Implementing Quality Management System to Enhance Organizational Efficiency: A Survey of Senior Staff at Dresser Rand Nigeria Limited

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Abstract
Organizations that struggle with the problem of inefficient resource utilization are most likely those with the absence of an effective management system. Oil and gas servicing firms looking to be effective and relevant in this twenty-first century must implement quality management systems (QMS) with a view to increasing efficient utilization of resources. This study investigates the effect of implementing quality management system certified to ISO 9001 on organizational efficiency, using Dresser Rand Nigeria Limited as a case study. The findings from this study are expected to support management's decision to implement quality management system if one of their objectives is to reduce waste and efficiently utilize resources, especially for organizations that are not yet certified. A survey of the population of senior staff achieved 70% return rate with a sample size of 49. Findings showed that Dresser Rand Nigeria Limited is certified to ISO 9001 and implements it with the following documents: Control of documents, Control of records, Internal Audit, Control of non-conforming products, Corrective action, and Preventive action. Its level of organizational efficiency was found to be high (0.79), affirming the significant and positive relationship between implementing quality management system and organizational efficiency. Further findings showed that quality system audit shifted the figure down (0.64), though was still significant. The company benefits from implementing QMS through; efficient utilisation of resources, increased employees' satisfaction, continual improvement, increased opportunities in specific markets, and increased customers' satisfaction. However there were some challenges during implementation. The findings suggest that similar firms can improve their organizational efficiency by certifying to and implementing ISO 9001 for quality management system standard; secondly, a quality system audit (both internal and external) is necessary periodically to evaluate how well the organization keeps to the guidelines of the standard. Implication for management is that, QMS can only be successful if top management are persuaded to take a sustained and active role in the implementation process.

Keywords: *Implementation, quality management system, quality systems audit, organizational efficiency*

INTRODUCTION

Background of the Study

It has become imperative with current business trends that organizations aiming to have a competitive edge in the global market and to remain relevant must implement within their work processes an effective management system that can help them to be more efficient. Organisations that are not competitive as measured by profit, in the absence of the sustained monopolistic position, may fail (Khare, 2006). If efficiency factors can drive the competitive edge, then organizations should put in place management systems with a view to efficient utilization of resources (Naveh and Marcus, 2005). Many organizations have arrived at the conclusion that effective quality management can enhance their competitive abilities and provide strategic advantages in the marketplace (Business Week, 1992, Naveh and Marcus, 2005). The main focus of the quality management system (QMS) though is on customer satisfaction; however, without an efficient work processes, wastage and inefficient utilization of resources will eventually lead to customer loss, due to dissatisfaction with defective and delayed products (Aquilano, Chase and Jacobs, 2009). An organization, therefore, progresses by placing priority on efficiency – which comes from using scarce resources in the best manner (Lawrence and Dyer, 1983:9).

In a broad sense, efficiency is the ratio of the output to the input of the resources. It measures the relationship between inputs and outputs or how successfully the inputs have been transformed into outputs (Low, 2000). An organization will achieve efficiency when it eliminates wastes and use less labour, materials, space and time through its processes. Organizational efficiency therefore measures how well the organization uses its resources. Pinprayong and Siengthai, (2012) states that organizational efficiency reflects the improvement of internal processes of the organization, such as organizational structure, culture and community. Therefore the measurement of organizational efficiency should be seen as an essential part of business management and should be carefully designed as one of the key measures of the success of an organisation. Achieving organizational efficiency has been the focus of several researchers, however, little has been said about how a QMS implementation can result in organizational efficiency.

Literature rather is replete with studies on the relationship between quality management system and customer satisfaction (Ahonen, 1999), QMS and organizational performance (Easton and Jarrell, 1998; Flynn, Schroeder, and Sakakibara, 1994; Hendricks and Singhal, 1996, 1997, 2001), but only a handful explored the relationship between QMS and organizational efficiency. Anvari, Ismail, and Hojjati, (2011) have shown that TQM principles and methods have much in common with economical and efficient manufacturing; and Kumar and Harms (2002) attributed increased operational efficiency to improved business processes. Also extant literature covers a gamut of organizational performance measures as influenced by a variety of management systems, but very few use the efficiency variable as a performance indicator (Kumar, and Harms, 2002). This study aims to contribute to the literature on the relationship between QMS and organizational efficiency by investigating the implementation of the ISO 9001 quality management system standard in Dresser Rand Nigeria Limited.

A Quality Management System can be seen as a complex system consisting of all the elements and components of an organisation dealing with the quality of processes, procedures

and products. Al-Rawahi and Bashir, (2011b) defines QMS as the managing structure, responsibilities, procedures, processes, and managing resources to implement the principles and action lines needed to achieve the quality objectives of an organisation. Naveh and Marcus, (2005) established that benefits of implementation are procedural efficiency and error rate reduction. Quality management succeeds when the cost of the system is less than the cost of defects and poor service which would otherwise result (Kumar, and Harms, 2002; Anvari, Ismail, and Hojjati, 2011).

To maximize the output Porter's Total Productive Maintenance system suggests the elimination of six losses, which are: (1) reduced yield – from start up to stable production; (2) process defects; (3) reduced speed; (4) idling and minor stoppages; (5) set - up and adjustment; and (6) equipment failure. The fewer the inputs used to generate outputs, the greater the efficiency.

