DEVELOPING A TQM SYSTEM FOR A COMPANY

First Initiative for PhemssalTech Ventures in Lagos, Nigeria

Olufemi Adefolalu

Bachelor's Thesis
February 2013
Degree Programme in
Environmental Engineering

TAMPEREEN AMMATTIKORKEAKOULU
Tampere University of Applied Sciences

Tampereen ammattikorkeakoulu
Tampere University of Applied Sciences
Degree Programme in Environmental Engineering

Olufemi Adefolalu:
Developing a TQM System for a Company
First Initiative for PhemssalTech Ventures in Lagos, Nigeria

Bachelor's thesis 42 pages

February 2013

Abstract

Quality is service targeted towards intended use and to achieve it requires a process based quality management system (QMS) as specified by ISO 9001:2000. A Quality Manual describes management practices, the structure of the QMS and the framework for a feedback system.

The main idea of the ISO quality family is continuous improvement using a PDCA (Plan, Do, Check and Act) circle. A company, based on its chosen field of operation, identifies customers' needs, set mission and vision and strategically plans to achieve them. The organisational structure is designed and management processes will be employed to make the whole system work. Business results in the form of customers' feedback will be collected for review and analysis, then improvement planning will be set in motion and the system will continue to update itself.

The quality plan presented in this thesis outlines the quality programme that is to be applied by PhemssalTech Ventures through implementation of projects. The quality programme is intended to be executed during procurement, construction and installation in project steel work.

Key words: quality assurance, quality programme, customer, organisation, supplier

ABBREVIATIONS AND TERMS

PTV PhemssalTech Ventures

QUALITY: Attribute in entirety of a product or service that meet an intended purpose.

QUALITY CONTROL:

Production methods to monitor and coordinate processes for compliance with a set standard

QUALITY ASSURANCE:

Organized and methodical process contained in the quality system, and exhibited as required, to assure that a service and product meet quality requirement.

QUALITY SYSTEM:

Configuration and structure sets up by organisation to execute a quality plan.

QUALITY SYSTEM AUDIT:

Methodical and autonomous inspection test to establish construction process and examination procedure is in compliance with organized quality activities, executed towards organisational objectives and policy

QUALITY MANAGEMENT:

All activities of the overall management function that determine the quality policy, objectives, and responsibilities, and implement them by means such as quality planning, quality control, and quality improvement within the quality system.

QUALITY POLICY:

Top management expressions of target and management plan towards achievement of quality.

QUALITY OBJECTIVE:

Organisational expressions of quality describing goals and strategy to achieved it.

PROCEDURE:

Methods specified to carry an activity

OPERATIONAL PROCEDURE

Organisational methods and processes that involve scheduling of interrelated activities toward achievement quality

SYSTEM PROCEDURE:

Quality direction specified by ISO quality family standards

PROCESS:

Procedural system of converting resources into product

PRODUCT:

Output of construction processes

CONFORMITY:

Compliance with quality requirement

SPECIFICATION:

Statements of quality requirements

SUPPLIER:

Firm that deliver raw material on purchase for construction activities

CUSTOMER:

Organisation that receives service and product provided

NDE:

This is a non-destructive examination test performed on constructed steel member (structural or flat) to ascertain compliance with stated quality requirement.

Requisition: This is a method of requesting for materials especially took off from a construction drawings put on a form for the purpose of purchase.

Specification: Essential purchasing details about materials and service requisitioned useful for material inward inspection

Users: Recipient of materials or service requisition within the organisation

Request for quotation (RFQ): A request on document sent to Suppliers asking for their offer in the supply of materials

Sourcing: Systematic search for material and Supplier availability

Quotation Analysis: Analytical presentation of quotations by comparison for qualitative selection.

Expected Date of Arrival (EDA): Approximate date of material delivery of product delivery

Lead-Time: The period of time from placing material order to delivery of the ordered materials.

Purchase Order: This is relatively a legal document binding the organisation and the Supplier on agreement to fulfil the requirements stated therein towards the purchase of materials or services.

Vendor Rating: It is a method evaluating Suppliers abilities according to a performance criterion.

MII-Material Inwards Inspection

MIIR-Material Inwards Inspection Report

HSE: Health, Safety and Environment.
MTO: Material Take Off.
MR: Management representative.
CAR: Corrective action request.
PAR: Preventive action request
CEO: Chief Executive Officer.
QA: Quality assurance
QC: Quality control

CONTENTS

1 INTRODUCTION 8
2 THE COMPANY 10
2.1 The Company in brief 10
2.2 Mission and Vision statements 10
2.2.1 Location 11
2.2.2 Field of operation 12
2.3 Challenges 14
2.4 Strategy 14
3 METHODS OF DEVELOPING THE QUALITY MANAGEMENT 16
4 QUALITY POLICY 17
5 QUALITY OBJECTIVES 19
6 ORGANISATION AND RESPONSIBILITIES 20
6.1 The Organisation 20
6.2 Organisation Chart 20
6.3 Quality Organisation Chart 21
6.4 Responsibilities and Authorities 21
6.4.1 Project Director 21
6.4.2 Management Representative 22
6.4.3 Project Manager 22
6.4.4 Construction Manager 23
6.4.5 QA/QC Manager 24
6.4.6 Planning Engineer 25
6.4.7 Quality Control Engineer 26
6.4.8 Quality Inspector 26
6.4.9 Document Controller 27
6.4.10 Procurement Officer 27
6.4.11 Project Engineer 27
6.4.12 Supplier 28
6.4.13 HSE Manager 28
6.4.14 Human Resources Manager 29
6.4.15 Financial Controller 29
6.4.16 NDE Inspector 30
7 MATERIAL PURCHASING AND SUPPLYING 31
7.1 Suppliers Management 31
7.2 Evaluating/Rating of Suppliers 32
7.3 Requisition 32

7.4 Selection of Suppliers 33
7.5 Expediting 33
7.6 Verification of purchased product 34
8 CONTROL OF NON CONFORMITY 35
9 WORK PROCEDURES 36
9.1 Construction procedure 36
9.2 Control of Document Procedure 36
9.3 Management review 37
10 CONCLUSIONS AND DISCUSSION 39
REFERENCES 41

1 INTRODUCTION

One definition of Quality is a service targeted towards intended use and to achieve it requires a process based quality management system as specified by ISO 9001:2000. A Quality Manual describes management practices, structure of the QMS and the framework for a feedback system. (Mettälä 2011)

Among the requirements of ISO 9001:2000 is that the organization should establish and maintain a quality manual that includes the scope of the quality management system and the size of documentation differ from one to another due to the size of the organisation. Therefore, the scope of this quality management system includes documented statement of quality policy, quality objective, organizational chart, authorities and responsibilities, handling of suppliers, control of documents, handling of non-conformance, corrective action, and management periodic review (SFS 2004, 27).

