeness, consistency, timeliness, and relevancy of data.

Hence, data quality management is a set of capabilities, strategies, methodologies, and practices that ensure the delivery of accurate, complete and fresh data. Pipino, Lee and Wang, (2002), posit that data quality management is important for businesses as it facilitates the decision-making process of management in the organization, enhance their ability to identify and address data quality issues, and accurately measure performance. However, DQLABS (2024) defined data quality as the reliability of data, considered by the ability of data to serve its intended purpose. According to Loshin (2010), there are three main strategies that can be used to ensure data quality in organizations. These strategies include setting and enforcing data standards, implementing data profiling and integration processes, and establishing data governance processes. Therefore, the data quality management process which can also be seen as it dimensions include; data profiling, data visualization, data integration and Meta data management.

Data Profiling

Data profiling encompasses an assortment of methods to efficiently analyze a given data set. Abadi (2007), stated data profiling is the process of examining the data available in an existing data source and collecting statistics and information about that data. From a more advanced perspective, techniques such as key-word-searching in data sets, sorting, writing structured queries, or even using dedicated data profiling tools. Data profiling very important in data quality management, and this is because of two major reasons which includes the fact that the area itself is neither established nor defined in any principled way, despite significant research activity on individual parts in the past. Secondly because more and more data beyond the traditional relational databases are being created and beg to be profiled (Felix, 2014). In this study, data profiling is described as the process of examining, analyzing and creating useful overview of data. Which in turn seeks to eliminate errors in the quality data management process. Data profiling captures the procedures geared towards assessing data sets as well as the realization of metadata. Profiling results can also be used to measure and monitor the general quality of a data set, for instance by determining the number of records that do not conform to previously established constraints (Felix, 2014).

Data Visualization

Data visualization techniques have been immensely responsible for effective information realization and insights generation. In today's ever advancing business environment, data visualization techniques, methodologies, and applications have experienced profound advancements such that many businesses and organizations perceive them as a primary means of analyzing and interpreting data for their business. According to Nguyen, Gardner & Sheridan, (2020), data visualization is key towards improved decision making in the decision. Previous Studies conducted on the prevalence of data visualization shows that about 57% of businesses implemented some form of data visualization as a way of generating business insights (Stodder 2013). Data visualization can be defined as the way and manner data is displayed for easy interpretation and understanding. Tools such as graphs charts, maps etc are employed in this regard. Data visualization is a key element in visual analytics, this is because data visualization is pivotal and acknowledged as a critical skill for data-centric jobs and is one of the most sought-after job requirements across businesses all over the world today (Ryan et al., 2019).

Data Integration

Following the introduction and continuous utilization of databases by businesses and administrators across the globe. Data integration emerged as one of the primary fields of research in the area. Data Integration is the central process of combining data from various sources at a single place to give the users a virtually unified view of all the data. Integrating the data from diverse heterogeneous sources is essential from the business point of view, as it ensures that the organization conduct analysis of data at a single place. Data integration can be defined as be the process of organizing historical, current or real-time data, that is realized from diverse locations or formats (syntax or semantics), into a single structure so that the user is able to view it as a single entity irrespective of its location or syntax/semantics. Effective data integration helps organizations act intelligently because of the reports generated from the data available in the organization (Sagar & Pravin, 2016). The objective of data integration design transcends in how the global schema is defined. In mainly centers around which data model to use and what kinds of constraints can be expressed on the data. In addition, the relation between the data sources and the global schema needs to be defined.

Data integration is essential in data quality management because of two major reasons which includes; firstly, for a given set of available information systems, an integrated view could be forged to expedite information access and reuse through a single avenue or access point. And secondly because for a particular information need, data from different information systems is compiled to gain a more extensive basis towards the required need (Gal, 2006). Accordingly, organizations can use the results emanating from their analysis to make pivotal decisions that impacts the organization positively. When data is passed from its source system to a data warehouse various inconsistencies, errors or redundancies may be introduced. These inconsistencies or redundancies need to be removed so that the data warehouse is able to provide a reconciled view of the data to the users of the data warehouse. Integration of data is integral as it impacts efficient delivery of customer needs. The data integration system provides a unified view of the data combined from various sources, called the global schema. The global schema provides an integrated, regulated, and virtual view of the underlying sources (Sagar & Pravin, 2016).

Meta Data Management

Meta data management entails the fitting of Meta data that ensures requisite data is located for reporting and analysis. It helps an organization view the relationship between data and draw possible conclusions about data available in their database. Metadata refers to information

dimensions which are created, stored, and shared in order to understand the value and contextual relevance of a data resource. Owing to the advancement in information technology, World Wide Web and more recently the social semantic web, the importance of metadata cannot be overemphasized as it impacts efficient delivery of data quality management that supports improved decision making in the organization (Satija, Mayukh & Daniel, 2020). Meta in information management and studies refers to the structured data (more specifically, a record of descriptor-value pairs) describing characteristic features of information bearing entities. It is often explained with the phrases of "data about data" and "information about information resource" which captures its essence in brevity. The effective management of an organization's Meta data facilitates two critical roles towards providing access to the organization's e – resources. And these roles includes; digital data organization, and identification and discovery of resources during real time search. Such a technological leap towards remote access of digital information resources backed by metadata tags have also necessitated a further line of research, that of standardization of the way metadata records should be organized in terms of consistency, appropriateness, and relevance of their tags. Studies on data quality management has brought about the introduction of several metadata models, sometimes referred to as metadata schemas (standard, if recommended by an appropriate international organization).

