

**Organizational performance improvement in an oil
producing facility in Nigeria through
operational excellence**

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ABSTRACT

This research work focuses on the improvement of organizational performance through the implementation of Operational Excellence. It presents various models that are applicable to different industries, and which can be adapted to fit organizational needs.

Operational Excellence has been given different definitions by different people and organizations. However, it is a disciplined integrated management system that improves organizational performance through the application of best practices and continuous improvement efforts. When successfully implemented, it ensures waste reduction or elimination, lower operational costs, quality improvements and customer satisfaction, all of which translate to improved and sustained business profitability and growth.

Even in hostile business environments like in Nigeria, Operational Excellence has been shown to improve performance. A study of an organization implementing an Operational Excellence model revealed the following:

- I. Improved environment, health and safety (EH&S) performance where targets of zero fatalities and reduced incident numbers and rates were achieved, surpassed and sustained.
- II. Improved reliability and efficiency performance through a robust asset integrity, reliability and optimization process.
- III. Successful cost reduction efforts in security, marine and aviation services.
- IV. A flourishing relationship with host communities.

The assessment of an organization to determine how well it is doing can be achieved using The Oliver Wight ABCD Checklist for Operational Excellence. This was used in this work and found to be a very important tool.

High points and challenges to achieving anticipated results were discovered and included in this work.

DEDICATION

This work is dedicated to the memory of my brother, Peter Okwuchukwuka Ozumba who translated to glory on 29 May, 2006. Keep shining among the stars!

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While my gratitude goes out to every individual who contributed to the success of this work, I would like to specially thank the following:

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TABLE OF CONTENTS

TITLE PAGE.....	i
ABSTRACT	ii
DEDICATION	iii
ACKNOWLEDGEMENT	iv
TABLE OF CONTENTS	v
LIST OF TABLES AND FIGURES	ix
LIST OF ACRONYMS.....	xi
LIST OF KEYWORDS	xii
1.0 INTRODUCTION	13
1.1 BACKGROUND.....	13
1.1.1 OPERATIONAL EXCELLENCE	14
1.2 PROBLEM STATEMENT AND SUBSTANTIATION	15
1.3 RESEARCH OBJECTIVES	18
1.4 RESEARCH OUTPUT	18
1.5 BENEFICIARIES	18
2.0 LITERATURE REVIEW	20
2.1 INTRODUCTION	20
2.2 OPERATIONAL EXCELLENCE DEFINED	22
2.2.1 ORGANIZATIONAL STRATEGY.....	23
2.2.2 THE CUSTOMER AND CUSTOMER VALUE.....	29
2.2.3 VALUE STREAM, FLOW AND WASTE ELIMINATION/REDUCTION	30
2.2.3.1 Value Stream Mapping (VSM)	31
2.2.3.2 Process Mapping.....	32
2.2.3.3 Flow Analysis Tool (FAT)	33
2.2.4 THE EMPLOYEES	33
2.3 OPERATIONAL EXCELLENCE TECHNOLOGIES.....	34
2.4 PERFORMANCE METRICS AND MEASUREMENT.....	36
2.5 BENCHMARKING AND STANDARDIZATION.....	37
2.6 THE ROLE OF INFORMATION TECHNOLOGY (IT)	39

2.7 OPERATIONAL EXCELLENCE AS ORGANIZATIONAL CULTURE	41
2.8 ACHIEVING OPERATIONAL EXCELLENCE	42
2.9 OPERATIONAL EXCELLENCE MODELS	43
2.9.1 OPERATIONAL EXCELLENCE IN BANKING.....	43
2.9.1.1 Implementation of the Operational Excellence framework in Banking.....	45
2.9.1.2 Risks and Challenges of Implementing the Framework.....	45
2.9.1.3 Benefits of Implementing the Framework	46
2.9.2 OPERATIONAL EXCELLENCE IN MANUFACTURING	46
2.9.2.1 The “Reliability” Operational Excellence Model.....	46
2.9.2.2 DuPont Operational Excellence Model	48
2.9.2.3 The DEB-LOREX model of Lean Transformation and Operational Excellence	53
2.9.2.4 Operational Excellence in Information Technology (IT) Management.....	57
2.10 CHALLENGES TO ACHIEVING OPERATIONAL EXCELLENCE.....	61
2.11 CRITICAL SUCCESS FACTORS OF OPERATIONAL EXCELLENCE	62
2.12 CHAPTER SUMMARY.....	63
3.0 RESEARCH DESIGN AND METHODOLOGY	64
3.1 INTRODUCTION	64
3.2 RESEARCH DESIGN	64
3.2.1 PROPRIETARY AND CONFIDENTIALITY ISSUES	65
3.3 RESEARCH TACTICS	65
3.3.1 TARGET POPULATION.....	66
3.3.2 UNITS OF ANALYSIS.....	66
3.3.3 SAMPLING METHOD	67
3.3.4 SAMPLING FRAME	67
3.4 DATA COLLECTION TECHNIQUES	67
3.5 METHODOLOGY.....	68
3.5.1 IDENTIFICATION OF OPERATIONAL EXCELLENCE MODEL, ORGANIZATIONAL PROCESSES AND KPAS	68
3.5.2 ANALYSIS OF ORGANIZATIONAL PERFORMANCE RESULTS	68
3.5.3 ASSESSMENT OF PROCESSES AND PROCEDURES AGAINST THE OLIVER WIGHT CHECKLIST.....	69
3.5.4 QUALITATIVE SURVEY OF RESPONDENTS	69
3.6 RESEARCH VALIDITY.....	70