The eight principles of quality management start with customer focus in that organization should understand current and future needs of customer, should meet customer`s requirement and exceeds their expectation. Leadership is the next principle that requires organisation to establish internal environment in which people can become fully involved in achieving the set objectives and close related is involvement of people at all levels. Process approach is achieved more efficiently when activities and related resources are managed as a process but system approach involve identifying and managing interrelated process as a system. Continual improvement is an important principle that must be part of organisation objective. Effective decisions are based on analysis of data and information gathered which form another principle of quality management together with mutually benefiting relationship of supplier with the organisation (SFS 2004, 31).

The scope of this quality management system excludes process approach, system approach and factual approach because the enormity will exceed thesis requirement but it will be improved overtime as it is meant to be functional document.

The aim of the thesis was to create a basis for TQM-system based on ISO 9001:2000 and ISO 9001:2004. The quality management system is to ensure that the Company

carries out its function according to guidelines set out in the quality standards in order to measure up competitively in its market environment. The ISO quality system enhances conformity of industries even in their various markets to well acceptable standard operation. The ISO quality system also demands consistency of companies with regards to what is stated in their quality manual. To that end, this quality management system is designed to demonstrate how PhemssalTech Ventures is going to accomplish it stated functions and the review of its processes.

The TQM system was patterned according to the compatible pair of ISO family quality standards which are ISO 9004:2000 and ISO 9001:2000 (SFS 2004, 17). Directions are laid down in ISO 9001:2000 for effective quality management system while ISO 9004:2000 provides guidance for integration and performance improvement. This quality plan will outline how quality performance will be achieved, monitored and sustained for quality assurance through execution of total quality management. (Cianfrani et al 2002, 11)

This thesis is aimed at starting to build the TQM-system whereby quality inspection of construction deliverables are arranged to comply with project requirements, construction codes and drawing specifications. It outlines the quality programme that is to be applied by PhemssalTech Ventures through implementation of projects. The quality programme is intended to be executed during procurement, construction and installation in project steel work.

2 THE COMPANY

2.1 The Company in brief

PhemssalTech Ventures was set up in 2010 with the purpose of providing services involving designing, procurement, fabrication and welding of steels - structural and plate members -targeted for use by both Non-Oil and Gas and Oil and Gas companies. By virtue of its operation, it is a project based construction company that can not only produce mechanical equipment such as pressure vessels, tanks, oil platforms, piping networks but can also be involved in construction of civil/environmental structures such as steel structure reinforced buildings and warehouse. (CAC 2010)

The Chief Executive Officer of this company claimed to have over ten years' intensive experiences in proposal, engineering, procurement, construction and management of projects ranging from pressure vessels, tanks, manifold skids and platforms, maintenance overhauling of industrial production lines, construction of structural reinforcement of warehouse and office buildings and got involved in facility management. After acquiring this many experiences, he noted that he deem it fit to set up the edifice that will widen the market of steelworks construction in Nigeria. (Adefolalu 2013)

The company presently has one permanent employee which is the Chief Executive Officer and a pool of fabrication and inspection experts which are employed on contract basis. (Adefolalu 2013)

2.2 Mission and Vision statement

Mission and Vision statements are carefully and concisely fine tuned expressions that companies used to declare organisational focus. Organisations can significantly convey purpose and inspire workers to share same passion for excellence. Mission statement defines organisation's purpose and primary objectives while Vision statement communicates both purpose and values of the organization by giving direction to the em-

ployees to be involved and passionate towards the goal. The statements also shape customers' confidence in the organization. (Mind tools 2013)

On time delivery is usually the concern of customers in the region where PTV is to operate, because projects sometimes experience delay due to materials shipping hold ups. Hence, timely delivery is PTV winning idea because the materials' issue will be closely monitored and application of quality management system is the success measure. The winning idea and the success measure was combined and fine tuned in the formation of the mission statement. The vision statement was created from mission statement but uncovered that the project will be responsible. It highlighted how the organisation will achieve its mission and was polished to inspire, energize and motivate prospective employees, which will be highly valued. (Adefolalu 2013) The mission and the Vision statements are hereby stated below;

Mission statement: To become world class project based steel works Production and Service Company building up and maintaining trust in quality and on time delivery of products for optimum customer satisfaction.

Vision statement: We will expend ourselves technologically and efficiently to put to use the content of our quality management system in accordance with ISO quality standards and satisfy our customers with timely deliverables.

2.2.1 Location

The company office of administration is located in the heart of Lagos at 8, Ojelade Street off Ikorodu road, Jibowu – Lagos. The Company also has two plots (1338 square meters) fenced landed workshop space located at Arigbajo in the vicinity of West Africa Portland Cement Factory, Ewekoro, Ogun State (CAC 2010).

2.2.2 Field of operation

The company`s area of specialization includes engineering design, procurement and resourcing, fabrication, welding and installation of steel works for tanks, towers, warehouse, gas filling station, pipe spools, scrubbers, heat exchangers, separators, boilers, chimneys, billboards, hangers, crane booms, manifolds skids, gates etc.(CAC 2010). The field of operation is therefore civil and environmental services involving steel works as shown (picture 1) with structural steel works as reinforcement for Mercedees Benz concrete warehouse building. The project incorporated environmental principle in that heavy concrete slab for decking was replaced with aluminum conflor and light concrete. (Adefolalu 2013)

PICTURE 1, 2 & 3. Structural steel works for Mercedes Benz warehouse, ground tanks for Shell Nigeria Ltd and Pressure Vessel Dish for Chevron on inspection; executed by the C.E.O (Photos: Femi Adefolalu 2007)

The field of operation according to the CEO of PTV is also mechanical as demonstrated by the pictures (picture 3, 4 and 5) in the production process of pressure vessel for Chevron and ground tanks (picture 2) for Shell Nigeria. (Adefolalu 2013)

PICTURE 4 & 5. Construction progress of manhole and pressure vessel for Chevron by the C.E.O. (Photos: Femi Adefolalu 2007)

An environmental service was also involved in the construction of flue ducts and chimney (picture 6 and 7) for Nestle Nigeria Ltd to disperse excess heat from beverage production in the form of steam. (Adefolalu 2013)

PICTURE 6 & 7. Stack duct & industrial chimney constructed for Nestle by the C.E.O. (Photos: Femi Adefolalu 2007)

The company established and funded a micro-finance firm called Klassmate savings and loans with the purpose of becoming financial backbone of the company. The set up firm is still up and running providing financial assistance to small scale business in Ogun State, Nigeria. (Klassmate 2010)

The Company CEO Mr. Femi Adefolalu stated categorically that PhemssalTech Ventures bided and was awarded the engineering, procurement of materials, fabrication and erection of X-ray steelwork support safety cage for Federal Medical Center, Abeokuta,