Concept of Organizational Sustainability`

Colbert and Kurucz (2007) identify the colloquial definition of sustainability as being to "keep the business going", whilst another frequently used term in this context refers to the "future proofing" of organizations. Boudreau and Ramstad (2005), refer to "achieving success today without compromising the needs of the future". Organizational sustainability is referred to as "adopting organizational strategies and activities that meet the needs of the enterprise and its stakeholders today while protecting, sustaining, and enhancing the human and natural resources that will be needed in the future" (Deloitte and Touche, 1992). Bestman et al (2022), defined organizational sustainability can also be seen as the ability of organizations to be consistent in their mode of operation in order to survive over a long period of time. Sustainable organizations are the ones whose attributes, activities and actions are projected to bring a desirable future-state for its stakeholders (Funk, 2003). Sustainable growth encompasses a business model that creates value consistent with the long-term preservation and enhancement of financial, environmental and social capital.

Measures of Organizational Sustainability

Improved Decision Making

Improved decision-making connotes the process of evaluating multiple different courses of action in order to determine the most optimal choice that will lead to enhanced outcomes. The capacity of an administrator or management to make decisions on behalf of their respective organizations and select the optimal course of action to accomplish the established target or resolve the problem at hand. The use of organised choice guidelines is necessary in order to maintain focus and adherence to established protocols. These guidelines, collectively known as decision-making methods, have been explained in the study conducted by James and Edwin (2017). Improved decision making refers to the process of making better choices or judgments by using various strategies, tools, and techniques to enhance the quality of decisions. This can involve gathering and analyzing relevant information, considering different perspectives, weighing potential outcomes, and minimizing biases or errors in thinking. Improved decision making often leads to more effective and efficient results in both personal and professional settings. Improved decision making involves enhancing the quality of choices or judgments made by individuals or groups through the use of effective strategies, methodologies, and tools.

It encompasses processes such as gathering relevant information, analyzing data, considering various options, assessing risks, and minimizing biases to achieve better outcomes.

Nutt (2014), a distinguished researcher and professor in decision-making, has made significant contributions to understanding and improving decision-making within organizations. Nutt's concepts and findings include the idea that approximately half of organizational decisions fail, causing financial losses and other negative consequences. To address this issue, he proposes understanding the reasons behind decision failures to improve decision-making processes and outcomes. Additionally, Nutt criticizes organizations for relying on flawed decision-making processes that involve assumptions, biases, and limited information. Instead, he suggests a more structured and systematic approach, including exploring various alternatives, considering diverse perspectives, and assessing potential risks and consequences. Hence, improved decision making in organization can lead to a number of benefits that promote organizational success. First, it can lead to more efficient and effective operations, as decisions are made based on accurate and up-to-date information. This can help to reduce costs and improve profitability. Second, improved decision making can lead to better customer service, as decisions are made with the needs of customers in mind. This can lead to increased customer satisfaction and loyalty, and can help to attract and retain customers. Third, improved decision making can lead to greater innovation, as organizations are able to identify and pursue new opportunities more effectively.

Innovation

The word innovation is derived from the Latin word ‘innovare’ meaning ‘to renew, to make new or to alter’. In order to sustain achievement, a firm needs to survive the competitive and turbulent market, in which products’ life cycle, technologies, competitors, laws and even whole societies exhibit rapid change of nature. Firms need to protect their tangible and intangible assets against the market uncertainties (Davila et al., 2006). Innovation gives the organization the ability to adapt and evolve to meet the changing market conditions and customer demands. It is generally and widely acknowledged as a key ingredient of productivity success and involves People, Process and Product. A recent definition by Knowles et al. (2008), defines innovation as the introduction of new products, processes, or business systems. Such introduction could be as a result of adoption or creation of new products, processes or business systems. Rogers (2003) defined innovation as “an idea, practice, or object that is perceived as new to an individual or another unit of adoption.” From the definitions provided, innovation can be inferred as a new product, process or business system. Innovation is the implementation of a new or significantly improved product (good or service), or process, a new marketing method, or a new organizational method in business practices, workplace organizations, or external relations. A product innovation is the introduction of a good or service that is new or significantly improved with respect to its characteristics or intended uses. This includes significant improvements in the technical specifications, components and materials, incorporated software, user-friendliness or other functional characteristics.