4.0 INVESTIGATION, RESULTS AND FINDINGS 71

4.1 INTRODUCTION 71

4.2 CASE STUDY ORGANIZATION: Aschio Petroleum Nigeria Limited. 71

4.2.1 NEED FOR PERFORMANCE IMPROVEMENT THROUGH OPERATIONAL EXCELLENCE 72

4.2.2 NEW GOALS: MISSION, VISION, VALUES AND OBJECTIVES 73

4.2.3 OPERATIONAL EXCELLENCE MODEL IMPLEMENTED 75

4.3 FOCUS KEY PERFORMANCE AREAS (KPA_s) AND KEY PERFORMANCE INDICATORS (KPI_s) 81

4.4 RESULTS AND ANALYSIS OF ORGANIZATIONAL PERFORMANCE 84

4.4.1 ENVIRONMENT, HEALTH AND SAFETY (EH&S)..... 84

4.4.1.1 Workforce Fatalities..... 84

4.4.1.2 Workforce Days Away From Work Rate (DAFWR)..... 85

4.4.1.3 Workforce Total Recordable Incident Rate (TRIR)..... 87

4.4.1.4 Petroleum Spill Volume and Number 88

4.4.1.5 Workforce BBS Participation Compliance 91

4.4.2 RELIABILITY AND EFFICIENCY 93

4.4.2.1 Organizational Production Efficiency..... 93

4.4.2.2 Preventive Maintenance Compliance 94

4.4.3 COST REDUCTION 96

4.4.3.1 Security and Marine costs..... 96

4.4.3.2 Cost of Helicopter services 97

4.5 ASSESSMENT OF PROCESSES AGAINST OLIVER WIGHT ABCD CHECKLIST FOR..... 97

4.6 VALIDATION OF RESULTS THROUGH INTERACTION WITH THE WORKFORCE 101

4.6.1 HIGHPOINTS..... 102

4.6.2 CHALLENGES 102

4.7 SUMMARY OF FINDINGS 103

4.8 CHAPTER SUMMARY 104

5.0 CONCLUSION AND RECOMMENDATIONS 105

5.1 CONCLUSION 105

5.2 RECOMMENDATIONS..... 106

APPENDICES.....108
APPENDIX A.....108
APPENDIX B.....127

LIST OF REFERENCES.....129

LIST OF TABLES AND FIGURES

Tables

2.1 DIFFERENCES BETWEEN VALUE STREAM MAPPING AND PROCESS MAPPING	Error! Bookmark not defined.
2.2 ROLES OF INFORMATION TECHNOLOGY	Error! Bookmark not defined.
2.3 DUPONT OPERATIONAL EXCELLENCE MODEL	Error! Bookmark not defined.
2.4 SEVEN STEPS TO OPERATIONAL EXCELLENCE IN IT MANAGEMENT	Error! Bookmark not defined.
4.1 ASCHIO PETROLEUM NIG. LTD ORGANIZATION PERFORMANCE HIGHLIGHTS	Error! Bookmark not defined.
4.2 OPERATIONAL EXCELLENCE MODEL IMPLEMENTED BY ASCHIO PETROLEUM NIG. LTD	Error! Bookmark not defined.
4.3 WORKFORCE FATALITIES.....	Error! Bookmark not defined.
4.4 WORKFORCE DAYS AWAY FROM WORK RATE (DAFWR)	Error! Bookmark not defined.
4.5 WORKFORCE TOTAL RECORDABLE INCIDENT RATE (TRIR).....	Error! Bookmark not defined.
4.6 PETROLEUM SPILL VOLUME AND NUMBER	Error! Bookmark not defined.
4.7 WORKFORCE BBS PARTICIPATION COMPLIANCE.....	Error! Bookmark not defined.
4.8 ORGANIZATIONAL PRODUCTION EFFICIENCY	Error! Bookmark not defined.
4.9 PREVENTIVE MAINTENANCE COMPLIANCE	Error! Bookmark not defined.
4.10 ASSESSMENT AND RATING OF THE STRATEGIC PLANNING PROCESS	Error! Bookmark not defined.
4.11 ASSESSMENT AND RATING OF THE PEOPLE/TEAM PROCESS	Error! Bookmark not defined.
4.12 ASSESSMENT AND RATING OF THE TOTAL QUALITY AND CONTINUOUS IMPROVEMENT PROCESS.	Error! Bookmark not defined.
4.13 ASSESSMENT AND RATING OF THE PLANNING AND CONTROL PROCESS ..	Error! Bookmark not defined.

FIGURES

2.1 MANAGEMENT SYSTEM FOR STRATEGY DEVELOPMENT..... Error! Bookmark not defined.
2.2 OPERATIONAL EXCELLENCE FRAMEWORK FOR THE BANKING INDUSTRY ..	Error! Bookmark not defined.
2.3 THE “RELIABILITY” OPERATIONAL EXCELLENCE MODEL.....	Error! Bookmark not defined.
2.4 DUPONT CHANGE MANAGEMENT PROCESS.....	Error! Bookmark not defined.
2.5 DEB-LOREX OVERALL REPRESENTATION FOR LEAN TRANSFORMATION AND OPERATIONAL EXCELLENCE..	Error! Bookmark not defined.
2.6 DEB-LOREX MODEL FOR LEAN TRANSFORMATION AND OPERATIONAL EXCELLENCE	Error! Bookmark not defined.
4.1 COLUMN CHART OF WORKFORCE FATALITIES.....	Error! Bookmark not defined.
4.2 GRAPH REPRESENTING WORKFORCE FATALITIES.....	Error! Bookmark not defined.
4.3 COLUMN CHART OF WORKFORCE DAYS AWAY FROM WORK RATE (DAFWR)	Error! Bookmark not defined.
4.4 GRAPH REPRESENTING WORKFORCE DAYS AWAY FROM WORK RATE (DAFWR)	Error! Bookmark not defined.
4.5 COLUMN CHART OF WORKFORCE TOTAL RECORDABLE INCIDENT RATE (TRIR)	Error! Bookmark not defined.
4.6 GRAPH REPRESENTING WORKFORCE TOTAL RECORDABLE INCIDENT RATE (TRIR)	Error! Bookmark not defined.
4.7 COLUMN CHART OF PETROLEUM SPILL VOLUME.....	Error! Bookmark not defined.
4.8 GRAPH REPRESENTING PETROLEUM SPILL VOLUME.....	Error! Bookmark not defined.
4.9 COLUMN CHART OF PETROLEUM SPILL NUMBER	Error! Bookmark not defined.

4.10 GRAPH REPRESENTING PETROLEUM SPILL NUMBER..... Error! Bookmark not defined.

4.11 COLUMN CHART OF WORKFORCE BBS PARTICIPATION COMPLIANCE Error! Bookmark not defined.

4.12 GRAPH REPRESENTING WORKFORCE BBS PARTICIPATION COMPLIANCE . Error! Bookmark not defined.

4.13 COLUMN CHART OF ORGANIZATIONAL PRODUCTION EFFICIENCY Error! Bookmark not defined.

4.14 GRAPH REPRESENTING ORGANIZATIONAL PRODUCTION EFFICIENCY Error! Bookmark not defined.

4.15 COLUMN CHART OF PREVENTIVE MAINTENANCE COMPLIANCE Error! Bookmark not defined.

4.16 GRAPH REPRESENTING PREVENTIVE MAINTENANCE COMPLIANCE..... Error! Bookmark not defined.

LIST OF ACRONYMS

CM:	Corrective Maintenance
CSVSM:	Current State Value Stream Mapping
DMAIC:	Define - Measure - Analyze - Improve - Control
EH&S:	Environment, Health and Safety
FAT:	Flow Analysis Tool
FMEA:	Failure Mode and Effect Analysis
FSVSM:	Future State Value Stream Mapping
ISO:	International Standards Organization
KPA:	Key Performance Area
KPI:	Key Performance indicator
KPIV:	Key Process Input Variable
KPOV:	Key Process Output Variable
MOC:	Management of Change
MSA:	Measurement System Analysis
OSHA:	Occupational Safety and Health Administration

PdM:	Predictive Maintenance
PM:	Preventive Maintenance
RCA:	Root Cause Analysis
RCM:	Reliability Centered Maintenance
SPC:	Statistical Process Control
TPM:	Total Productive Maintenance
VOC:	Voice of the Customer
VSM:	Value Stream Mapping

LIST OF KEYWORDS

Best practices
Competitive advantage
Culture
Customers
Lean
Leadership
Metrics
Measurement
Mission
Operational Excellence
Performance improvement
Processes
Productivity
Six sigma
Strategy
Vision
World-class performance

-----CHAPTER ONE-----

1.0 INTRODUCTION

1.1 BACKGROUND

The business environment changes rapidly and continuously. This is attributed to varying customer needs, changing demographics, giant leaps in technological advancement in areas such as transportation, computing, automation and mechanization, information and telecommunications, and the general effects of globalization (*Davis et al. 2003*).