Ogun State in 2010. The contract was executed for Botad/GE Power as the Clients and completed in six weeks. He added that the company also bided for the construction of Port Harcourt Stadium Vidiwall Advertisement Screen in 2011, for PPC Ltd but the project is yet to be awarded. Still in 2011, it bided for construction of reinforced structural steel works of Niger Delta rehabilitation centre in Bayelsa state but unfortunately the project was not awarded. (Adefolalu 2013)

Moreover, the CEO also mentioned that the company did engineering work on consultancy for the construction of 33 meters x 15 meters Tank farm for Allah`s Work construction Ltd. The engineering package was defended and presented before project stakeholders as part of proposal/pre-project awardance activities for the Client before PhemssalTech ventures went into dormancy. (Adefolalu 2013)

2.3 Challenges

The quality management system sets out a plan of the company according to the demand of the ISO 9000 series of quality standard and thereby exposes it to prospective customers on the platform of its operation as viable. Nonetheless, the big challenge of the Company is its survival in a highly competitive environment in which it finds itself. The Oil and Gas business is majorly the source revenue of the country and therefore makes the operations around it very attractive and competitive that companies operating with ISO standard quality management system do not have guarantee for survival and growth. (Adefolalu 2013)

2.4 Strategy

A word of military origin; plan of action designed to achieve a particular goal (Mettälä 2012). For PhemssalTech, it will mean direction and scope to configure resources within challenging environment in order to meet market needs and fulfil stakeholder expectations. It was not intentioned that the organisation should go under the drain and that

was the reason for developing the quality management system in order to revive the company. This section is thereby intended to stipulate strategy towards the revival of the company.

Marketing activities will be reactivated and intensified with phone calls and visitation of long list of business contacts to create awareness about the re-emergence of the company. Funds may be requested from Klassmate savings and loans on interest for warehouse construction of workshop space to make the company attractive to prospective client. The revival strategy is targeted to commence by April 1, 2013 and significance change expected before end of December, 2013 (Adefolalu 2013). The principle of PDCA circle will be applied to ensure viability in that it will be ensured that this Plan will be executed (Do) and Checking will be at the time of expected change. If the execution is found wanting, required corrective action (Act) will be carried out; the circle continues until plan action is achieved. (Mettälä 2012)

3 METHODS OF DEVELOPING THE QUALITY MANAGEMENT

The main idea of the ISO quality family is continuous improvement using a PDCA (Plan, Do, Check and Act) circle. A company, based on its chosen field of operation, identifies customers' needs, sets up mission and vision and strategically plans to achieve them. The organisational structure is designed and management processes will be employed to make the whole system work. Business results in the form of customers' feedback will be collected for review and analysis, then improvement planning will be set in motion and the system continue to update itself. (Mettälä, 2011)

The inspiration to produce quality management system for PhemssalTech Ventures came during the course implementation of Total Quality Management 1 & 2 and understudying the requirement guidelines of ISO standards series in order to apply this to the company based on its field of operation. The most favourites and compatible of the ISO standard series are ISO 9001:2000 and ISO 9004:2000. (Cianfrani et al 2002, 33)

For example ISO 9001:2000 and ISO 9004:2000 both section 4, quality management system general requirement and managing systems respectively expressed that the organisation shall establish and document a quality management system and continually improve its effectiveness (SFS 2004, 23) and as such planned resources to support and monitor the operation of PhemssalTech Ventures are stipulated in this document.

In addition, the same section in ISO 9001:2000 also mentioned that if an organisation chooses to outsource any process that affects conformity with requirements, control of the process to be outsourced shall be identified in the quality management system. Documentation requirement includes quality policy, objectives, manual and control of document which are indicated in the quality manual. Management review is also part of compatibility of the two standards and these are likewise incorporated in the quality management system. (SFS 2004, 31)

4 QUALITY POLICY

ISO 9001:2000 stipulated that quality policy should be appropriate to the purpose of the organization, provides a framework for establishing quality objectives, contain commitment to comply with requirement and plans on continual improvement of quality management system. While ISO 9004:2000 guided that the quality policy should be used as a means of leading the organization toward improvement of its performance. (SFS, 2004, 41)

Therefore the Chief Executive Officer of PTV who is the overall head in managing the quality management shall by his designation oversee the quality control system and quality assurance of the company. He may however designate this function and responsibility on a Project Director who will be appointed as consultant/assistance to the CEO or Project Manager that will be appointed as regular employee. These men would have intensive pressure from their office and as result a personnel with the purpose of steering the quality management program will be employed on consultancy to drive the Top management course. (SFS, 2004, 41)

Nonetheless, the CEO is well acquainted with the obligation of effective quality management system which involves setting up programme of quality performance that will be achieved, monitored, stabilized and sustained for quality assurance through execution of total quality management. This technique will improve co-ordination, monitoring and review of process outlined in the quality plan. (SFS, 2004, 41)

The company policy is to ensure service fit for purpose and quality assured products with spare parts as required, sub-assemblies that first comply with and exceed the detail contractual requirements – not exceeding financial commitment – but with regard to quality standard, technical specifications and reliability as reasonably practicable. (SFS, 2004, 41)

The framework of the quality objective requires personnel to expend themselves towards quality assurance on service and product delivery and deliverables by working in accordance with quality manual, work instructions, codes, standards and procedures. The company is committed to justify the confidence place on it when contract are

awarded by ensuring through the process that the quality is achieved and will be expended to sustain the quality level achieved on finished product and service geared toward continually improving customers' needs. (SFS, 2004, 41)

The policy also includes keeping track of success stories regarding quality deliveries which shall be useful to measure improvement overtime, provide evidence of quality level achieved. The record shall include plan of contractual activities, control system put in place throughout operation and implementation process. Documentation shall be done systematically in accordance with procedure set out in the quality plan. This activity will enhance certification of product and service for quality even if it may not be required by contractual terms. (SFS, 2004, 41)

5 QUALITY OBJECTIVES

ISO 9001:2000 chapter 5.4.1 mentioned that quality objectives should be measurable and consistent with quality policy besides being pertinent to the activities and processes of quality management system and ISO 9004:2000 5.4.1 guided that top management should form the quality objective as leading to improve the organisation`s performance and should consider current and future needs and product of the organisation. (SFS, 2004, 43)

The top management of PTV have therefore aligned its quality policy with the development of the quality objective by establishing a clearly defined authorities and responsibilities toward quality achievement in project operations. Quality system will be implemented from proposal which is the beginning of every project to designing, procurement, fabrication, installation, delivery and commissioning point as the contractual terms determine the work scope. In an effort to satisfy customer, inspection lookout will be for detection of any omissions to contractual terms and non-conformance and PTV will be willing to go through corrective action procedure through construction period. (SFS, 2004, 43)

Due to the fact that the company is concerned about the depletion of materials use in construction thereby impacting environmentally, it will ensure to economically manage materials during construction and avert unnecessary waste. The content of these quality objectives shall be dully communicated internally and externally in such a way that personnel involved in the operation of the organisation can contribute their achievement. The performance of the organisation shall be systematically reviewed to benchmark its achievement in adhering to its commitment to implement quality management system. (SFS, 2004, 43)

The top management of PTV is committed to adhere to the standards and guidelines set out in this quality management system and determined to satisfy its customers need for quality product and service.