According to Pinprayong and Siengthai, (2012) there is a difference between business efficiency and organizational efficiency. Business efficiency reveals the performance of input and output ratio, while organizational efficiency reflects the improvement of internal processes of the organization, such as organizational structure, culture and community. Excellent organizational efficiency could improve entities performance in terms of management, productivity, quality and profitability. Pinprayong and Siengthai , (2012) introduced six dimensions, for the measurement of organizational efficiency:

a. Corporate structure design;
b. Management and business system building (an integrated system inclusive);
c. Development of corporate and employee styles;
d. Motivation of staff commitment;
e. Development of employee's skills;
f. Subordinate goals.

An efficient organisation can be characterised by:

- explicit awareness of, and concern for, the needs of customers and other stakeholders
- (e.g. suppliers, society, staff);
- senior and middle managers who understand and focus on business needs;
- a commitment to improve products and services;
- staff development and training programmes that meet the needs of the organisation;
- processes designed to identify and reduce wasted effort or output;
- complete, current, clear and relevant documentation.

Efficiency is all about resource allocation across alternative uses (Kumar and Gulati, 2010). An effective QMS implementation can assure an organization's place through a determined focus on efficiency.

Statement of the Problem

Organizations today seek to offer products and services that not only meet but also surpass customer expectations. At the same time, they are under pressure to cut costs to remain competitive. These are challenges that have resulted in collapse of the organisation because of a lack of proper quality management (Al-Khadra, Barqawi, and Alramahi, 2012). Organizations both large and small therefore require a comprehensive approach to quality improvement that resolves these challenges of quality and cost efficiency. This paper hypothesis that an effective management of the QMS implementation stages is necessary to overcome these challenges. This paper investigates the implementation of the ISO 9001

Quality Management System in the oil and gas sector and how the standard influenced organizational efficiency.

Purpose and Objectives

The main purpose of this study therefore is to determine the extent to which the implementation of quality management system influenced how the organization utilized its resources. This purpose is achieved in terms of the following objectives:

a. Identify the effectiveness of the ISO 9001 Quality Management System implementation;
b. ascertain the level of organizational efficiency in the study firm;
c. Determine the relationship between implementing quality management system and organizational efficiency;
d. Determine the moderating effect of a quality systems audit;
e. Identifies the benefits and challenges of implementing quality management system.

Research Questions

Against this backdrop, the research seeks to answer the following questions:

a. How effective is the ISO 9001 Quality Management System as implemented?
b. What is the level of organizational efficiency in the study firm?
c. What is the nature of the relationship between implementing quality management system and organizational efficiency?
d. To what extent does a quality systems audit influence the relationship between implementing management system and organizational efficiency?
e. What are the benefits of a quality management system?
f. What challenges do companies face during implementation of a quality management system?

Hypotheses

In the course of this research work, the following hypotheses were tested.

Ho_1: There is no significant relationship between quality management system implementation and organizational efficiency.

Ho_2: Quality systems auditing does not significantly moderate the relationship between quality management system implementation and organizational efficiency

Significance of the Study

This research attempts to identify not only key stages of the QMS implementation process, but also for the manager to have a better understanding of the ISO 9001 QMS standard, and ties them to organizational efficiency for the first time. This study is both important and timely, because it represents a successful implementation of a quality management system in a leading global supplier of technology and services located in Nigeria within a highly competitive oil and gas sector, and contains detailed information about strategies that similar organizations can adopt for their own QMS or other management system implementation to increase efficiency.

Secondly, ISO 9001 certification demonstrates an organization's ability to consistently meet and exceed customer expectations (Uzumeri, 1997). For this reason, many buyers require suppliers to be ISO 9001-certified to minimize their risk of purchasing a poor product or service. A business that achieves ISO 9001 certification will be able to attain significant improvements in organizational efficiency and product quality by minimizing waste and errors, and increasing productivity. Our target is to contribute to the existing literature and

raise interest for further studies in this field.

The rest of the article is structured as follows: First, the extant literature on organizational efficiency, quality management systems with respect to designing and implementing a quality management system based on the ISO 9001 framework, and quality systems audit, are reviewed. This is followed by a description of the research methods and procedures used in the study. The results of our enquiry are then discussed. Finally, recommendations and directions for future research are offered.

Quality Management System and Features of ISO 9001

Intrinsically, quality means giving the customers what they want and in doing, one is effective, efficient and productive. A management system is simply the way an organization manages its processes, people and other resources so that its products or services meet their objectives and customer requirements. Quality management system therefore implies management commitment to quality. According to Al-Rawahi and Bashir (2011b) quality management system consists of all the organization's policies, procedures, plans, resources, processes, and delineation of responsibility and authority, all deliberately aimed at achieving product or service quality levels consistent with customer satisfaction and the organization's objectives. When these policies, procedures, plans, etc. are taken together, they define how the organization works and how quality is managed.

ISO 9001 is an international standard that defines requirements for establishing a quality management system to control and manage the processes of an organization and to better serve their customers. The Standard is built upon eight fundamental principles of quality management, embedded into its various requirements and these are: Customer focus, Leadership, Involvement of people, Process approach, Systems approach to management, Continual Improvement, Factual approach to decision making, and mutually beneficial supplier relationships. It is noteworthy here that a process-based QMS helps the organization achieve efficiency better since things are managed as processes, rather than as individual tasks or separate departments.