The changing tastes of customers, and their desire to get products and services cheaper, faster, and in better quality, cause organizations to search for means of delivering customers' needs in economical ways in order to stay in business. Again, with focus on people and environmental safety growing each day, organizations work toward conforming to the laws of government and other regulatory bodies and thus, strive to meet global standards in required areas.

Every day, there are more products and services for consumers to choose from, with an ever increasing number of providers for such products and services in the global market place, leading to very high levels of competition. To stay relevant in business, organizations in all spheres such as manufacturing, banking, Information Technology (IT), and healthcare have had to adopt different measures. For instance, according to *Haddock et al (2006)*, some organizations in manufacturing for example, adopted a low-cost model which involved producing their goods in regions associated with low labor and material costs. However, they noted that the gains achieved by the low production costs of these regions may eventually be eroded by logistics costs, lack of scale and quality gaps.

To remain competitive in such a dynamic environment, organizations must seek continual improvement in the objects which define their areas of operation. A variety of improvement methodologies have been developed and applied over the years, each from a slightly different perspective, with a different focus, for different specific industries, and as solutions for different requirements, all to enhance and sustain performance. Articles on www.gpworldwide.com and www.operationalexcellence.ca list these methodologies to include Lean initiatives, Six Sigma, Total Quality Management (TQM), New Product Development, Quality Function Deployment, Reliability Excellence, Process Re-engineering, to mention but a few. While some have been applied as designed, others have been applied in a mix as an integrated approach, such as Lean Six Sigma. Generally, the purpose of these all is to minimize financial and material waste, enhance product and service quality, protect people and the environment, and maximize profit and customer value.

These methodologies have been tested and proven, and their successes to yielding results abound in literature. However, there are views that a different approach must be adopted to ensure that the achieved successes are sustainable in the current competitive business environment. For example, *Russell & Koch (2009)* state that there is the tendency for organizations to pursue efficiencies in such discrete areas as manufacturing, sales and procurement and other functional areas, by implementing appropriate improvement tools. While desired results may be achieved in the confines of such functional areas in an organization, this siloed approach may not necessarily translate to overall organizational performance improvement. On the other hand, greater business efficiency can be achieved by the adoption of an end-to-end approach that links business processes.

1.1.1 Operational Excellence

In line with the above, an end-to-end improvement approach whose implementation is said to help organizations achieve and sustain world-class performance, and much faster, is currently gaining ground. This is Operational Excellence. Though dating back to the 1970s, Operational Excellence is still relatively new as an adopted approach to organizational improvement. This is because it previously was restricted to the manufacturing industry, but is currently finding application in all other sectors, and even in office businesses. According to *The Office that Grows Your Business (2009)*, it is a concept “embraced by corporate leaders for competitive edge in today’s challenging global market; an antidote to slipping revenues; it allows for the achievement of improved performance much faster than other improvement programs”. *Russell & Koch (2009)* go further to state that Operational Excellence offers a disciplined approach and the application of best practices that lead to world class performance and the foundation for sustainable growth.

Other claims in various literature generally refer to Operational Excellence as an approach that helps managers focus, align and engage in what is required to become more competitive, and achieve world-class levels of performance by integrating people, processes and tools which lead organizations to outperform their competition sufficiently with respect to cash flow, return on assets and growth.

Various industry experts, vendors and organizations have defined or referred to Operational Excellence in different ways to showcase the high points of the philosophy. Below are reproduced a number:

- Operational Excellence is an integrated management system that drives business productivity by applying proven practices and procedures in three foundation blocks: asset productivity, capital effectiveness and operations risk management. It gives the organization benefits of lower costs, increased efficiencies, fewer injuries, maximum sustainable returns on operating assets, and an enhanced competitive position. (*DuPont, 2005*)

- Six sigma, lean manufacturing, Total Quality Management; when integrated under the umbrella of Operational Excellence and applied across the organization, a new way of doing business emerges; one that produces higher yields, reduces waste, and improves quality and customer satisfaction. (*Stuart, 2007*)
- Operational Excellence is when each and every employee can see the flow of value to the customer and fix that flow before it breaks down. (*Office That Grows Your Business, 2009*)
- Operational Excellence has become the umbrella adopted by organizations across virtually all industries, including life sciences to refer to the thrust for continuous improvement in all areas of business process performance while ensuring that this performance equals or exceeds 'best-in-class' organizations. (*Gaulich, 2009*)
- Operational Excellence occurs when people, products, processes and information technology are all aligned, and will ultimately result in decreased operational costs, improved productivity and finally, growth. (*Schneider, 2003*)
- Operational Excellence is a philosophy of leadership, teamwork and problem solving resulting in continuous improvement throughout the organization by focusing on the needs of the customer, empowering employees and optimizing existing activities in the process (*www.wikipedia.com*).
- Operational Excellence is the systematic management of safety, health, environment, reliability and efficiency to achieve world-class performance. (*Chevron Corporation*)

From the foregoing, the high points associated with the successful implementation of Operational Excellence are invaluable as well as numerous. These include the basic objectives of venturing into business: profit maximization and sustainability, safe operations and customer satisfaction, decreased operational costs and improved productivity, business growth and the attainment of world-class status.

1.2 PROBLEM STATEMENT AND SUBSTANTIATION

The recent world economic crisis has had a great impact on many, if not all, businesses. While some businesses have gone completely under and some are still struggling to stay afloat, others are on the path to recovery by employing varying measures to reduce or eliminate waste, save costs, sustain or improve profitability, and re-establish competitive advantage over peers. Depending on the approach adopted to achieve said recovery, some organizations will do so much quicker than others, while some will have a long way to go.

A search in literature and the internet revealed that the adoption of Operational Excellence as a continuous improvement philosophy is basically in the West and Asia, with many success stories recounted in different sectors. The same cannot

be said in Africa, and Nigeria, in particular. A comparison of the number of businesses in the region with the results of the search indicates that the adoption of Operational Excellence is almost non-existent.