6 ORGANIZATION AND RESPONSIBILITIES

6.1 The Organisation

Top management of organization is expected to clearly describe the organisational structure with a focus on processes which support the development and deployment of the quality management system. ISO 9001:2000 5.5.1 inferred that top management shall ensure that responsibilities and authorities are defined and communicated within the organization and ISO 9004:2000 5.5.1 guided that people throughout the organisation should be given responsibilities and authority to enable them contribute to the achievement of the quality objectives and establish their involvement, motivation and commitment (SFS 2004, 45). Hence, PTV included responsibilities and authority delegation per functional area of the personnel involved in the quality management system processes with organisational chart.

6.2 Organization Chart

In order to demonstrate the diagrammatic description of PTV responsibilities and authorities of personnel functional heads with their channel of reporting, the figure 1 shows the organisation set up. (ISO 10007 2003, 2)

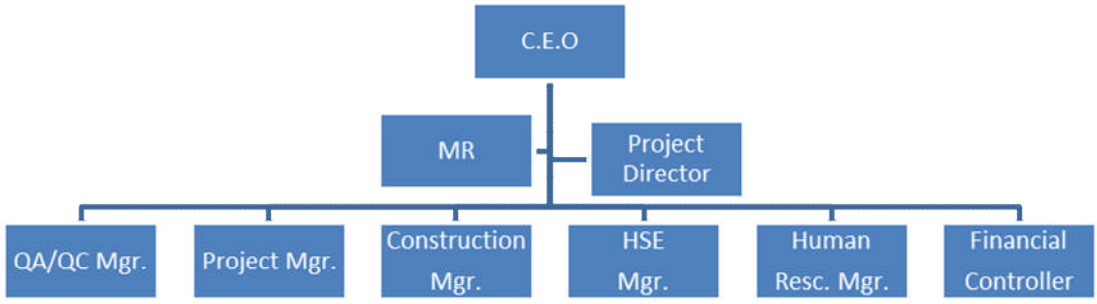

FIGURE 1: showing Organization chart

6.3 Quality Organization Chart

The Personnel that will be responsible consistently for the implementation of quality management system form the quality organisation chart(figure 2) and will ensure quality control and assurance on product delivered.

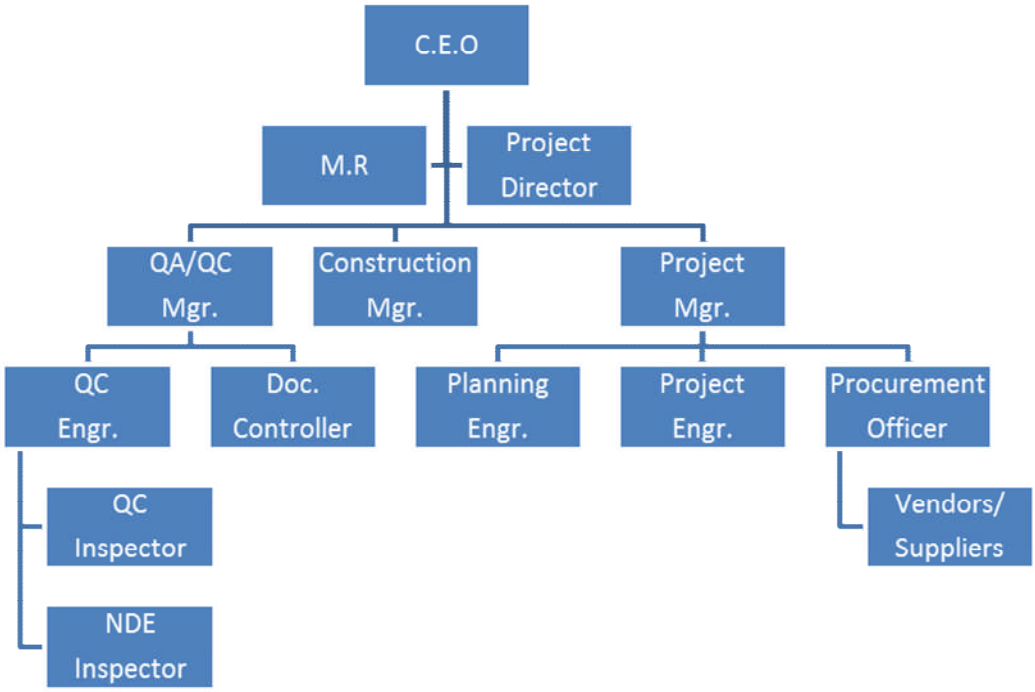

FIGURE 2: showing Project Quality Organization chart

6.4 Responsibilities and Authorities

6.4.1 Project Director

This portfolio will be held by a personality that is highly experienced in the application and implementation of quality management system through the construction span of ISO quality standard certified projects; from kick off through execution phase to commissioning/decommissioning. As a result, he may in position to be designated to champion the implementation of quality management system of PTV on delegation by the CEO. Nonetheless, he will be appointed on consultancy basis (SFS 2004, 45). In addition to his major role with regards to the quality management system, the following are his authorities and responsibilities;

- He gives technical and commercial support to the tendering process of projects.
- He is to direct all PTV's projects execution procedure

- He is to oversee the commercial performance of project executed by checking and agreeing on budget and later confirming that the budgets are met.
- His role can be delegated to Project Manager with reporting responsibility to the CEO. (SFS 2004, 45)

6.4.2 Management Representative

This is a position especially demanded by ISO quality standards 9001:2000 and 9004:2000 5.5.2 respectively that a management representative should be appointed and given authority by the top management to manage, monitor, evaluate and coordinate the quality management system. This appointment is to enhance effective and efficient operation and improvement of quality management system (SFS 2004, 47). In PTV Management Representative will be a member of the management who irrespective of other responsibilities will have responsibilities and authority that includes,

- Making sure that the procedure for total quality management is set up, executed and sustained
- He ensures that customer requirement is made as awareness and promoted through the organisation
- He reports to the top management on the operation status of the TQM system in the company and advice upgrading pattern. (SFS 2004, 47)

6.4.3 Project Manager

This position will oversee the implementation of quality management system in all projects from tender to kick off, procurement, execution and deliveries. He will ensure that quality standards are followed during quality inspection during execution to satisfy the customer in quality assurance. He can also be delegated the responsibilities of Project director and advice on policy matters (ISO 10006 2003, 17). His other responsibilities are as follow;

- He coordinates the tendering process of project; technically and commercially until the project is awarded.
- He will be the central communication interface between PTV and the customer with regards to project matters.

