Repositioning Accounting Information System Through Effective Data Quality Management: A Framework For Reducing Costs And Improving Performance

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Abstract :- A cursory look at organization's Accounting Information System reveals a most worrying situation; prevalence of poor data and error in the database from which organizational decisions and annual reports are based. This paper focuses on Repositioning Information System through effective Data Quality Management: a framework for reducing costs and improving performance. Questionnaire and interview were used in collecting data from the respondents. The mean and standard deviation of responses were determined while the hypotheses formulated were tested for acceptance or rejection using t-test. The study revealed that the quality of data in the Accounting Information System of the selected companies conform to data quality dimensions. The result also indicated that implementation of data quality management lead to cost reduction; and adoption of data quality management tools improves organizational performance. The main recommendation of this study is that all the Accounting Information System stakeholders should undergo training so as to update their knowledge with current tools and strategies that can help prevent consequences of poor data quality.

Key word:- Accounting Information System, Data Quality, Data, Information Technology, Information, Database

1.0 Introduction

The increasing dependence of Organization on Accounting Information System to fulfill their mission in this information age demands a proactive and strategic approach to data quality management. Data and Information are fundamental ingredients of all the activities of every human endeavour. They drive the process of material acquisition, billing, preparing estimates and budget etc. Commenting on the importance of data, Eckerson cited in [9] asserted that data and information have become as much a strategic necessity for an organization's well being and future success as oxygen is to human life. Data are collected, stored, elaborated, retrieved and exchanged in information system used in organization to provide services to business operations. However, the proliferation of data in this information century means that more bad data slip through the system. Data stored in organizational database have a significant rate of error, between one and twenty percent of data items in organizational database are estimated to be poor [30]. This creates challenges of managing data for data consumers/ users and professionals [3]. Inaccurate data which include invalid and inaccurate data can originate from different data sources – through data entry, data migration and conversion projects [17]. Data quality issues are one of the critical problems facing organizations in today's business environment.

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Despite this, errors in database are often neglected issues within organizational Accounting Information System and decision support system. "Too often data are used uncritically without considerations of error contain within and this lead to erroneous result, misleading information, wrong decision and increased cost" [2]. Accounting information which is the focus of study is a powerful tool that aid decision making by providing financial information to a variety of users. However, accounting information is only as good as the underlying data it stored and information it present. Accounting information delivered in a reliable and timely manner is critical to management of every organization. Indeed effective planning and delivering of service rely heavily on accounting information. Accounting Information System has been pen and paper reliant in the past but Information Technology has undoubtedly changed the work environment of an accountant. The foundation of Accounting Information System is providing information that is readily available and accessible for decision support and improved services and operation. Information that can be utilized in this way must be accurate, reliable and consistent in order to make intelligent and effective business decision based on facts. If this is not so, the Accounting Information System becomes useless and mere waste of resources. Misinformation as noted by Rezaee and Riley [7] can significantly damage the quality, integrity and reliability of financial report. This in turn creates serious implications for an organization's well being, particularly if the outcome of the decision relates to strategic objectives that create opportunities for increase competitive advantage and thus influence on organizational ability to prosper. Organizations need to be cognizant and prepared to deal with data quality issues. Several studies have been carried out on Accounting Information system [13], [25], [31]. While much of these research has focused on the organizational coordination and evaluation of the Accounting Information System, to date no research has examined the effectiveness of using Data Quality Management to Optimize the Accounting Information System. The considerable threat of poor data in organizational database, the inherent risk associated with

this and the need for efficient Accounting Information System has prompted the research on Repositioning Accounting Information System through effective Data quality Management: a framework for reducing costs and improving performance. Information gained from this research will remind organizations of the need to take proactive step towards making data in Accounting Information System fit for intended use to justify huge investment on Information Technology initiatives.