Aside the principles as outlined in the documentation, ISO 9001 are structured in clauses which serve as a guide for organizations during the implementation process. The clauses are labelled as: 0. Introduction, 1. Scope, 2. Normative Reference, 3. Terms and Definitions, 4. Quality Management System, 5. Management Responsibility, 6. Resource Management, 7. Product Realization, and 8. Measurement, Analysis and Improvement. Limitations of this research will only permit a brief description of the clauses.

The first 4 clauses (0 to 3) do not provide any requirements for a QMS. They just provide background information: like purpose, concepts, principles used - (like Process Approach, the Plan, Do, Check, Act- PDCA) etc. The remaining five clauses numbering 4 through 8 provide the control requirements that a QMS must implement. The following is a brief explanation of these 5 major clauses or parts of the ISO 9001 standard. Each major clause has several sub-clauses. Collectively, these 5 clauses set out the requirements for an organization's QMS.

Clause 4 - Quality Management System - sets requirements to identify, plan, document, operate and control QMS processes and to continually improve QMS effectiveness.

Clause 5 -Management Responsibility - sets requirements for top management to demonstrate its leadership and commitment to develop, implement and continually improve

the QMS.

Clause 6 - Resource Management - sets requirements to determine, provide and control the various resources needed to operate and manage QMS processes; to continually improve QMS effectiveness; and to enhance customer satisfaction by meeting customer requirements.

Clause 7 - Product Realization - sets requirements to plan, operate and control the specific QMS processes that determine, design, produce and deliver an organization's product and services.

Clause 8-Measurement, Analysis and Improvement - sets requirements to plan, measure, analyse and improve processes that demonstrate product and QMS conformity and continually improve QMS effectiveness.

ISO (2015) states that the adoption of a quality management system is a strategic decision for an organization that can help to improve its overall performance and provide a sound basis for sustainable development initiatives. The potential benefits to an organization of implementing a quality management system based on this International Standard are:

a. The ability to consistently provide products and services that meet customer and applicable statutory and regulatory requirements;
b. Facilitating opportunities to enhance customer satisfaction;
c. Addressing risks and opportunities associated with its context and objectives; and
d. The ability to demonstrate conformity to specified quality management system requirements.

The overall objective of an organization's QMS must be to enhance customer satisfaction by meeting their requirements. This objective can be achieved by using the ISO 9001 requirements to control their QMS processes and by continually improving QMS effectiveness. Derived benefits then means that QMS implementation will ensure the organizations work in a more efficient way as all their processes will be aligned and understood by everyone in the business or organization. This increases productivity and efficiency, bringing internal costs down.

Designing and implementing a Quality Management System

There are many ways an organization can implement a quality management system (Lee, and Yu, 2009; Prajogo, Huo, and Han, 2012), however the decision lies with management; therefore top management's commitment to adopt, establishing, and implementing the QMS is the lifeline to any successful QMS implementation (Lohrke, Bedeian, and Palmer, 2004). Clause 5.1.1(a) under Leadership of the ISO 9001 QMS requirements states that Top management shall demonstrate leadership and commitment with respect to the quality management system by taking accountability for the effectiveness of the quality management system (ISO, 2015). They can do this by appointing competent persons for the implementation and providing resources. Clause 7.1.2 under Support requires that The organization shall determine and provide the persons necessary for the effective implementation of its quality management system and for the operation and control of its processes; and Clause 7.1.1 under Support states that The organization shall determine and provide the resources needed for the establishment, implementation, maintenance and continual improvement of the quality management system (ISO, 2015).

Incidentally, ISO 9001 does not outline stages in the implementation process. Fortunately,

however, we can rely on the guide provided by QMS service consultants like ETI, who have experiences assisting more than 650 small, medium and large companies through the complete implementation process from start to successful registration. Our study framework for QMS implementation is therefore based on ETI Group's implementation guide (ETI, 2014) summarised below. They proposed 15 steps divided into four phases. Phase 1 comprise of planning and design steps; Phase 2 comprise steps for documentation development, establishing quality system structure, designing and documenting of management processes; establishing of measurement programmes, and designing and documenting of operations processes; Phase 3 comprise steps for implementation; and Phase 4 comprises steps for assessment and registration. Following is a brief explanation about each phases and steps.