The *CIA World Factbook* lists Nigeria as an oil-rich state long hobbled with political instability, corruption, inadequate infrastructure and poor macroeconomic management. A 2010 estimate placed the country population at 152 million, 70% of which live below the poverty line, and about 47 million people constituting the labor force. While the most recent unemployment figures are unavailable, it is generally accepted that it is very high and the economic crises would have increased this percentage given the subsequent loss of jobs experienced in different sectors.

A case in point is in banking where job losses were due to banks restructuring their operations to align with reforms being orchestrated by the country apex bank, the Central Bank of Nigeria. In an article on the *BBC News website*, the CBN Governor was quoted saying these reforms were initiated to address the seeming rot in the system where there was an excessively high level of non-performing loans, a practice attributable to poor corporate governance practice, lax credit administration processes and the absence or non-adherence to credit risk management practices.

Consequent to the reforms, most banking organizations limited their loan services to customers, especially small-scale businesses which caused these businesses to struggle to keep afloat, eventually leading some to downsize their workforce. So, on the one hand, financial organizations embraced reforms necessitated by unwholesome practices, and the accompanying job losses, and the other hand, businesses struggle to survive with some resulting to cutting down on jobs.

Another area experiencing challenges is the power and energy sector. Currently, Nigeria contends with very poor levels in power supply as a result of inadequacies in generating, transmitting and distributing capacities and the maintenance of existing facilities. The lack of continuity in leadership developmental programs and the practice of a poor maintenance culture have led to very poor services and a setback to economic growth and national development. Individuals and organizations now resort to providing their own power to do business through the use of petrol and diesel generating sets, leading to increased running costs. Businesses unable to cope have eventually gone under, resulting again to the loss of livelihood for people.

Other sectors facing varying challenges include the manufacturing, service and even education sectors to mention only a few. With the levels of unemployment and poverty as indicated by statistics, Nigeria does not need more business closures and job losses. Rather, business concerns in various industries in the country require an approach to doing business that will ensure their survival during periods of upheavals, decreased operational errors and costs, improved performance, efficiencies, productivity and customer satisfaction and finally, business growth; an approach to business such as Operational Excellence.

An interaction with a selected number of business owners, proprietors and organizations' management in Nigeria to ascertain the reason the Operational Excellence philosophy as a reliable continuous improvement approach had very limited penetration in the business environment revealed the following, as summarized below:

1. Quite a number of business owners and managers had no knowledge of Operational Excellence as an improvement philosophy.
2. While some management-level personnel had some knowledge of Operational Excellence, the concept remained vague. They neither knew its difference from other improvement approaches nor benefits associated with its implementation.
3. Some people argued that the business environment here in Nigeria differed greatly from that of the Western world, with varying degrees of peculiarity, and as such a continuous improvement philosophy successful in the West may fail over here.
4. Consequent to (3), the perceived success stories from the West were, at best, remote given that none emanates from same business environment as Nigeria, and that the benefits of Operational Excellence as demonstrated from an organization within the same business environment would be convincing.
5. Operational Excellence is perceived as just another nomenclature for doing things the same old way.

In light of the above, there is thus the need to conduct a research to determine if the successful implementation of Operational Excellence by an organization in Nigeria actually results in improved organizational performance and competitive advantage, quantify the benefits therein, and in so doing, cater to as many concerns as possible as raised by business owners and managers.

1.3 RESEARCH OBJECTIVES

This research is carried out with a view to:

1. Quantifying the benefits of implementing the Operational Excellence philosophy for continuous improvement in an oil producing company in Nigeria.
2. Determining the degree to which organizational performance is improved by the adoption and successful implementation of Operational Excellence.

1.4 RESEARCH OUTPUT

Added to the research objectives, this work is aimed at introducing Operational Excellence to individuals and corporations with little or no knowledge of it and verifying the benefits claimed to be achieved by its implementation. This will be achieved by presenting various Operational Excellence models as applied in different industries. These provide a framework which can be adapted to fit the purposes of organizations for them to achieve reliable, cost effective and safe operations, improve efficiencies and sustain business profitability. In implementing Operational Excellence successfully, organizations would be better poised to compete favorably with their peers, ensure clear organizational focus on priorities, foster better team work, promote higher levels of staff engagement, excellent commitment to organizational performance improvement and achieve greater customer satisfaction.

1.5 BENEFICIARIES

Verifiable evidence that the successful implementation of the philosophy of Operational Excellence for continuous improvement will lead to improved organizational performance and competitive advantage will promote its adoption and result in the ultimate survival and growth of businesses. Professionals in industries would understand and know more about creating and sustaining flow of value to customers and ensuring that the flow is addressed before it breaks down. They would also know more about waste elimination and improving efficiency which lead to increased productivity that will translate to cost savings. Thus, beneficiaries of this research will include

- CEOs and business leaders in all industries
- Managers in various business capacities and
- All organizational personnel

In the chapters that follow, the concept, philosophy, design, findings as well as the recommendations and conclusions of this research work are presented.

Chapter Two deals with the literature review as concerned with Operational Excellence: its principles and pillars, and tools required for its deployment. The work of various researchers, authors and experts in Operational Excellence is presented and an appraisal of their views and conclusions in relation to this research work given. The materials were

chosen to cover the various industries where Operational Excellence has been applied successfully, and their adaptation of the philosophy to suit their purposes.

In Chapter Three, the research design is presented. The modes of empirical investigation into the subject matter as they relate to the research objectives are discussed.

Chapter Four introduces the organization under focus. To achieve the stated objectives, an oil producing organization currently implementing the Operational Excellence philosophy for continuous improvement is investigated. This chapter comprises of the research investigation, analysis of results and discussions on the findings.

Chapter Five concludes the research work with recommendations and conclusions.

2.0 LITERATURE REVIEW

2.1 INTRODUCTION

Competitive pressures on organizations have increased due to the convergence of many trends: geopolitical changes in Europe and Asia, improvements in technology like the internet and software development and management, changes in workflow structure and management, outsourcing and international collaboration. This convergence has led to a situation where organizations no longer dominate the marketplace by virtue of size, but rather on their organization core competencies and other competitive strengths (*Martin, 2008*).

Business and asset managers are always on the lookout for opportunities to improve organizational performance results, have the risks associated with business under control, and outperform the competition so as to stay in business. Generally, they contend with asset and labor productivity, government and industry regulations, quality of goods and services and meeting with customer expectations. They also have to deal with social responsibility and relationships, ineffective and inefficient operations as indicated by the bottom-line or when compared to the competition, waste reduction, profit decline and a host of other issues relating to doing business successfully.