1.1 Motivation for the Research

This paper is greatly motivated by data quality issues inherent in various organizations which if not checked will continue to have financial and legal consequences. Quality data are imperative for success of Accounting Information System, unfortunately, most Accounting Information System contain significant amount of inaccurate data [6]. Inaccurate data lie at the root of many of the most important issues of the day – from causing dissatisfaction among customers to compromising decision making to contested elections [30]. Data related problem cause supplier relationship to deteriorate, reduce internal productivity and substandard customer service [24], [21], [33]. Also poor data quality is pervasive and increasingly costly [30], [3], [26]. It is estimated that data quality problems cost US economy over $600 billion per annum (Eckerson cited in [9]. Numerous business initiatives have failed and losses generated because of data quality problems. Average perceived cost of poor data areas high as 10% of organizations revenue [3], [23]. When data are considered unreliable, data consumers must correct errors; verify the data's accuracy, all these consume staff time and add to cost [33]. In this century, misleading financial statement has become a serious problem for business, government and general public. This is attributed greatly to inadequate and lack of effective control system to assess the accuracy of data used in preparing such financial reports. This reduces public confidence on information technology and even the venerable accounting profession [7]. It is to ensure that huge investment in Accounting Information Systems yield returns that can translate into competitive advantage that a research on Repositioning accounting information system through effective data quality management: a framework for reducing costs and improving performance a study of Accounting Information System of selected Firms is justified.

1.2 Objectives of This Research

To contribute towards enhancing Data Quality for the Stakeholders in Accounting Information System, The study intends to achieve the following specific objectives.

- To empirically assess the quality of data in Accounting Information System with respect to data quality dimensions.
- To critically evaluate whether adopting data quality management procedure could lead to reduction in cost of operation.
- To examine the extent to which application of data quality management tools has led to significant improvement in organizational performance.

1.3 Assertions of This Research

- Quality of data in Accounting Information System does not significantly conform to the data quality dimensions.
- Implementation of data quality procedures does not lead to reduction in cost of operation.
- Application of data quality management tool does not significantly improve organizational performance.

2.0 Theoretical Framework

In this section attempt is made to review the existing literature on Data, Information, Data Quality, Data quality management, Accounting Information System among other major subheadings.

2.1 Meaning and Definitions of Data Items and Information

Data usually refer to the input of an Accounting Information System. As data are processed in the Accounting Information System, information is generated for decision making. Users can retrieve input data through the application software and produce information as output. There is no unique definition of data. Data refer to quantitative and qualitative attributes of a variable or set of variables. It exist in a variety of forms – as numbers or text on pieces of papers, as bits and bytes stored in electronic memory or as facts stored in a personal mind. It can be defined as raw fact. Turban et al [8] defined data item as elementary description of things, events, activities and transactions that are recorded, classified and stored but are not organized to convey any specific meaning. It can be numeric, a student grade in a class is a data item, and so is the number of hours an employee worked in a certain week, alphanumeric, figures, sounds or images. **Database** is a system where data are organized in a certain way so that accurate and timely information can be retrieved. An organization's database is its physical repository for financial and non-financial data. Database as used in the general sense, can be a filling cabinet or a computer disk. **Information** is data that have been organized so that they have meaning and value to the recipient. For example, a student's grade point average and employee's monthly emolument are information. The recipient interpret the meaning and draw conclusions and implications from data. By contrast with data, information causes the user to take an action to resolve conflict, reduce uncertainty and make decisions. This distinction between data and information has pervasive implications for this study of data quality management.

2.2 Definition and Meaning of Data Quality

The simplest definition of data quality is measurement of value of a specific set of data, utilized in a specific manner, towards a specific goal. However, researchers have gone far beyond a simple definition. They believe that data quality is multidimensional and multifaceted concept [1], Wang and strong cited in [27], [37]. No wonder in a database, data have no actual quality or value, they only have potential value that is realized only when someone uses that data to do something useful [2]. Batini and Scannapieco [1] defined data quality as encompassing term comprising utility, objectivity and integrity. This multidimensional nature means that organizations must use multiple measures to fully evaluate whether their data are fit

to use for a given purpose by a given data consumer at a given time. The general definition of data quality according to Huang et al cited in [35] is "data that is fit for use by consumers." Expressing his view on data quality Olison [6] opined that "data has quality if it satisfies the requirements of its intended use. It lacks quality to the extent that it does not satisfy the requirement. In other words data quality depends as much on the intended use as it does on the data itself. To satisfy the intended use, the data must be accurate, timely, relevant, complete, understood and trusted." Also data quality is the reliability and application of efficiency of data particularly when kept in a data warehouse. Shanks and Darke cited in [14], opined that "data quality refers to fitness of data for its purpose." Data quality in its most fundamental definition is a metric by which the value of data to enterprise can be measured. Redman [30] asserts that "data are of high quality if they are fit for their intended uses in operations and decision making and planning." Data are fit for use if they are free of defects and possess desired features. According to this definition, customers are the ultimate arbiter of quality, almost all customers want the data they use to be correct, meaning that data value agree with their real-world counterpart or with standard that itself is assumed to be correct. Kerr et al [18] supported this view and opined that consumers are people or groups who have experience in using organizational data to make business decisions.