- ❖ He makes project budget and present this before stakeholder for approval and ensure that the budget is sufficiently managed till completion of the project. It will be a plus if the project is executed below budget provided all quality criteria are fulfilled.
- ❖ He is to write project execution plan after digesting and understanding project specifications and terms.
- ❖ He reviews quality inspection plan, approves and see to the implementation during project execution.
- ❖ He reviews Safety, Health, Environment and Security plan on each project, approves and ensures application
- ❖ He ensures that project is appropriately resourced according to the requirement of each contract
- ❖ He forms, sensitise project execution teams on implementation of quality management system before and through construction period.
- ❖ He determines if training will be required and the type of training that the personnel will require on the project.
- ❖ He reviews and approves material requisition (MR) and eventual LPO
- ❖ He plans, coordinates and monitor the activities of project teams
- ❖ Apply control measures and expediting progressively toward successful completion of project with quality standard compliance.
- ❖ He approves applicable work instructions, and WPS on project
- ❖ He organises project meetings and supervises progress reporting
- ❖ He determines part of the project to be sub-contracted and manages the proceedings
- ❖ He ensures compilation of construction dossier and compliance with ISO quality management system.
- ❖ He ensures completion, delivery and close out of contract
- ❖ He sets up feedback system on close out contracts for continual improvement of quality management system. (ISO/IEC 20000-1 2005, 8)

6.4.4 Construction Manager

This position requires personnel experienced in construction strategy and application of quality management system especially on site fabrication and installation works (SFS 2004, 47). The responsibilities and authority of Construction Manager include;

- He writes construction procedures, plan and work programs according to quality manual procedure and ensure compliance
- He reviews technical specification of the project and apply it to the construction work
- He organises construction teams and assigns various duties
- He ensures there is high level quality performance in his interface with customer representatives
- He is expected to be aware of depletion impact of the material use in construction and therefore reduces production waste
- He ensures that construction work is carried out within the approved budget
- He makes his team comply with approved safety, health, environment and security procedure while on work site
- He contributes to the formation of quality inspection plan and adhere to inspection points during construction to ensure quality performance
- He develops fabrication and installation strategies which includes rigging plan and use of crane.
- He initiates material requisition, organises material receipt inspection, storage, warehousing and approves issue of materials during construction
- He should perform construction work appropriately according to quality procedure in order to negate the occurrence of non-conformance and in the event of non-conformance; he will be ready to advice corrective action and carry it out accordingly, on agreement with quality assurance team.
- He ensures clean and hazard free working environment and maintain good work site community relation
- He oversees and manages sub-contractor interference in the construction work (ISO 10006 2003, 17)

6.4.5 QA/QC Manager

This position is the departmental head of the core quality control and assurance team and therefore is responsible for the implementation of the quality management system. The responsibilities among many other things include;

- Distributing roles and duties of the quality control team thereby setting up quality assurance system

- He reviews construction procedure to ensure quality performance completeness
- He oversees the production of quality inspection plan by designating witness, review and hold points of inspection
- He reviews design documents and drawings ensuring that the correct revision is used in construction.
- He discusses and agrees corrective action on non-conformance with customer representative and verification on implementation of the corrective action
- He sees to the qualification and certification of welders according to contract requirements
- He performs surveys on suppliers for their qualification
- He reviews and evaluates supplier's quality program for integration into PTV's quality management system. (Godfrey et al 1998, 23.4)

6.4.6 Planning Engineer

The organisation will always need to plan and strategise activities with time bound before execution otherwise achievement can not be measured. Therefore this position is essential for quality management system and the followings are its responsibilities;

- He works especially with the project team to schedule activities until delivery and completion. (ISO 10006 2003, 21)
- He also works with procurement officer and construction manager and incorporates their work scope plan into the project schedule.
- As milestones are usually tied to payment in project execution, he agrees with customer and fix milestone on project schedules
- He sets up progress monitoring system and monitor progress on project and alerts project team in the case when particular activity is lagging behind
- He fixes critical path in schedule as project required and advices strategies to accomplish activities on critical path.
- He plans the organisation's implementation of quality management system and works with Management representative on review of the system
- For system continuity, he writes planning and progress monitoring procedure. (ISO 10006 2003, 17)

6.4.7 Quality Control Engineer

The organisation laid more emphases on quality assurance and that is why this position is paramount to quality management system. The authority and responsibilities are as follows,

- He checks for completeness in inspection and test reports and authenticates them.
- He works alongside QA/QC Manager in the preparation of inspection and test plan on construction works and monitors its implementation.
- Reviews quality records and procedures and later authenticates them for QA/QC Manager's approval
- He may also be able to take up the role of Management representative in steering the quality management system if delegated to do so.
- He attends project quality meetings and advice improvement on quality of work.
- He also works with the QA/QC Manager for quality assurance of the suppliers. (Godfrey et al 1998, 23.4)

6.4.8 Quality Inspector

The quality output of an organisation is not dependent on documentation only but requires someone that is on construction site checking compliance with quality standards. The role of Quality Inspector is as important as the Manager and is hereby stipulated as follows,

- Perform materials inward inspection of procured materials and certifies them ready for construction
- Surveys and inspects quality of construction work
- Complies with inspection and test plan and observe witness, review and hold points of the plan.
- He prepares quality inspection procedures and applies them on approval by the QA/QC Manager.
- He compiles quality progress report for the Quality Control Engineer
- Quality control equipment are under his custody. (Godfrey et al 1998, 23.4)

6.4.9 Document Controller

This position is important for the purpose of keeping track of the quality management system and it will be expounded in the document control procedure. (SFS 2004, 47)

6.4.10 Procurement Officer

This position requires personnel that is skilled on supply chain management and logistics because it is highly needed in the management of suppliers and his responsibilities are as follows,

- He conducts suppliers quality surveillance in conjunction with the Quality Team
- He performs sourcing of materials needed for construction works
- He makes request for quotation (RFQ) on materials based on material requisition (MR) endorsed by Project Manager
- He reviews quotations for specification compliance and negotiate on pricing
- He prepares L.P.O. and issues it out to successful supplier for supply of materials needed for construction works
- He initiates materials inward inspection and follows up on material traceability records
- He provides procurement plans on project to the Planning Engineer
- He involves in expediting action to forestall delays on procured items and works with quality team to carry out material source inspection as may be required on a project.
- He develops Suppliers data and grading system for easy and timely contact
- He writes procurement procedure for system sustenance
- He arranges logistics for the delivery of completed product. (SFS 2004, 47)

6.4.11 Project Engineer

The Project Engineer assists the Project Manager in carrying out some of his duties but his responsibility is in no way insignificant as enlisted below;

- He prepares project progress report and minute of progress meetings with customers which must be attended.