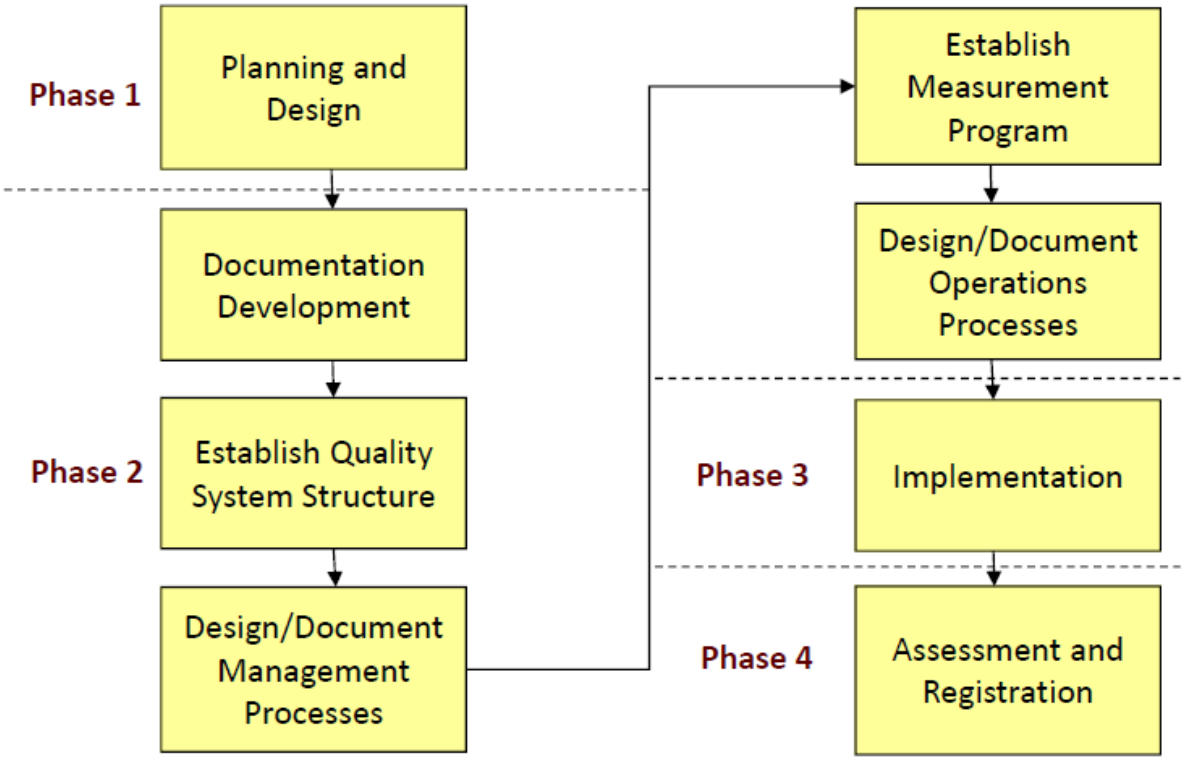

Fig. 1 Phases and Steps in the Implementation of QMS
Source: ETI, (2014)

PHASE 1: PLANNING AND DESIGN

Step 1 —Decision Making and Commitment: The first task is for top management to decide if the company should pursue ISO 9001. If the decision is taken, then Top management must also demonstrate its commitment and determination to implement an ISO 9001 Quality System in the organization. Without top management commitment, no quality initiative can succeed.

Step 2 —Implementation Team & Management Representative: ISO 9001 is implemented by people. The next step is to establish an implementation team and appoint a Management Representative (MR) as its coordinator to plan and oversee implementation. Implementation team members should include representatives of all organizational functions - Marketing, Design, Development, Planning, Production, Quality control, etc.

Step 3 —Employee Awareness Training: It is important to inform employees as early as

possible of management's plan to become ISO 9001 registered. They will need to explain the concept of ISO 9001 and how it will affect employees in order to gain buy-in and support.

Step 4 —Perform a Gap Assessment: The next step in the implementation process is to compare your existing quality system with the requirements of the ISO 9001 standard with the goal of determining: what existing company processes and procedures already meet ISO 9001 requirements, what existing procedures and processes need to be modified to meet ISO 9001 requirements, and what additional procedures and processes need to be created to meet ISO 9001 requirements.

Step 5 —Implementation Planning: A detailed implementation plan should be developed that identifies and describes task required to make the Quality System fully compliant with the standard. This plan should be thorough and specific, detailing: Quality documentation to be developed, The relevant ISO 9001 standard section, Person or team responsible, Approvals required, Training required, Resources required, and Estimated completion date.

PHASE 2: DOCUMENTATION DEVELOPMENT

Step 6 —Documentation Development: The minimum requirements for documented procedures required to create an ISO 9001 QMS are 6: Document Control; Control of Records; Internal Audit; Non-Conforming Product; Corrective Action and Preventive Action. For example, a Quality Policy is the foundation of an organization's QMS and establishes top management's commitment to Quality.

PHASE 3: IMPLEMENTATION

Step 8 —Implementation and Employee Training: The newly documented Quality System is put into practice throughout the company. Management and employees are trained on the new or revised work processes, procedures and work instructions as formalized in your documentation.

Step 9 —Quality System Registrar Selection: The registration body is an independent organization that is officially accredited to issue Quality. ETI advises that an organization chooses a registrar early and one that is suited to them. The registrar will audit your company's Quality System and if the audit is successful – issue the Quality System certificate.

Step 10 — Internal Auditor Training & Commence Internal Audits: ISO 9001 and related standards require that your company periodically perform an internal audit to evaluate the effectiveness of your Quality System and check that it complies with ISO 9001 requirements as well as your organization's own documented work practices.

Step 11 Management Review: Management reviews are conducted after about 6 months to ensure the continuing suitability, adequacy and effectiveness of your Quality System.