2.3 Characterizing Data Quality in Accounting Information System -Dimensions of Data Quality

To assess the quality of data in the Accounting Information System, the research community has identified various dimensions. According to Wang et al [34] dimension of data quality also known as data quality parameter is a qualitative or subjective dimension by which a user evaluates data quality**.** The definitions of those dimensions and their associated metrics are based on intuitive, understanding, industrial experience or literature review [29] and Huang et al cited in [10].

Table: 1 Summary of Literature Review Identifying Data Quality Dimensions Mostly Used

	SELECTED LITERATURE							
Dimensions	**Loshin [4]**	**Pipino [29]**	**Kerr et al [18]**	**Berti-Equille [11]**	**Batini & Scannapieco [1]**	**Chapman [2]**	**Olson [6]**	**Fisher & Kingma [15]**
Accuracy	✓	✓	✓	✓	✓	✓	✓	✓
Completeness	✓	✓		✓	✓	✓	✓	✓
Consistency	✓	✓		✓	✓	✓	✓	✓
Timeliness	✓	✓	✓	✓	✓	✓	✓	✓
Correctness		✓						
Currency	✓	✓			✓	✓		
Comparability			✓					
Usability			✓					
Relevance			✓				✓	✓
Understood							✓	
Trusted							✓	
Volatility					✓			
Interpretability					✓			
Accessibility		✓			✓	✓		
Reliability					✓			
Readability					✓			
Uniqueness	✓							
Flexibility						✓		
Transparency						✓		
Lineage						✓		
Security			✓			✓		

Source: *Developed for this study from Literature Review*

From the literature review 21 dimensions were identified. Presenting them according to how often they were mentioned by the authors whose works were reviewed, we have- Accuracy (8), Timeliness (8), Completeness (7), Consistency (7), Currency (4), Accessibility (3), Relevance (3), Security (2), Correctness (1), Comparability (1), Usability (1), Understood (1) Trusted (1), Volatility (1), Interpretability (1), Reliability (1), Readability (1), Uniqueness (1), Flexibility (1), Transparency (1) and Lineage (1). The number represents how many authors that mentioned them. This study adopted those dimension mentioned by at least two authors. Using these criteria only the first eight dimensions were selected and used for this work