- ❖ He studies construction drawings and extract material take off (MTO) for requisition
- ❖ He determines project critical path and advice the team accordingly
- ❖ He expedites construction work and ensures that project activities are not lagging behind schedule
- ❖ He compiles project deliverables and stamps them as-built for deliveries with the constructed work. (ISO 10006 2003, 16)

6.4.12 Suppliers

Chapter 7.4.1 of ISO 9001:2000 advised that organisation should ensure that purchased product conforms to specified purchasing requirements and the extent of control applied to the suppliers should be dependent upon the effect of the purchased product on the subsequent product realisation (SFS 2004, 91). The supplied materials for PTV construction work are the major determinate of the quality output and therefore the quality assurance on the suppliers starts from checking the quality program of suppliers. The Quality Team together with the procurement officer will conduct quality surveillance on prospective suppliers before any L.P.O. is issued to the Supplier for purchase of materials. When these materials are supplied, the Quality Inspector will conduct materials inward inspection (MII) for material traceability before it can be accepted for construction. (ISO/IEC 20000-1 2005, 12)

6.4.13 HSE Manager

Quality management system is not complete without taking care of health, safety and environment of the working area and someone will be appointed in PTV`s organisation to manage it (ISO 31000 2009, 10) with the following responsibilities,

- ❖ Writes safety, health, environment and security procedures
- ❖ Advices the top management on incorporation of health, safety and environment in the quality management system
- ❖ Deals with construction site community affairs and advice the project team on how to resolve crises at work site

- Conducts environmental impact assessment of PTV's construction activities and advices compensation activities
- Sets up HSE rules & regulations and enforces it
- Works with customer safety body to set up safety policies required on a project
- Advices worker's personal protective equipment (PPE) and makes requisition for purchase. (ISO 10381-3 2001, 18&19)
- Takes care of fire fighting equipment
- Sets up emergency response system and demarcating muster point
- Organises workers HSE and emergency response training
- Checks and collate the organisation's LTI and accidents statistics for presentation to the customer (ISO/IEC 20000-1 2005, 13).
- Provides safety orientation of the organisation to visiting customers' representatives (ISO 31000 2009, 11)

6.4.14 Human Resources Manager

The role of the Human Resources Manager is more of administration and configuration management of the resources toward quality management system (ISO/IEC 20000-2 2005, 3) but his responsibilities are as follows,

- Makes awareness about the need for skilled man power and organises interviews
- Sets organisational regulations and rules
- Sets up personnel roles and interconnects processes
- Handles legal related matters of the organisation
- Arranges offices and with the advice from HSE Manager sets indoor and outdoor environment
- Takes care of personnel welfare
- Works with HSE Manager to relate with worksite community and engage the youths. (ISO/IEC 20000-1 2005, 4)

6.4.15 Financial Controller

An organisation without skill of financial and economic management but with good quality management system may not thrive or survive. For example, the Project Manag-

er that draws up budget on project execution may use basic logic market prices of materials and resources but may need someone in the financial world to incorporate financial strategies and management of funds (SFS 2004, 47). Hence the responsibilities of Financial Controller are as follows,

- Oversees the organisation's overall financial standings
- Agrees with the Project Manager on project cash flows and funds project demands accordingly
- Reviews, endorses and funds L.P.O. given out to Suppliers
- Liaises with Project Teams to confirm project milestone reached and issues out invoice to the customer
- Follows up due payment from customer
- Advices C.E.O. on business opportunities (ISO/IEC 20000-1 2005, 14)

6.4.16 NDE Inspector

The quality assurance on the final product of PTV's on the larger part depends on inspection testing of the fabricated parts and whole construction and it will involve use of non-destructive testing process such as x-ray scanning of welds, mechanical testing, magnetic testing particles etc (SFS 2004, 47). The process of testing requires a personnel who is certified to do so and PTV will engage the personnel to perform the following responsibilities,

- Advice cost commitment of inspection testing for project to incorporate in the budget.
- Produces non-destructive test and examination procedures
- Incorporates testing plans on quality plan, conducts tests and makes report for customers' acceptance (ATA MSG/3 2005, 25)

7 MATERIAL PURCHASING AND SUPPLYING

7.1 Suppliers Management

ISO 9004:2000 7.4.1 guided that top management of the organisation should ensure that effective and efficient processes are defined and implemented for the evaluation and control of purchased products in order that the purchased product satisfy the organisation's quality management requirements (SFS 2004, 91). In order to achieve the efficient purchases, PTV will consider supplier's own quality program, material traceability records, evaluation of materials, warranty replacement of non-conforming purchased materials and logistic plans on the purchased material.

The management of PTV always desire to have materials certified based on ISO quality requirement and other applicable codes because it is part of total package of the final product. Hence, attention will be paid especially on cast numbers on material which can be traced on material traceability report (MTR) which gives manufacturer description of material science and formation process. This information is important because properties of materials such as durability, malleability and tensile strength are important structural factors towards the final product. (Cianfrani et al 2002, 663)

In addition to the quality management system, the organisation's mission statement promised to achieve customer satisfaction which is timely delivery. Therefore PTV will like to see how Supplier will demonstrate timely delivery of materials placed on orders and so criteria for checking this will be Supplier's history on supply delivery. Pertinent to timely delivery is logistic procedure of the Suppliers and PTV will consider logistic plans as factor in purchasing. (ISO/IEC 20000-1 2005, 12)

7.2 Evaluation/Rating of Suppliers

The contact details of prospective Suppliers will be collated, classified according to materials they specialises on and request for their quality program is sent out in order to align the suppliers program with PTV's quality management system. Visits to the Suppliers' premises will be organised by the quality assurance team of Procurement Officer, Quality Manager, Quality Control Engineer and Management Representative and present their recommendation to the C.E.O. for final decision. (ISO/IEC 20000-2 2005, 19)

Criteria for selection, evaluation and re-evaluation will be established and records of the results of the evaluation with necessary action to be taken for improvement will be maintained (SFS 2004, 93). Purchasing contact system will be set up for number of Suppliers that proved successful with the assessment of the Quality Assurance Team for improving PTV – Supplier relationship and result to faster delivery period. In a bid to ensure re-evaluation and continuous improvement of the system, the suppliers will be checked on how they meet criteria of quality and timely delivery, applying good ethical business practice over a period of six months and the Suppliers will be rated accordingly. (ISO/IEC 20000-2 2005, 20)

In the event that any Suppliers are found to be less than sufficient based on the criteria of rating, they will be informed and place on probation for a period of six months and on improvement, they will be promoted to the rating list, otherwise will be delisted. (ISO/IEC 20000-2 2005, 20)