Data Quality Management a Prerequisite for Sustainability among Firms

Pipino, Lee and Wang, (2002), posit that data quality management is important for businesses as it facilitates the decision-making process of management in the organization, enhance their ability to identify and address data quality issues, and accurately measure performance. In addition, the authors maintained that DQM can improve the quality of data by reducing errors, improving accuracy, and increasing the completeness of data. Effective data quality management practices are essential for businesses to remain competitive in the modern market

and to be able to make improved decisions quickly and accurately. Pipino, Lee and Wang (2002) clearly presented the appositeness and relevance of data quality management in business. Without utilizing this tool, organizations may lack the ability to make improved decisions, leading to poor service delivery to customers.

Timely availability of data is essential for successful coordination of business processes. In order to ensure that data is available when and where it is needed, strategies must be implemented to enhance quality. According to Pappaioanou et al. (2003), organization-wide strategies can be implemented to ensure timely data availability. Some of the strategies includes improving the quality of existing data, developing a framework for decision-making, and utilizing technology for data storage, manipulation, and communication. Quality improvement initiatives should involve improving data accuracy, completeness, and clarity.

Mathieu and Zajac, (2002) who agreed that data management has been used to implement activities and functions that increase response from participants in functions within the organization, which are incredibly vital for valuable performance. Data quality is seen from the degree to which data is fit for use by data consumers in their intended uses" (Redman and Wang, 2008). Data quality management is therefore focused on ensuring that data meets the needs of its intended users, whether they are internal or external to the organization. Effective data quality management can provide numerous benefits to organizations, including improved decision-making, increased operational efficiency, and enhanced customer satisfaction. Data management requires a commitment to ongoing improvement and a culture of data quality within the organization

According to Felix, (2014), results gained from effective data profiling can also be used to measure and monitor the general quality of a data set, for instance by determining the number of records that do not conform to previously established constraints so as to enhance efficiency in the organization. According to the author, deploying techniques such as query optimization and data cleansing will aid a more reliable data profiling outcome. The author suggested that there is need to advance sustainable data profiling culture in the organization, as data profiling will improve work outcomes. According to Anvesha (2022), an organization may have a large volume of databases without knowing what exactly to do with it. However, with data visualization, administrators will be able to deploy data visualization tools to enhance their decision-making capabilities as it helps them gain improved understanding and what to do to improve administrative outcomes.

Anvesha (2022), that data visualization ensures relevant insights are visibly presented in such a way that end users will be able to understand data contents even without having deep knowledge on data management. According to the author, when data visualization is properly presented, it conveys a story of data contents for easy comprehension. The storytelling of data visualization is critical component of data quality management as it captures key data areas to facilitate further actions. According to Joseph and Rebecca (2023), data integration is critical for improving outcomes in an organization. The authors affirmed that data integration has been guiding successful administrative outcomes at the workplace, especially with the expansion in data needed for running an organization proactively. Also, the authors maintained that the organized manner in which an organizations' data is integrated from several sources, there is need to also make needed provisions to accommodate this adjustment in the data lifecycle management. They further recommended that organizations become more innovative in their data integration policies and programs to ensure they arrive at well informed business decisions.

METHODS

The study adopts the review of extant literature as the method of this study. For the purpose of providing a better understanding about the concept, several literatures were studied and reviewed to better highlight the problem of the study. Both empirical and non-empirical papers were reviewed to give insight on the topic data quality management: a prerequisite for sustainability among firms in Rivers State.

CONCLUSION

The efficiency of every organization depends reasonably on the data quality management practices by the management of the organization. As technologies among firms continue to change day by days. The ability to sustain real-time service and adaptability in the face of technological changes era necessarily requires sound data quality management system to aid management in the quest to enhance sustainability. Therefore, the study provided the relationship between the dimension of data quality management and measures of organizational sustainability accordingly, the study strategy and methodology were designed in a way that points towards the achievement of the study objectives. The study concluded that data quality management through the use of data profiling, data visualization, data integration and metadata management have a very significant influence on improved decision-making and innovation.

RECOMMENDATIONS

The following recommendations are hereby made:

i. Firms should make use of data quality management more effectively and efficiently so as to increase efficiency as well as enhance sustainability in the organizations.
ii. Firms should implement standard data visualization system as a strategy for sustaining and improving its sustainability as it enables them to interpret data easily and make sound decision.
iii. Data quality management should be given more attention as it enables the organization to improve work outcomes as well as enhance it sustainability.

Contribution to Knowledge

This study having theoretically validated the purpose of this study, which is to provide understanding on the concept of data quality management: a prerequisite for sustainability among firms in Rivers State, thus contributes to the existing body of knowledge. Consequently, this study will be of immense benefit to the following:

i. Firms in Rivers State will take advantage of the data quality management in their organization to incorporate the needed policies and practices which will be immensely essential towards sustainability.

ii. Also, to make relevant budgetary allocations for the training and development of staff members on up-to-date data quality management tools and data requirement to enhance efficient delivery of work outcomes across the departments, units and teams in the organization.

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