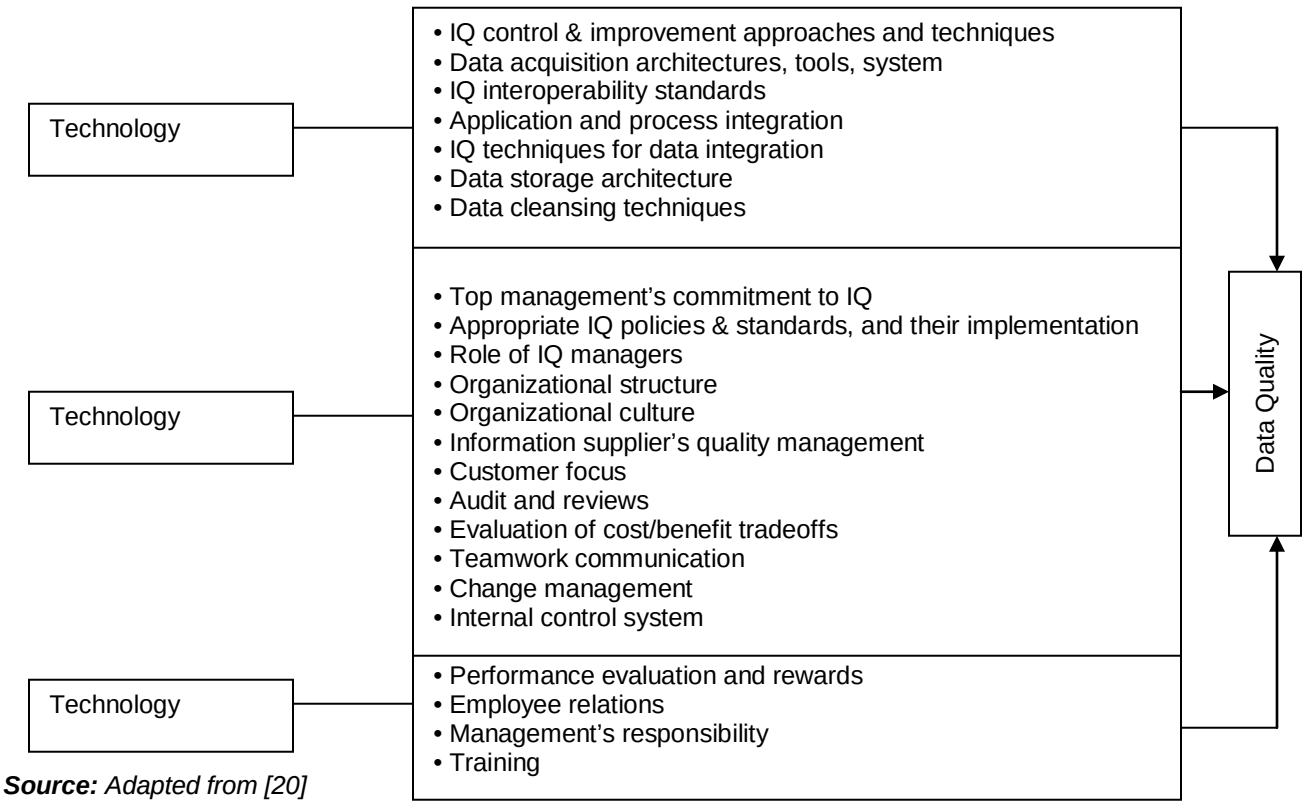
2.4 Data Quality Management

Data quality management refers to organizational strategy, polices and initiative to ensure that data existing in the database and information system in the database are free from defects. It is an important measure for improving data quality. It is about finding the causes of data problem and fixing them, making the important data more accurate, complete and timely, managing process that adds value to the organization etc. The need to ensure that data are fit for the intended use and enable organization maintain competitive edge is at the foundation of data quality management. The concept of data quality management is closely related to data management which according to definition provided by DAMA is the development, execution and supervision of plans, polices, programs and practices that control, protect, deliver and enhance the value of data and information assets. Commenting on the need to manage data quality to ensure that data are generated to satisfy user requirement, Bellou et al cited in caballero and Piattini [12] defined data quality management as: "the set of activities and processes that an organization can develop in order to design and establish several quality policies and identify techniques and procedures that assure the organizational resources for data and information are the right ones for the present and potential users of data." Data quality management should define data quality policy and data quality strategy as well as data quality objectives, processes and responsibility. According to Herlfert and Herrmann [16] data quality management consist of quality improvement processes and quality oriented organization structures, as well as supporting techniques, methods and standard.

2.5 Factors Affecting Data Quality

Most efforts on data quality issues lack strategic perspective and prevent organizations to optimize the effectiveness of their data quality initiative. Clearly, personnel management, organizational factors as well as effective technological mechanisms affect the ability to maintain data quality. Wang et al cited in [20]. In line with this classification [37] identified technological, organizational and environmental characteristics as factors that affect data quality. These factors may translate into serious consequences at the technical level, organizational level or at the legal level [12]. These are summarized below.

Summary of Factors Influencing Data Quality



Source: *Adapted from [20]*

2.6 Definition and Meaning Accounting Information System

Accounting Information System maintain and produce the data used by organizations to plan, evaluate, and diagnose the dynamics of operations and financial circumstances Anthony et al cited in [36]. Advent of information Technology changed the way in which traditional accounting systems work. Electronically captured data need to be processed, stored and distributed through IT-based Information Systems. Information Technology has dramatically increased the ability and capability of processing accounting information. However, Information Technology also bring with it some issued that traditional accounting system did not experience one of such critical issues is the data quality which is the focus of this study. Accounting information system is a system that process financial information and supports decision tasks in the context of coordination and control of organizational activities. It is defined as a subsystem of an information system, and its function is to process financial transaction and non financial transactions that directly affect the processing of financial transactions. Before explaining Accounting Information System further it is important to explain the term system and information system what are used in defining Accounting Information System. The term **system** generates mental images of computers and programming but it has much broader applicability. A system is made up of interrelated components or subsystems that work together for a common purpose. Some systems are natural such as system of electrons, protons and neutrons, while some are artificial such as social system and information system. Also while some system are open and interact with the environment, like the human system and business system, some others are closed and do not interact with the environment such as solar system [5]. An **information system** is the set of formal procedures by which data are collected, processed into information and distributed to users. It accepts input called transactions which are converted through various processes into output information that goes to user.

This is classified into:

- Accounting Information System: The subsystem that processes financial transactions and non-financial transactions that directly affect the financial transactions
- Management Information System process non-financial transaction: The distinction between Accounting Information System and Management Information System is based on the type of transaction this system process. In an organization, the functions of Management Information System and Accounting Information System are integrated in order to achieve operational efficiency.