7.3 Requisition

The generation of material requisition (MR) commences after the project execution awardance in which the Project Engineer will do material take off (MTO) based on the fabrication drawings and forward this to the Construction Manager for review and completeness. The Project Engineer will then raise the requisition to the Procurement Officer who will then send request for RFQ to Suppliers who are rated and classified for the materials purchase. (ISO 263 1973, 1)

The requisition will contain information such as the type of materials which is usually steel plates or structures, specification, the grade, the formation and the quantity. The same information will be used to check the correctness of the RFQ and eventual L.P.O. (ISO 263 1973, 1)

7.4 Selection of Suppliers

The Management of PTV will evaluate the ability of suppliers to supply the require materials on the project and will then send the RFQ to the Suppliers selected which will be about two or three for competitive quotation. The Procurement Officer on receipt of the RFQs will then review them with the quality assurance and project team to be sure that it meets their requirements based on applicable code of construction, drawings and material requisition. The selection criterion of the supplier that will be responsible for supply of the materials required will be quality compliance, time of delivery that can be accommodated the project overall schedule, good market price, payment terms and performance history of suppliers. (ISO/IEC 20000-2 2005, 20)

The selection process will not be biased but will be based on technical and commercial factors that align with the quality management system. The selected Supplier will be negotiated with on price level and proforma invoice will be requested for confirmation of quote before an L.P.O can be raised by the Procurement Officer on the Supplier for the purchase of the materials. The materials supply may be divided between two or more suppliers and more than one L.P.O. will be issued for same projects but to different Suppliers. The signatories as approval to the L.P.O. will include the Project Manager, Financial Controller and the C.E.O. (ISO/IEC 20000-1 2005, 12)

7.5 Expediting

It is expected that the Suppliers will comply with delivery terms stated in their proforma invoice but there may be an event where the Suppliers will delay on the supply of purchased materials and to forestall this ugly incident to affect the general schedule of the project, the Procurement Officer will carry out expediting. Follow up and monitoring will be done on the Suppliers by correspondences through emails, letters; contact media

by phone calls and even visitation to the Suppliers business outlets. (ISO/IEC 20000-1 2005, 10)

7.6 Verification of purchased product

ISO 9001:2000 chapter 7.4.3 stipulated that organization should establish and implement the inspection for ensuring that purchased product meets specified purchase requirements (SFS 2004, 91). On arrival of the purchased materials, the Quality Inspector in connection with the Procurement Officer has the task of inspecting the materials for conformity with the quality requirement specified in the L.P.O. When the materials conform to the level of quality expected a release sticker will be placed on the materials which means the material can be used for construction, otherwise a non-conformance sticker will be placed on the purchased materials. (ISO/IEC 20000-1 2005, 31)

8 CONTROL OF NON CONFORMITY

ISO 9001:2000 chapter 8.3 stipulated that the organisation should ensure that product which does not conform to product requirements is identified and controlled to prevent its unintended use but the control responsibilities for dealing with non-conforming product shall be defined in a documented procedure. ISO 9004:2000 also guided that Top Management should empower people in the organization with the authority and responsibility to report non-conformance at any stage of a process in order to ensure timely detection and disposition of non-conformance (SFS 2004, 119).

Therefore, during the process of fabrication the Quality Inspector will be surveying the quality of work being done, by confirming measurements, fitting process and strength of welds but when any fabricated part or finished product is not conforming with quality standards, specification or applicable codes, it is mandatory to placed the product on hold by using inerasable bright colour marker or putting sticker on the item to avert immediate use. (SFS-EN 60300-1 2003, 21)

The control of non-conforming product is not complete until the Quality Inspector issues non-conformance report to Construction Manager and put on copy the Project Manager and Quality Manager so that they will be aware of some hold up on the progress of construction and will want to quickly resolve the NCR. The Construction and the technical teams will then sit on round table to discuss how to close out the NCR. The proposed corrective action is then documented and forwarded to the PTV quality assurance team who on agreement presents it to the customer's technical team for acceptance. The corrective action is expected to be according to an applicable code of construction ethics and that will make the acceptance faster. (SFS 2004, 119)

The non-conformance may have to do with using an alternative material for specified material; thereby the QA/QC Manager in as much as by his experience accepts the alternative will submit concession request report to the customer's technical team stating an applicable code or quality standard for acceptance. On acceptance of the proposed corrective action or concession request, the specified action is immediately carried out and re-inspected to be sure that it complies with the accepted corrective or concession action and the Quality Inspector will close the NCR and document as part of as-built deliverables for the completed project. (SFS-EN 60300-1 2003, 21)

9.0 PROCEDURES

9.1 Construction procedure

This is a process based document to be produce by Project Manager according to project specifications, construction codes and design packages. (ISO/IEC 20000-1 2005, 14)

9.2 Control of Document Procedure

ISO 9001:2000 4.2.3 stated that documents required by the quality management system should be controlled and the controls needed could include approval of document prior to issue, review, updates as necessary, changes, current revision status of document, document remain legible, readily identifiable, external document distribution and prevention of unintended use of obsolete document (SFS, 2004).

Therefore, on documents such as procedures, plans or work instructions PTV organization will ensure that documents are clearly titled and contain the name of person that prepared the documents, date, name of the person that reviewed, the name of the person that approved it, document number and revision number. The Document Control Officer have the responsibility of ensuring that all the document contain the aforementioned information and he puts blue stamp on the document as controlled document. (ISO/IEC 20000-1 2005, 4)

The use of transmittal to distribute reviewed and approved procedures, plans and work instructions to various parties responsible will be mandatory to complete the process of controlling the document and the DC Officer will generate the transmittal and will see to it that the recipient of the document acknowledge receipt. (ISO/IEC 20000-1 2005, 4)

The documents however will be readable because the font type will be Arial and the size will be 12 except specified otherwise by the customer. Whenever procedures, plan or work instruction is revised, the previous revision becomes obsolete and the obsolete document will also be controlled to avoid unintended use. Document normally will be printed on both sides of paper and when obsolete will be shredded. In order to manage resources, the obsolete document with blank sides may be re-used for rough work such as calculations but not for document going out of the organization, by ruling 'X' on the printed side. (ISO/IEC 20000-2 2005, 2)

Any correspondence coming to the company either by e-mail or document which can be contract, specifications, drawings, enquiries must first come to the C.E.O.'s table that after reading it will then attention it to the respective Manager that will carry out action on it. The Project Manager may be delegated to carry out this function with full report to the C.E.O. when not on seat. The process will be reversal when documents are going out of the organization, they have to pass through the C.E.O. whether he is a signatory or not and the D.C Officer will also make use of transmittal for recipient's acknowledgement. (ISO/IEC 20000-2 2005, 2)

9.3 Management review

It is mentioned in ISO 9000:2000 chapter 8.5.1 that the organisation shall continually improve the effectiveness of the quality management system through the use of the quality policy, quality objectives, audit results and management review. ISO 9004:2000 8.5.1 guided that management should seek to improve the effectiveness and efficiency of the processes of the organisation rather than wait for a problem to reveal opportunities for improvement and improvement can range from small-step ongoing continual improvement to strategic breakthrough improvement projects. The organisation should have a process in place to identify and manage improvement activities (SFS 2004, 127).