In the banking industry for example, *Noble (2008)* writes that turbulence in global credit markets has added further pressure on financial markets to derive increasing profit contribution from their businesses. With a slow-down in revenues generated from mortgage and consumer-lending, profit margins are expected to shrink in future due to increase in securitization costs and other costs. Thus, there is the requirement for sustainable cost efficiencies, while maintaining and growing market position and managing the complexity of business. In an article retrieved from <http://www.deloitte.com>, with the increase in competitive pressures driven by globalization, consolidation, and regulations, banks need to increase efficiency and enhance service. To remain competitive, bank executives must develop ways to achieve greater efficiencies through consolidation, complexity management, off-shoring and outsourcing and effective use of technology to cater to the ways products and services are offered and utilized given the effect of commoditization and disintermediation. The aim therefore is for how long term efficiencies can be achieved.

Hamilton (2008) writes that the powerful networks, computing platforms and sophisticated applications environments available today ensure that IT is a huge enabler of productivity. Businesses and consumers can currently employ an impressive array of capabilities such as information access and sharing, knowledge acquisition, decision making,

automation and marketing with the use of the Personal Computer (PC), internet and portable and wireless devices. Many organizations depend highly on IT for the smooth running of their operations, without which they are practically grounded. This has led to IT being integral and very vital to business, necessitating the huge investments required for the acquisition and maintenance of IT infrastructure.

Business leaders however contend with questions on how much to budget for IT, how to ensure significant benefits will accrue from the huge investments and how to effectively organize and manage IT functions. Thus, to ensure a sustainable competitive advantage from IT and provide required value, the IT function must excel at delivering the needs of the customer, and at affordable costs. It must be robust, reliable and secure and should have the ability to adapt quickly to changes in the environment. This can be achieved by deploying a strict management model that is disciplined and relentlessly committed to excellence by following proven best practices, eventually leading to the transformation of the IT function from a difficult-to-manage cost center to a value-added service to the organization.

In the face of a downward trend in patient (customer) satisfaction statistic, battered employee morale, and fierce competition from peer establishments having superior equipment, facilities and financial standing in the healthcare sector, *Stubblefield (2005)* writes that the need for a competitive advantage was imperative for his organization to stay in business. Having eliminated programs, facilities, equipment and location as potential competitive advantage, his organization realized that the provision of quality service was their best shot to survive. There was the need to create a workplace culture of excellence where employees would find satisfaction in their jobs, and in turn create a healing environment for patients. This would be achieved by building a service culture that would be difficult to duplicate or compete with where employees are empowered to perform at the highest level resulting in an inspired, engaged, responsible and accountable workforce, leading to higher customer satisfaction ratings and considerable recognition.

In summary, to improve organizational performance and productivity through the efficient management of capital, materials and labor, to eliminate waste identifiable by tools such as spaghetti diagrams and value stream maps, to improve quality and lower business costs and as such maintain market position, to deliver the needs of customers effectively and at affordable costs and to achieve sustainable world-class performance, some organizations in all spheres of business have readily adopted Operational Excellence as the relevant management model that is disciplined and committed to achieving organizational excellence in terms of performance and competitiveness. For them, Operational Excellence is an important competitive differentiator in these current economic conditions, and a vital strategy for achieving the objective of improving business performance, taking market share and changing competitive position.

2.2 OPERATIONAL EXCELLENCE DEFINED

Various people and groups have defined Operational Excellence in the context in which they operate. From the automobile service industry for example, *Schneider (2003)* defines Operational Excellence as “the synchronized application of resources (resources can be anything-time, people, energy, capital or physical plant) from promotion, marketing and advertising, all the way to doing the work; from taking the order, orchestrating the production process, through to delivering the vehicle and following up”.

Haddock et al (2006) however put it simply as a concept which entails doing things well across an organization’s operations in a way that gives the organization a competitive advantage in the market place. *Gerst (2007)* goes on to add that Operational Excellence is both a way of thinking and a set of technologies which aim at improving your competitive position by helping you do what you do, better than anyone else and in the process execute jobs faster, with less waste, greater quality and lower cost. The author refers to Operational Excellence Thinking as the notion that organizations must be viewed as systems where all work that occur, from strategic planning to assembly, accounting to operations, happen as a result of processes. Interdependencies link the processes and thus, performance improvement must involve all functional areas in the entire organization.

The definition favored for this work is taken from the book *The Office that Grows Your Business (2009)* and given below. This is because, when broken down, it provides the foundations of the philosophy responsible for an organization’s competitiveness and performance improvement:

“Operational Excellence is when each and every employee can see the flow of value to the customer, and fix that flow before it breaks down”.

According to *Duggan*, this is a definition that is simple and concise which implies that each employee knows the product path of a good or service, and knows something is wrong when it does not get to its destination. Additionally, when something does go wrong, they know what to do to fix it without seeing the supervisor, reporting to management or having a meeting.

Key words, phrases and important questions can be extracted from this definition to reveal the essence of Operational Excellence. They include:

- ✓ Every employee: this implies that everyone in the organization, from top to bottom, is involved; no one is left out.

- ✓ Value and value flow: how is value determined? How is it ensured that wastes are eliminated or reduced so as to expend resources on what the customer values?
- ✓ Customer: the reason goods or services are produced, without which there is no business.
- ✓ Fix flow before breakdown: what plans or strategies are available to fix flow before a breakdown? What tools and technologies would be required?

Below, a detailed discussion follows to reveal the level of importance of the elements of Operational Excellence.

2.2.1 ORGANIZATIONAL STRATEGY

An organization's strategy basically reflects how it plans to use all of its resources and functions (operations, IT, finance and marketing) to gain an advantage over its competitors (*Davis et al, 2003*). It defines the specific businesses in which the firm will compete and the way in which resources are acquired and allocated among various business. The strategy, which is based on the corporate mission, is defined by the marketplace where the customers for the organization's goods and services are present.

Haddock et al (2006) list three strategies that may be adopted by organizations as Positioning, Internal Learning and Execution. Positioning refers to the strategy where the organization involves itself in the provision of products and services which appeal to different or emerging customer needs. Firms may choose to differentiate themselves from the competition by identifying a different combination of competitive dimensions from other players in the market space, and configuring their operations systems accordingly. For this strategy to be successful, customers must find value in the chosen dimensions.

Internal learning involves an organization developing an ability to learn. This translates to being motivated towards innovation. *Schwientek & Schmidt (2008)* write that the entrance of China and other low-cost producing nations into the global market has led to the significant increase in the number of suppliers of various products. With market competition subsequently rising, it becomes very important for every organization to find and highlight unique selling points so as to be differentiated from the pool of competitors. Thus, some organizations decide to create product or processes that lead to cheaper or better products thereby establishing and nurturing an environment for innovation excellence.