Transaction is an event that affects or is of interest to the organization and is processed by its information system as a unit of work. **A financial transaction** is an economic event that affects the assets and equities of an organization, which is reflected in its accounts, measured in monetary terms and the organization is legally bound to process. Examples of financial transaction include sales of product to customers, purchases of inventory from suppliers etc. **Non financial transactions** on the other hand do not affect the assets and equities of an organization and the organization is not legally bound to process it; example, adding new supplies of raw materials to list of vendors. It is important to note that Accounting Information System is important organizational mechanisms that are critical for effective decision making and control in an organization. The effectiveness of Accounting Information System depends on the ability of the information provided from the system to meet the requirement of the user.

3.0 Methodology

The Survey research design method was used in carrying out this study. The target population constitute of Accounting and Information and Technology (IT) personnel in two Companies with fully computerized Accounting Information System selected for this study. These categories of staff were chosen because they are the major stakeholders in Accounting Information System and have better understanding of data quality issues. Both primary and secondary sources of data collection were used. Primary data were collected through interview and questionnaires, while secondary data were through textbooks, journals and internet materials. The questionnaires were distributed through the Accountant of the companies. Out of 36 questionnaires distributed, only 26 were properly filled and returned. The questions were designed using 5 point Likert summation rating scale with a choice of strongly agreed to strongly disagree, very large extent to very little extent, very high to very low. The value ranking of the choice ranges between 5 and 1. The maximum value is 5 and the minimum value is 1. A mean value of 3 and above was considered significant. The data collected were analyzed and presented. Standard deviation and mean of the responses were determined while t-test was used in testing the formulated hypotheses with the aid of Statistical Package for Social Science (SPSS) **Decision Rule-** Reject Null hypotheses if the t-cal is greater than the test value and accept if otherwise.

4.0 Analysis of the Results and Testing of Hypotheses

Hypothesis 1: Quality of data in the Accounting Information System does not conform to data quality Dimensions

Table 2: One sample t-test on indicators of quality in Accounting Information System based on mean value and standard deviation of responses.

Indicators of Data Quality	Mean	Std. Dev	Test-Value	Mean Difference	Df	t-cal	P-value
Data represent real world state	4.08	.845	3.00	1.077	25	6.499	.000
Data are not missing and is sufficient for the task at hand	4.08	.688	3.00	1.077	25	7.977	.000
Data presented in the same format	4.38	.804	3.00	1.385	25	8.783	.000
Data are available in time to perform task	3.81	.801	3.00	.808	25	5.142	.000
Data in the system are promptly updated	4.04	.774	3.00	1.038	25	6.845	.000
Data are applicable and helpful for the task at hand	4.27	.778	3.00	1.269	25	8.323	.000
Data in the system are available and quickly retrievable	4.19	.801	3.00	1.192	25	7.590	.000
Data are protected against unauthorized access	4.00	.849	3.00	1.000	25	6.009	.000

Source: *Statistical Analysis using SPSS Software.*

The result of one sample t-test shows that mean values of all the indicators of data quality were significantly greater than the test value of 3.00. This is shown by all the t-cals (between 5.142 – 8.783) being greater than the corresponding test-values and also the P-values .000 which are less than the stipulated 0.05 significance level. Because the t-cal is greater than the critical value, the null hypothesis is rejected and therefore concludes that quality of data in the Accounting Information System conform to data quality dimensions.

Hypothesis 2: Implementation of data quality procedures does not lead to reduction in cost of operation.

Table 3: One sample t-test on reduction on cost of operation based on mean value and standard deviation of responses.

Dimensions of Cost Reduction	**Mean**	**Std Dev.**	**Mean Difference**	**Test-value**	**df**	**t-cal**	***P-value***
Reduces time spent hunting	3.88	0.82	.88	3.0	25	5.53	.000
Reduces opportunity cost of investment in Accounting Information System that failed to meet objective	4.08	0.84	1.08	3.0	25	6.50	.000
Prevent cost of work around due to multiple common entries and inaccurate data	4.08	0.84	1.08	3.0	25	6.50	.000
Reduces high cost associated with re-work as a result of using unreliable data	3.88	0.82	.88	3.0	25	5.53	.000
Reduces excessive overhead association with duplication of work	4.08	0.89	1.08	3.0	25	6.16	.000
Reduces high cost of marketing to win back customers that left due to data problem	4.27	0.87	1.27	3.0	25	7.40	.000
Cost Reduction: Grand Mean	**4.04**	**.089**	**1.04**	**3.0**	**25**	**61.02**	

Source: *Statistical Analysis using SPSS Software.*

Using one sample t-test the mean values of all dimensions of cost reduction were significantly higher than the test value of 3.0. This is shown by the high t-cals (Between 5.53 – 61.02) and their corresponding *P-values* which are less than the stipulated 0.05 significance level. It was therefore concluded that the implementation of data quality management policies leads to overall cost reduction in all dimensions of cost reduction. The null hypothesis was therefore rejected.