PHASE 4: ASSESSMENT AND REGISTRATION

Step 12 —Stage 1 Registration Audit: When the Quality System has been in operation for a few months and has stabilized; it is normally time to schedule your stage 1 registration audit. Your selected registration body will first carry out an audit of your documentation and then, if your documents meet the requirements of the standard, the

registrar will visit your facility and perform a stage 1 Audit to ensure all applicable ISO 9001 or related standard requirements have been met.

Step 13 – Corrective Actions: Following the stage 1 audit, management will review the results and make corrective actions to fix any non-conformances (activities that are not in compliance with the requirements of the standard and/or own documented work practices) found during the stage 1 registration audit.

Step 14 —Stage 2 Registration Audit: The organisation's selected Registrar will perform a stage 2 Registration Audit to ensure all applicable ISO 9001 or related standard requirements have been met and that the organization have corrected any non-conformances found during the stage 1 audit. Following the successful completion of the stage 2 audits the company will be awarded an ISO 9001 certificate, generally for a period of three years. During this three-year period, your registration body will carry out periodic surveillance audits to ensure that the system is continuing to operate satisfactorily.

Step 15 —Continual Improvement: ETI points that Certification to ISO 9000 should not be an end. An organization should continually seek to improve the effectiveness and suitability of their Quality System through the use of their: Quality policy, Quality objectives, Audit results, Analysis of data, Corrective and preventive actions, and Management review.

Quality Systems Audit (QSA)

It is not enough to implement a QMS and hope that it would achieve the objectives of the QMS implementation continually. One major technique to ensure the QMS is effectively implemented and maintained is to conduct a quality systems audit. An audit is a systematic and independent examination to determine whether quality activities comply with specifications and whether these specifications are implemented effectively. Therefore, ISO defines an audit as a systematic, independent and documented process for obtaining audit evidence and evaluating it objectively to determine the extent to which audit criteria are fulfilled (ISO 9000, 2005; ISO 19011, 2011). Quality System Audits (QSA) is conducted by registrars to ensure that providers and employers are providing products and services of an acceptable standard.

Other compelling reasons why a QMS implementation should be audited include ensuring compliance with ISO 9001, ensuring compliance with organization requirements, and ensuring compliance with regulatory requirements. (Hernandez, 2010) added is that, auditing can be done for improved performance in the QMS implementation to look for opportunities for improvement, look for best practices that could be applied in other areas, look for preventive action, and look for outstanding emphasis on customer satisfaction. Casadesús and Castro (2005) advised that, an internal audit should be conducted within the organization prior to calling in a registrar for an external audit as this would ensure better compliance through preparation.

MATERIALS AND METHODOLOGY

The target population for this study consisted of senior staff of Dresser Rand Nigeria Limited. Questionnaire was distributed to them on the 9th of January, 2017 and retrieved two weeks later, on the 20th of January, 2017. A total of 49 questionnaires, representing 70% of original sample size of 70, were retrieved and found usable. The questionnaire was titled:

Implementing Quality Management System and Organizational Efficiency in Dresser Rand Nigeria Limited. Staff responded to questions about their personal demographics, the state of the implemented QMS, their perception to efficiency indicators within the organization, and how they perceived the quality systems audit. They also provided perceptions as to their understanding of challenges of implementation and benefits derivable from a quality management system. Reliability scores using Cronbach alpha achieved the following results of 0.74, 0.72, 0.85, 0.76 and 0.83 respectively for QMS Implementation, Organizational efficiency, Quality systems audit, Benefits of Implementing QMS, and Challenges of Implementing QMS to show that instruments were consistent. Data collected were analyzed with frequency, mean, percentages, and Pearson Product moment correlation coefficient statistical tools using SPSS statistical software package. A 5-points Likert scale was used to measure responses for the aforementioned variables which puts the mid-point at a mean rating score of 3 (1 = To no extent; 2 = Small extent; 3 = Moderate extent; 4 = Large extent; and 5 = Great extent).

About the Study Firm

Dresser-Rand is among the largest global suppliers of custom-engineered rotating equipment solutions for applications in the oil, gas, petrochemical, and process industries. Dresser-Rand business offers an equipment portfolio that includes turbo and reciprocating compressors; steam turbines; industrial and aero-derivative gas turbines; high-speed engines; and modular power substations. With the world's largest installed base, one of the world's largest technical support and service center networks, and a presence in more than 150 countries worldwide, the Dresser-Rand business delivers local solutions and services on a global scale.

One of the key milestones in the history of Dresser-Rand is the company-wide initiation of Total Quality Management in the year, 1989 and in 2008 was named one of America's Safest Companies by EHS Today magazine. In 2014, Dresser-Rand received Industry Leader Award for Safety Performance. Dresser-Rand has been recognized as a leader in Health and Safety for which they have received many awards including:

i. Occupational Excellence Achievement Award from the National Safety Council (North American Operations and several individual facilities);
ii. Zero Accident Award from the local mayor (Cilegon, Indonesia Service Center); and
iii. Global Certification to OHSAS 18001:2007 by Lloyd's Register Quality Assurance (LRQA)

Some of their quality certification include ISO 14001:2004 Global Multi-site Certificate, ISO 9001:2008 Certificate and OHSAS 18001:2007 Certificate.

DATA ANALYSIS AND INTERPRETATION

Primary data were collected from the organization. Out of the total 70 senior staff visited, 49 useable responses were obtained with the rest declining or not providing a response in time as well as cases of incomplete responses. This represents a 70% response rate which was considered enough to provide a valid inference regarding the implementation of ISO 9001 QMS and its effect on organizational efficiency in Dresser Rand.