Execution involves implementing a strategy more effectively than competitors. It entails building enduring, advantaged competences and capabilities based on organizational processes, systems and culture. To succeed, firms will need to climb the learning curve quickly and aggressively, building experience and developing unique capabilities. Competitors would find success based on this strategy difficult to replicate because this kind of capacity can be developed only with conscious effort, experience and time.

Stoner & Wankel (1986) state that strategy may be viewed from two different perspectives:

- ✚ From the perspective of what an organization intends to do: a broad program for defining and achieving an organization's objective and implementing its missions
- ✚ From the perspective of what an organization eventually does: the pattern of the organization's response to its environment over time.

Again the authors state that there are three levels to strategy:

- I. **Corporate level strategy:** this is formulated by top management to oversee the interests and general operations of the organization that contain more than one line of business.
- II. **Business Unit level strategy:** this concerns managing the interest and operations of a particular business. It defines the scope and boundaries of the business unit in terms of how it addresses the specific markets that it serves and the products and services that it provides. Strategic Business Units (SBUs) often differentiate themselves from the competition in order to prosper, and they adopt such strategies as low-cost (producing the lowest cost goods and services), market segmentation (satisfying the needs of a particular market niche) and product differentiation (offering products that differ significantly from the competition).
- III. **Functional level strategy:** this creates the framework for the management functions such as finance, operations, Human Resources (HR), marketing, and Research & Development (R&D), so that they conform to the business unit level strategy. It is developed to support and align with the established business unit strategy.

The operations strategy refers to how the operations management function contributes to an organization's ability to achieve its competitive advantage in the marketplace. This is developed from the competitive priorities selected by the organization to support a given strategy. The competitive priorities may include any of the following: high quality, fast deliver, safety, reliable operations, environmentally friendly products and services, low cost, safety and flexibility.

In the development of an effective operations strategy, two focus areas with respect to competitive priorities are:

- **Trade-offs:** basically, a firm may find it difficult excelling simultaneously on all competitive priorities. Therefore, a hierarchy among the different priorities may have to be established pertaining to how critical they are to the organization's success. Management then focuses more of their effort and resources on the chosen priorities while still giving a somewhat different level of attention to others. (Wallace, 1992) writes that since organizations aim for survival and prosperity, they must pursue zero trade-offs (which may be literally impossible, but effectively possible) which is all about achieving customer satisfaction and translates to competitive success in the market place.

- **Core capabilities:** these can be defined as the set of skills that an organization's operations management function has developed that allows it differentiate itself from the competition. Organizational capabilities are generally grouped into two. Distinctive capabilities of an organization are its characteristics which cannot be replicated by competitors, or can only be replicated with great difficulty. They form the basis of sustainable competitive advantage for the firm and include patents, exclusive license, effective leadership, strong brands, team work and tacit knowledge. Reproducible capabilities are those that can be created, or even bought, by competitors. Thus, they cannot serve as basis for sustainable competitive advantage for the firm. The core capabilities of an organization must be identified, especially in functional areas, and aligned to meet the overall goals of the firm. This is important in order to successfully implement an operations strategy.

Martin (2008) writes that an organization's productivity and financial performance are directly related to its operational effectiveness and efficiency. In turn, operational effectiveness and efficiency are directly related to how an organization's products or services are designed and the production processes that were created to produce them. Also important to operational effectiveness and efficiency are the day-to-day management decisions that may impact the yield, availability and cycle time of an operational system. In summary, management decisions and how the organization's strategy is executed affect its productivity and financial performance.

In an article in the *Harvard Business Review*, *Kaplan & Norton (2008)* associate the underperformance of organizations to a breakdown in its management system as a result of the failure in linking strategy effectively to operations. This may stem from organizations formulating grand strategies which they eventually find difficult to translate to operational goals and targets that mid-level or lower level managers find difficulty in understanding and achieving. Again, even when companies formalize their strategic objectives, some still struggle because they do not link these objectives to tools that support the operational improvement processes that ultimately deliver on the strategy's objectives.

To mitigate these, the adoption of a management system with respect to adequate strategic planning is encouraged. This management system, also referred to as the Closed Loop Management System, generally begins with strategy development which involves applying tools, processes and concepts such as mission, vision and value statements; SWOT analysis; shareholder value management, competitive positioning, and core competencies to formulate a strategy statement. The statement is then translated into specific objectives and initiatives using other tools and processes including strategy maps and balanced scorecards. Strategy implementation in turn, links strategy to operations with a third set of tools and processes including quality and process management, re-engineering, process dashboards, rolling forecasts, activity based costing and dynamic budgeting. With the progress of implementation, managers continually

review internal operational data and external data on competitors and the business environment. Finally, managers periodically assess the strategy, updating it when they learn that the assumptions underlying it are faulty or obsolete. Steps in strategy development and implementation are as given below:

- I. **Develop the strategy:** this commences with the examination of the organization's fundamental business assumptions and competitive environment. Answers are sought to questions such as:
 - What business is the organization in, and why? This question focuses managers on high-level strategy planning concepts. Before the strategy can be formulated, executives must agree on the organization's purpose (mission), its aspirations for the future (vision), and the internal compass that will guide its actions (values).
 - What are the key issues faced in this business? Having determined the mission, vision and values of the organization, managers subsequently undertake a strategic analysis of the organization's external and internal situations. Externally, they study the industry economics, competitiveness data and the dynamics of the organization's financial technologies and market performance relative to competitors. Internal analysis includes assessing the firm's internal capabilities and performance, identifying distinctive resources and capabilities that may give it competitive advantage. Managers finally assess the current strategy with the view to ensuring the strategy leverages internal strengths to pursue external opportunities while countering weaknesses.