Hypothesis 3: Application of data quality management tools does not significantly improve organizational performance

Table 4: One sample t-test on improvement on Organizational performance based on mean value and standard deviation of responses.

Organizational Performance Indicators	Mean	Std. Dev.	Mean Difference	Test Value	df	t-cal	*P-Value*
Sales performance	4.08	0.89	1.08	3.00	25	6.16	.000
Employee's productivity	4.15	0.78	1.15	3.00	25	7.50	.000
Making less defective product due to accurate data	4.27	0.67	1.27	3.00	25	9.71	.000
High return on investment in Accounting Information System	4.23	0.82	1.23	3.00	25	7.70	.000
Optimal use of resources due to accurate inventory control	3.81	0.69	.81	3.00	25	5.93	.000
Increase in profit margin due to reduction in cost	4.12	0.71	1.12	3.00	25	7.99	.000
Accurate budget and estimates	4.23	0.65	1.23	3.00	25	9.63	.000
Efficient planning and decision making	4.31	0.74	1.31	3.00	25	9.06	.000
Accurate reporting	4.54	0.65	1.54	3.00	25	12.13	.000
Efficient capacity utilization	4.00	0.75	1.00	3.00	25	6.81	.000
Organizational Performance: Grand Mean	**4.19**	**0.08**	**1.19**	**3.00**	**25**	**79.15**	**.000**

Source: *Statistical Analysis using SPSS Software.*

The one sample t-test shows that all mean values of all dimensions of organizational performance were significantly greater than the test value of 3.0. This is shown by the high t-cals (Between 5.93 – 79.15) and their corresponding *P-values* which are less than the stipulated 0.05 significance level. It was therefore concluded that the application of data quality management tools improve overall organizational performance as well as all dimensions of organizational performance. The null hypothesis that states that the application of data quality management tools does not improve organizational performance was not supported.

5.0 Summary of Findings

The study assesses the effectiveness of Repositioning Accounting Information System through effective data quality Management from two parameters: Costs of operation and overall corporate performance.

- The study showed that quality of data in the Accounting Information System of the companies conforms with data quality dimension and this contribute to the improved performances.
- Moreover, the study revealed that there is significant relationship between effective data quality management and cost reduction. Improvement in data quality results in reduction in cost of rework, duplication, excessive overhead due to inaccurate data.
- It was also discovered that application of data quality management tools like thorough integration and user acceptance testing improves organizational performance as evidenced in high sales performance, increase in employee's productivity, and optimal use of resources among other things.

5.1 Conclusion

Data quality management is imperative for the success of Accounting Information System as it ensure that quality data are provided for improved corporate performance. It is relevant both in decisional and operational processes. If output from Accounting Information System fail to cause users to act due to poor data quality, the system serve no purpose and has failed its primary objectives. Data quality management policies enable enterprises respond proactively and deliver products and services that customers want. It has implication for an organization's ability to perform and increase its performance. Implementation of data quality polices at all levels ensure that right information is available to the right person at the right time and right format. When this is done, organizations will be sure to compete favorably in this information age.

5.2 Recommendations

Data quality management should be an integral part of organizational database design process. All the staff involve in creating and collecting data, designing and developing

information system, managing data quality as well as those that use data in Accounting Information System should undergo training so as to update their knowledge of current tools and strategies that can be adopted to improve data quality. Organizations knowing that their activities and operations rely so much upon Accounting Information System to communicate to general public and for routine management decisions should pursue an aggressive plan of treating data as an important resource. Management should be strong advocates of data quality management. Data quality problems are not a fix it once and for all issue. This call for regular assessment and review of polices and strategies adopted in the light of prevailing circumstances. Management should show that they are committed to the initiative by investment into Accounting Information System and employing qualified business and technical personnel to be sure that the investment yield return. Communication is essential in ensuring that every person in an organization is aware of management stand on data issues. It is only when the above recommendations are implemented then organizations and general public can effectively utilize the voluminous accounting data available at their disposal.

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