Table 1: Demographic characteristics of respondents

Characteristics	Frequency	Percentage
Gender		
Male	41	83.67%
Female	8	16.33%
Total	**49**	**100.00%**

Age of Respondents		
18 - 25 years	9	18.37%
26 - 35 years	15	30.61%
36 - 45 years	18	36.73%
46 years & above	7	14.29%
Total	**49**	**100.00%**
Marital Status		
Single	24	48.98%
Married	25	51.02%
Total	**49**	**100.00%**
Position in organization:		
General Manager ;	3	6.12%
Technical/Departmental Manager ;	8	16.33%
Engineer (Process/Mechanical/Electrical) ;	12	24.49%
Project Planner/Project Manager	6	12.24%
Supervisor	20	40.82%
Total	**49**	**100.00%**
Department		
Administration	5	10.20%
Accounts	4	8.16%
Engineering	11	22.45%
Procurement	8	16.33%
Production	12	24.49%
Health, Safety & Environment (HSE)	9	18.37%
Total		
	49	**100.00%**
Educational qualification		
B.Sc./B.Ed./BA/HND/NCE	29	59.18%
M.Sc./MBA/M.Ed./Ph.D.	8	16.33%
Others	12	24.49%
Total	**49**	**100.00%**
How long have you been with this organization?		
2-3yrs	4	8.16%
3-10yrs	16	32.65%
10yrs and above	29	59.18%
Total	**49**	**100.00%**

Source: Researcher's Field survey data, 2017

Table 1 above shows the distribution of respondents according to their characteristics. Gender distribution is skewed in favour of the male respondents, who are more than 80%, implying a male-dominated employment structure in the organization. The age range with the least frequency is 46 years and above as indicated by 7 representing 14.29% respondents. Mean age of respondents is given as 34.74 years with standard deviation of 8.33. The marital status distribution is quite uniform with Single 24 (48.98%) and Married 25 (51.02%). Under

Position in organization, table shows that most supervisors are close to half of the respondents, with 20 representing about 41%. As expected, General Manager, who are part of top management, is the least with only 3 (6.12%). Table also shows that respondents were pooled from 6 departments, and distribution was close to even except for the departments of Administration and Accounts which were the lowest with respective frequencies of 5 (10.20%) and 4 (8.16%). Production was the department that contributed the highest number of respondents with 12 (24.45%). Table showed that Educational Qualification was skewed in favour of those with qualifications from tertiary institutions having nearly 60% of respondents. Respondents with post-graduate qualifications were 8 (16.33%). Finally, table showed that researcher sought to know how long respondents have been in the organization. This was important in that it usually takes close to a year for top management to decide on QMS, complete implementation and conduct an audit; therefore only staff who have worked a minimum of two years would witness implementation process and would give valid response. As the table indicates, only 4, representing 8.16% have been with the organization for between 2 – 3 years while 16 (32.65) indicated 3 – 10 years. The rest nearly 60% have been with the organization 10 years and above.

QMS activities that organization has documented procedures

The implementation of ISO 9001 QMS requires that an organization has, as a minimum, the documented procedures for the following activities: Control of documents, Control of records, Internal Audit, Control of non-conforming products, Corrective action, and Preventive action. Table 2 below shows that the organization has documented procedures for all of the required documents as indicated by the respondents.

Table 2: **Response on QMS activities that organization has documented procedures**

Activities	No.	Yes	Total	Percent (Yes)
Control of documents	0	49	49	100%
Control of records	0	49	49	100%
Internal audit	0	49	49	100%
Control of non-conforming products	0	49	49	100%
Corrective action	0	49	49	100%
Preventive action	0	49	49	100%

Source: Researcher's Field survey data, 2016

Effectiveness of QMS Implementation in Dresser Rand

Questions were posed to determine how effective the respondents perceived the ISO 9001 QMS implementation. Table 3 below was used to summarize the eight questionnaire items used in measuring this variable as perceived by senior staff of Dresser Rand Nigeria Limited. Two items were used to represent each of the four phases earlier identified in literature, which are Planning and Design, Documentation Development, Implementation, and Assessment and Registration. The highest mean rating score of 3.898 was got for the assertion that Top management has demonstrated its commitment and determination to implement an ISO 9001 Quality Management System in my organization and this is a Planning and Design phase. The standard deviation for this instrument was 1.246 showing that there was modest variability with regards to how each of the sampled senior staff perceived the effectiveness of top management's efforts in planning and design in their organisation. The lowest mean rating score of 3.061 was got for a step in Implementation phase where respondents asserted that our documented Quality management System is put into practice throughout the organization. The standard deviation for this instrument was

1.391. The overall mean score is 3.352 being high than 3.0 is interpreted to mean that respondents have perceived the implementation of QMS effectiveness to be high.

Lee, and To Yu (2009) after conducting a survey on 45 ISO 9001 certified service organizations in Macao, China postulate that managers in organizations must realize that ISO 9001 is capable of generating a competitive advantage only if top management is fully committed to program implementation from a strategic perspective.