The organisation will empower the Management Representative to conduct internal audit on the departments from project management to construction, quality, finance, hu-

man resources, and HSE. The audit will be scheduled twice in a year where the MR will give one week notice to the departmental heads so that they can do good housekeeping for compliance with the quality management system(ISO 10002 2004, 8). Aside from the scheduled audits, the MR can on its own volition momentarily pay an auditing visit on a department to check how they are complying with the quality management system. (Cianfrani et al 2002, 391)

Sequence to the audit and any non-conformance is found in any department, the MR will detail this in NCR and also expound the repair action in a corrective action report (CAR) (ISO 10012 2003, 15). He will then give the defaulted department period of one week to carry out the corrective action and on expiry of the period; he will re-visits the department to certify that they have carried out the suggested corrective action. (Cianfrani et al 2002, 635)

Depending on the nature of the nonconformities, after closing out the NCR with the CAR, the MR will expect the department to produce preventive action report (PAR) to forestall repetition of the nonconformity which repair action will result to waste of man-hour. (Cianfrani et al 2002, 635)

10.0 CONCLUSIONS AND DISCUSSION

Quality management system based on ISO standard provides a common language which can unite organisational department and show them how their needs can be stated and met in ways that serve the entire company to achieve common goal. The existences of quality management system ensure consistency from year to year while the company concentrates on other developmental activities. The required documentation that is built in the document clearly shows the measurement procedures and corrective action to be taken enhancing continual improvement (Cianfrani et al 2002, 133).

ISO quality standards required product identification and traceability through handling, manufacturing and delivery process. The traceability system should be documented and maintained from raw materials to the finished (Cianfrani et al 2002, 663). Therefore PTV will always demand material certificates (MTR) from Suppliers and check accordingly that material cast number is in concurrence with the document. The records will be kept even if the materials will be in the storage and will be certified on project bases. The MTR will be important package of project deliverables

One generic quality management system requirement is customer satisfaction (Mettälä 2012). The company must have process activity that determines customer satisfaction and specify the frequency to ensure objectivity and validity. Indicators such as customers` feedback are required to monitor trends in both customer satisfaction and customer dissatisfaction. The company will have objective data to document compliance. Satisfaction and dissatisfaction are not opposite ends of same continuum but rather separate continuum (Cianfrani et al 2002, 653). Therefore, PTV will track pattern of customer satisfaction including current and future expectations of the customers.

The key success factor of in the application of quality management system is the top management commitment (Cianfrani et al 2002, 681). The Chief Executive Officer of PhemssalTech Ventures is committed to fulfil the contents of this document and to employ distributed effort, pre-measurement, scalability, periodic measurement and critical improvement.

For a company to function effectively it has to identify and manage it linked activities using resources according requirement of ISO standards to enable transformation of inputs into products that will meet customer`s expectation (SFS 2004, 13). The quality management system designed for PhemssalTech Ventures integrates co-ordination and implementation of service management processes that will provide continuous quality control, greater efficiency and opportunities for improvement. Performing the activities of this document requires people and operation teams that will be well organized and coordinated and therefore it will be ensured that appropriately qualified and competent personnel will be employed to execute the provisions of this document (Godfrey et al 1998, 5.32).

The design and implementation of an organisation’s quality management system is influenced by varying needs, particular objectives, the product provision, employed process and the size and structure of the organisation (SFS 2004, 11). Hence, the adoption of quality management system is a strategic decision of PTV.

REFERENCES

Adefolalu, O., 2013. Classic Information about PhemssalTech Ventures – Overview discussions. Tampere.

Air Transport Association of America ATA MSG-3, 2005. Operator/Manufacturer Scheduled Maintenance Development. Washington, DC. USA.

Cianfrani C. A., Tsiakals J. J. and West J. E. (Jack), 2002. The American Society for Quality ISO 9000:2000 Handbook. ASQ Quality Press Milwaukee, Wisconsin

Corporate Affairs Commission Federal Republic of Nigeria – Certificate of Registration of Business Name, PhemssalTech Ventures, 2010

Godfrey B. A. and Juran J. M., 1998: Juran`s Quality Control Handbook, Fifth Edition McGraw Hill Inc.Read 04.02.2013. http://www.pqm-nline.com/assets/files/lib/juran.pdf

International Standard ISO 10006, 2003. Quality management systems – Guidelines for quality management in projects. ISO copyright office, Switzerland

International Standard ISO 10002, 2004. Quality management - Customer satisfaction – Guidelines for complaints handling in organisations. ISO copyright office, Switzerland

International Standard ISO 10012, 2003. Measurement management systems – Requirements for measurement processes and measuring equipment. ISO copyright office, Switzerland

International Standard ISO 10007, 2003. Quality management systems – Guidelines for configuration management. ISO copyright office, Switzerland

International Standard ISO 10381-3, 2001. Soil quality - Sampling – Part 3: Guidance on safety. ISO copyright office, Switzerland

International Standard ISO/IEC 20000-1, 2005. Information technology-service requirement- Part 1: Specification. ISO copyright office, Switzerland.

International Standard ISO/IEC 20000-2, 2005 Information technology-service requirement- Part 2: code of practice, ISO copyright office, Switzerland.

International Standard ISO 31000, 2009. Risk management - Principles and guidelines. ISO copyright office, Switzerland

International Standard ISO 263, 1973. General Plan and selection. ISO copyright office, Switzerland

Klassmate savings and loans Ltd, 2010. Memorandum of understanding – Agreement of Partners signed 22.02.2010.

Mettälä J. 2011: Basics of Quality principles and Environmental Management Lecture slides, Tampere University of Applied Sciences. Tampere, Finland.

Mettälä J.2012: Total Quality Management Lecture slides, Tampere University of Applied Sciences. Tampere, Finland.

Mind Tools Ltd. 1996-2013. Mission and vision statements – unleashing purpose. Read 22.02.2013. http://www.mindtools.com/pages/article/newLDR_90.htm

SFS Finnish Standards Association, 2004 Quality management systems. Guidelines for the application of ISO 9001:2000 in education, Helsinki, Finland

SFS-EN 60300-1 Finnish Standards Association, 2005 Dependability management. Part 1: Dependability management systems. Helsinki. Finland