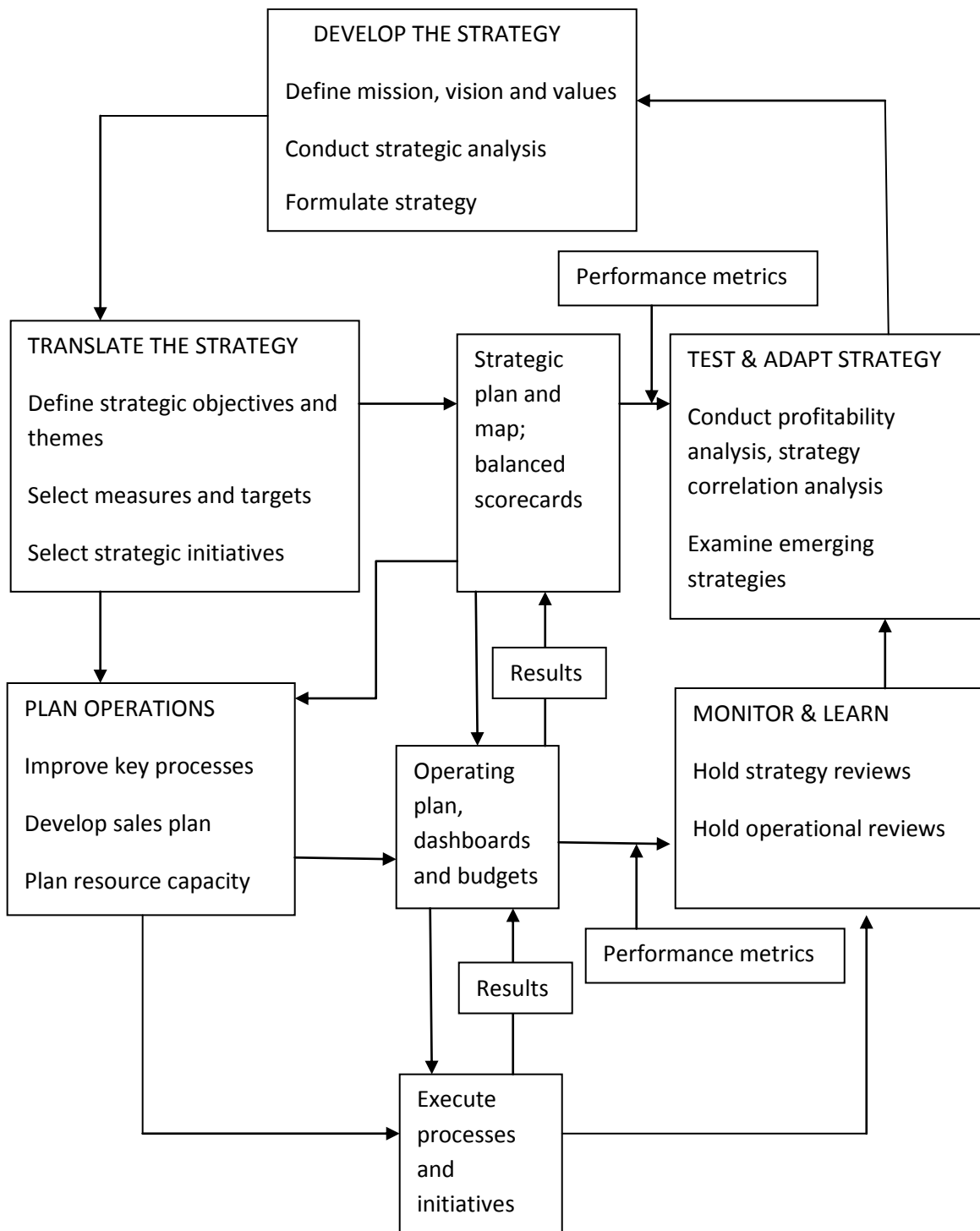


Figure 2.1 Management System for Strategy Development. Kaplan & Norton (2008)

- How can we best compete? Finally, managers tackle the strategy formation itself and decide on a course of action that will create sustainable competitive advantage by distinguishing the firm's offerings from the competitors and ultimately, will lead to superior financial performance. Strategies must respond, in one form or another, to issues concerning customers, markets, distinguishing value proposition, key

processes which give competitive advantage, human capital capabilities and technology, and organizational enablers.

II. **Translate the strategy:** once the strategy is formulated, managers need to translate it into objectives and measures that can be clearly communicated to all units and employees. The strategy map provides a powerful tool for visualizing the strategy as a chain of cause-and-effect relationships among strategic objectives. The chain starts with the organization's long-term financial objective and then links down to objectives for consumer loyalty and the organization's value propositions. It then continues to link goals related to critical processes, to people, technology and organizational climate and culture required for successful strategy execution. Large organizations typically create an overall corporate strategy map and then link it to strategy maps for each of its functional units.

After the development of the strategy map, it is linked to a balanced scorecard of performance metrics and targets for each strategic objective. Measurements are important so as to manage, and possibly improve on results being achieved. The balanced scorecards metrics allow executives to make better decisions about the strategy, and quantitatively assess its execution. Finally, resources are identified and authorized for a portfolio of strategic initiatives, which are designed to close identified performance gaps and intended to help achieve the strategies objectives.

III. **Plan operations:** with strategic metrics, targets, initiatives and portfolios in place, the organization then develops an operational plan that lays out the actions that will accomplish the strategic objectives. This starts with setting priorities for process improvement projects. These include Business Process Management, Total Quality Management, Lean Management, Six Sigma and Re-engineering programs which are all aimed to enhance organizational performance by relating directly to the objectives on the strategy maps and scorecards. The ultimate goal is to align near-term process improvements with long-term strategic priorities.

IV. **Monitor and learn:** as organizations implement their strategic and operational plans, there is the need to regularly monitor and learn from incoming results. Performance reviews are carried out by functional departments and business units to address problems and issues that have arisen or that persist. Performance indicators and initiatives are also reviewed to assess progress and identify barriers to strategy execution.

V. **Test and adapt the strategy:** time to time, managers may discover that some assumptions underlying the adopted strategy are flawed or obsolete. It sometimes happens that the strategy an organization uses to dominate its market space may have radically changed over time. Examples include size, available capital,

customer loyalty and preference. Thus, rigorous examination of the strategy will be carried out to decide on the applicability of incremental improvements, or the need of a new transformational strategy. The strategy testing and adapting process introduces new inputs to the offsite: an analysis of the current economics of existing products, services and customers, statistical analysis of correlations among the strategy performance measures and considerations of new strategy options that have emerged since the previous strategy development meetings. Indicators of the strength of the strategy include cost and profitability trends and reports, statistical analysis and emergent strategies.

Conclusively, in the pursuance of Operational Excellence, the strategic plans developed and implemented need to be successful. To increase the chances of success, following the management system in strategy formulation and execution as detailed above is vital. Decisions made in the daily running of the organization to achieve short-term and long-term goals will impact the effectiveness and efficiencies of the business, and ultimately the performance of the organization.

2.2.2 THE CUSTOMER AND CUSTOMER VALUE

In business, the customer is a crucial asset and king. As such, the varying needs and values of the customer must constantly be determined and understood in order to create systems and process work flows which would consistently meet the need and value expectations in an efficient and effective manner as compared to the competition, thus building strong customer relationships which lead to enduring organizational profitability. *Martin (2008)* writes that understanding customer needs and value perception also drives organizations to identify and align their resources behind core competencies. Added to this, understanding customer key value elements such as time, price, safety, utility and function often allow immediate and substantial improvements to process workflows because non-essential operations or process wastes can easily be identified and eliminated using appropriate tools and methods.

In his book, *Wallace (1992)* states that competing and winning in the market place require strategically linking customer and competitor issues into the primary operational elements of the business. Therefore, the development of a customer-driven operational strategy which establishes the primacy of the customer by focusing all operational aspects of the business on the customer, and serves as a filter for decision making by increasing the odds that correct decisions are arrived at, raises the chances of achieving success in business.