Table 3: Senior Management's response on the effectiveness of QMS Implementation

Questionnaire Items	N	Mean	Std. Deviation
Planning and Design: Top management has demonstrated its commitment and determination to implement an ISO 9001 Quality System in my organization	49	3.898	1.246
Planning and Design: Employees of this organisation were informed as early as possible of management's plan to become ISO 9001 registered.	49	3.367	0.906
Documentation Development: My organisation has all six of Document Control; Control of Records; Internal Audit; Non-Conforming Product; Corrective Action and Preventive Action as part of our documentation.	49	3.286	1.155
Documentation Development: Our Quality Policy truly reflects and establishes top management's commitment to Quality	49	3.347	1.762
Implementation: Our documented Quality System is put into practice throughout the organization.	49	3.061	1.391
Implementation: My organization periodically performs an internal audit to evaluate the effectiveness of our Quality System and check that it complies with ISO 9001 requirements.	49	3.469	1.459
Assessment and Registration: Following the stage 1 audit, management reviewed the results and made corrective actions to fix any non-conformances.	49	3.143	1.137
Assessment and Registration: I perceive that my organization is committed to continual improvement	49	3.245	1.164

Source: SPSS ver. 20 Output window

Organizational Efficiency in Dresser Rand

Table 4 below was used to summarize the five questionnaire items used in measuring organizational efficiency in the firm as perceived by respondents. The highest mean rating score of 3.510 is for the assertion that in their organization, there is proper resource allocation by management in order to reduce cost inefficiency. The standard deviation for this instrument was .982 indicating senior staff agreement did not vary much. The lowest mean rating score of 3.020 is for the assertion that their organization has employed staff in departments only on the basis of need. The standard deviation for this instrument was 1.574, which shown that respondents varied widely in this assertion. As a matter of fact, the overall mean score for this variable is 3.233 with a standard deviation 0.465. The overall mean score being higher than 3.0 is interpreted to mean that organization efficiency in Dresser Rand is significantly high.

Table 4: Senior Management Response on Organizational Efficiency

Questionnaire Items	N	Mean	Std. Deviation
In my organization, there is proper resource allocation by management in order to reduce cost inefficiency	49	3.51	0.982
My organization has employed staff in departments only on the basis of need	49	3.02	1.574
Personally I am satisfied with how quickly I see measurable results from performance improvement due to implementation of ISO9001	49	3.184	1.55
Management has clear customer oriented policy set in place, which leads to constant focus on efficiency	49	3.347	1.091
My firm has proper resources allocation policy for staff and there is organizational perspective of their future.	49	3.102	1.046

Source: SPSS ver. 20 Output window

Challenges of QMS Implementation

Challenges identified by this research to be militating against QMS implementation include Increase in production costs during training and implementation of the QMS, dissatisfaction of staff because of new methodology, Lack of support from personnel, and lack of qualified personnel. Table 5 below indicates that agreement to the extent of challenges range from a low mean rating score of 2.583 to the highest of 4.042. The factor that was perceived to be more challenging is dissatisfaction of staff because of new methodology and the least was Lack of Qualified Personnel with a mean rating score of 2.583. The overall mean rating score for challenges of QMS implementation is 3.323 implying that these challenges are significantly high since they are above the mid-point of 3.

Table 5: Senior Management Response on Challenges of QMS Implementation

Questionnaire Items	N	Mean	Std. Deviation
Increase in production costs during training and implementation of the QMS	49	3.0833	.97504
dissatisfaction of staff because of new methodology	49	4.0417	1.02693
Lack of support from personnel	49	3.2083	1.34203
Lack of Qualified Personnel	49	2.5833	1.28644

Source: SPSS ver. 20 Output window

Hypothesis 1: The Relationship between QMS Implementation and Organizational Efficiency

The relationship between QMS Implementation and Organizational Efficiency is resolved by subjecting the variables to Pearson product moment correlation coefficient analysis. Recalling the first hypothesis earlier stated, we have:

Ho_1: There is no significant relationship between QMS Implementation and Organizational Efficiency.

In testing this hypothesis, data on QMS Implementation and Organizational Efficiency were related and the result obtained is as shown in Table 6 below.

Table 6: Correlation coefficients for QMS Implementation and Organizational Efficiency

		QMS Implementation	Organizational Efficiency
QMS Implementation	Pearson Correlation	1	.79(**)
	Sig. (2-tailed)		.004
	N	49	49
Organizational Efficiency	Pearson Correlation	.79(**)	1
	Sig. (2-tailed)	.004	
	N	49	49

** Correlation is significant at the 0.01 level (2-tailed).
Source: SPSS ver. 20 Output window

Interpretation of above results
QMS Implementation is correlated with organizational efficiency giving a coefficient of 0.79, and a p-value of 0.004, which shows that there is a strong positive linear relationship between the two variables. Direction is same (i.e. as one increases, so also does the other), also, since the p-value (= 0.004) is less than the level of significance, α (= 0.05), we therefore reject the null hypothesis and conclude that there is significant correlation between the two variables: QMS Implementation and Organizational Efficiency in Dresser Rand Nigeria Limited.

Terziovski, Feng and Samson (2007) posit that ISO 9001 certification has a significant and positive effect on operational performance but a positive but weak effect on business performance. However, this can only be realized if the implementation process is well planned while considering the philosophical aspects of the organization in addition to employee training, corrective action, periodic audits as well as commitment throughout all levels in an organization.

Hypothesis 2: Moderating Influence of Quality Systems Audit
The statement of the hypothesis in only null form is:
Ho_2: Quality Systems Audit does not significantly impact the relationship between QMS Implementation and Organizational Efficiency;
Table 7 below shows the zero-order correlation between all variable pairs resulting in three coefficient results, where quality system audit is not moderating. Table 8 shows the correlation results where quality system audit is moderating.

Table 7: Correlation matrix showing correlation coefficients for variable pairs

		QMS Implementation	Organizational Efficiency	Quality Systems Audit
QMS Implementation	Pearson Correlation	1	.79(**)	.71(**)
	Sig. (2-tailed)		.006	.000
	N	49	49	49

Organizational Efficiency	Pearson Correlation	.79(**)	1	.69
	Sig. (2-tailed)	.006		.079
	N	49	49	49
Quality Systems Audit	Pearson Correlation	.71(**)	.69	1
	Sig. (2-tailed)	.000	.079	
	N	49	49	49

** Correlation is significant at the 0.01 level (2-tailed).
Source: SPSS ver. 20 Output window

Interpretation of above results
Zero-order correlation between QMS Implementation and Organizational Efficiency shows the correlation coefficient where Quality Systems Audit is not mediating the variables; and this is, indeed, both fairly high (0.79) and statistically significant (p-value (=0.004) < 0.05). The partial correlation controlling for Quality Systems Audit, however, is a high (0.64) and statistically significant (p-value (= 0.034) < 0.05.) also.

This is evidence to show that the observed positive "relationship" between QMS Implementation and Organizational Efficiency is due to underlying relationships between each of those variables and Quality Systems Audit.

Looking at the zero-order correlation, we find that both QMS Implementation and Organizational Efficiency are positively correlated with Quality Systems Audit, the controlling variable. Removing the effect of this controlling variable reduces the correlation between the other two variables to be 0.64 and significant at $\alpha = 0.05$, therefore we reject the null hypothesis and conclude that: Quality Systems Audit does significantly mediate the relationship between QMS Implementation and Organizational Efficiency in Dresser Rand Nigeria Limited.

Table 8: Partial Correlation showing the effect of the Moderating Variable: QSA

Control Variables			QMS Implementation	Organizational Efficiency
Quality Systems Audit	QMS Implementation	Correlation	1.000	.64
		Significance (2-tailed)	.	.034
		Df	0	45
	Organizational Efficiency	Correlation	.64	1.000
		Significance (2-tailed)	.034	.
		Df	45	0

Source: SPSS ver. 20 Output window

Discussion of Findings
This study investigated the role of effective QMS implementation in influencing efficient utilization of resources in Dresser Rand. To our knowledge, it is the first study that demonstrates the effect of QMS implementation on organizational efficiency.

Respondents were senior staff mainly in the departments of Engineering, Procurement, Production, and Health, Safety & Environment (HSE) and majority of male. Research revealed that respondents have a Correlational study in hypothesis two revealed that there was a strong positive linear relationship between quality standard management system and organizational performance. A positive correlation coefficient score of 0.79 resulted because as quality management increased organizational efficiency increased. A high score means that the strength of the relationship was strong since the coefficient was above the threshold of 0.5; and as expected, the relationship was significant;

Conclusion

The results has shown that the implementation QMS in an organisation can lead to effective utilization of its resources and that quality audit system has a great positive influence on the implementation of QMS towards continual improvement of the system.
Also organisations may need to leverage the existing resources by ensuring maximum efficiency, effectiveness and utilization.

Recommendations

Study therefore makes the following recommendations:

Continuous improvement – a culture whereby all employees are constantly involved in making improvements to quality

This provides insights into what it means to effectively deploy quality management practices. Organizations maintaining a set of quality management practices that support the efficient utilization of resources should be more effective at implementing quality management. This helps illuminate what effective implementation of quality management means. This research indicates that quality management practices should be bundled around efficiency-focused processes.

Top level management must be committed to the development and involved in the implementation of your quality management system. Top management commitment is vital if the system is to be introduced successfully. Make sure senior managers are actively involved, approve resources and agree the key processes of the business.

Train your staff to carry out audits of the system. Auditing can help with an individual's development and understanding as well as providing valuable feedback on potential problems and opportunities for improvement.

Make sure you have good internal communication channels and processes within the organization. Staffs need to be involved and kept informed of what's going on.

The nature and complexity of your documentation will depend on the nature and complexity of your organization. ISO 9001 only defines the need for six procedures. What you have in addition to this is up to you.

This paper contributes to literature on efficiency management. Quality management provides a context for studying efficiency management and illustrates specific practices that can be used to effectively manage efficiency. This helps us understand not only what organizational efficiency is, but also how it can actually be managed through specific management practices.

Future studies could focus on testing and refining the concepts developed in this research. For

example, Lee, To and Yu (2009) in their study of ISO 9001 in Macao, China maintain that organizations can implement the ISO 9000 standards in different methods. If there exists in practice different methods of ISO 9001 implementation, future studies could investigate whether different methods of implementation could result in different levels of organizational efficiency. Future studies could also look at the extent of implementation for the different principles of ISO 9001 QMS.

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