Yanker et al (2001) add that taking a strategic approach to managing customer value and satisfaction is likely to achieve increased business profitability. To realize the greatest economic benefits, organizations must, among other things:

- Build customer-centric organizations by driving customer focus into strategic business objects: putting the customer first becomes part of the corporate positioning and differentiator in the marketplace and focusing on high-value customers
- Train, motivate and organize human resources to support the customer mission and
- Apply customer focus in planning end-to-end measurements: constantly refining organizational understanding of customer economics and drivers of satisfaction through the use of clear metrics; continually assessing customer satisfaction and soliciting feedback from customers to improve understanding of their needs is critical.

The Voice of the Customer (VOC) is a concept which reveals to the organization what the customer finds valuable in the product manufactured or service rendered. By listening to the VOC through customer research and survey groups, determining and understanding the VOC creates a highly competitive weapon for the organization when it translates the information and materials obtained into products and services that satisfy the yearnings of the customer. *Martin (2008)* lists five value elements of any product or service as time, quality, function, price and relative customer importance. These, in combination with the three categories of customer needs as identified by Dr. N. Kano which include Basic, Performance and Excitement may be used to obtain useful customer information by market segment.

In summary, in an effort to achieve Operational Excellence, an organization must understand the importance of the customer to its survival and so must establish strategic plans which are customer focused. To be globally competitive, customer excellence must be understood with respect to the VOC by creating systems that will efficiently convert information and materials into products and services that meet with customer needs and value expectations.

2.2.3 VALUE STREAM, FLOW AND WASTE ELIMINATION/REDUCTION

The intent in business is to align process workflows using adequate tools and methods to deliver customer value without wasting resources. The identification and elimination or reduction of waste leads to an improvement in organizational efficiency in the pursuit of Operational Excellence. *(Sarkar 2008)* writes that wastes are symptoms of problems in a system or process and need to be identified and dealt with by a structured intervention. These wastes, originating from the Toyota Production System (TPS) include those associated with overproduction, waiting, unnecessary motion, inventory, transportation, over processing or inappropriate processing, defects, and the underutilization of people.

Various tools have been designed and successfully implemented in the identification of waste. This waste identification can occur at two different levels: the strategic level using Value Stream Mapping (VSM) where material and information flows across and throughout all value-adding processes are captured visually and the tactical level or process level using Process Mapping where disconnects, wastes and delays in a process are highlighted.

2.2.3.1 Value Stream Mapping (VSM)

A value stream is a set of actions that bring a product from concept to realization or from raw materials to finished goods. These actions or development tasks add value to the final product and are linked together to form an efficient and continuous flowing value stream. Value Stream Mapping (VSM) is a high-level but simple tool taken from Lean management principles, which helps operations managers and engineers understand how their flows currently operate and to help them improve them or design better ones in future. It is a method of creating a pictorial representation of the processes that occur in an organization, from the start of a workflow to its end.

According to *McManus and Millard (2002)*, VSM serves to describe a highly complex real system in a less complex 2-D format where the simplification of the system facilitates insight and understanding of the system under focus. It enables the visualization of material and information flow of all the processes used, both value-adding and non-value adding (waste) processes, and aids the identification and elimination of such waste after analysis.

The fundamental steps in carrying out a VSM are listed below.

1. Determine a product or product family: a product family is a set of products with common process steps.
2. Collect relevant data across the value stream such as inspection and maintenance reports, quality reports and audits. Then, define scope of the VSM exercise.
3. Draw a Current State Value Stream Map (CSVSM) which would serve as a baseline for improvement.
4. Analyze the CSVSM and identify the non-value adding activities or wastes which become evident after analysis.
5. Draw the Future State Value Stream Map (FSVSM) that eliminates the non-value adding activities and identify information and material loops.
6. Develop and execute a plan for implementing required changes which address the non-value adding activities. The development of the plan includes setting objectives necessary to achieve the future state, setting measurable goals for each objective, setting an order of work to be carried out, setting milestones and obtaining the buy-in of all concerned parties.

Although many VSM software products are available from vendor organizations such as eVSM, sigmaflow and proteus, some individuals advocate doing VSM by hand. Their argument is that creating the drawing by hand ensures people actually go to look, observe and really try to see what really goes on in the value stream.

2.2.3.2 Process Mapping

Process Mapping is an important tool that allows for a full understanding of an entire product or service path in a process and helps in diagnosing where problems lie. It is an effective way to identify constraints and bottlenecks in business processes and is very essential for customer-focused improvements because it allows the understanding of the process from the customer perspective. Process Mapping begins with a clear definition of the start and end points of a process. The process is mapped diagrammatically by a walk through the entire process to ensure that all events and individual steps in the process are captured as they usually occur.

An analysis of the map is then carried out to identify delays, bottlenecks, time taken for each step (task time), time taken between each step (wait time), the period between the first and last steps, issues surrounding re-work and staffing and the complaints generated from the VOC. Generally, the analysis is carried out so as to identify improvement areas on the process map, initiate process redesign where applicable and implement required changes.

Hines and Rich (1997) state that Process Mapping basically passes through the following stages:

- ✚ Study of the process flow
- ✚ Identification of wastes
- ✚ Consideration of whether the process can be re-arranged in a more efficient manner
- ✚ Consideration of a better flow pattern involving different flow layouts or transport routes and
- ✚ Consideration of whether everything that is being done at each stage is really necessary, and the effect of removing superfluous tasks

At the end of a Process Mapping exercise, the highpoints include the following:

- The development of a complete and shared understanding of an entire process
- The documentation of the steps or actions involved in the process
- The determination of the efficiency of the current process during analysis and
- The identification of areas where improvements are needed, the actions required and the subsequent implementation of necessary changes.

While Value Stream Mapping and Process Mapping may seem particularly similar, they are somewhat different in that the former is a high-level activity required for strategic planning while the latter is suited for tactical or lower-level planning. The table below highlights some of the differences.

Value Stream Mapping	Process Mapping
Considers the whole value stream	Concentrates on a single process
Identifies non-value adding activities between processes	Identifies non-value adding processes within a process
Improvements to a system are usually significant but may be difficult to achieve	Improvements to a process are usually small but very easy to implement
Enables long-term strategy to be planned	Enables short-term tactical planning

Table 2.1 Differences between Value Stream Mapping and Process Mapping

2.2.3.3 Flow Analysis Tool (FAT)

Flow Analysis Tool (FAT) builds on the concept of Process Mapping and is a tool used to deconstruct elements of a complex process so that it becomes evident in detail what happens in each stage of the product or service process. The understanding of how flow, the seamless movement through value creating steps, effectively proceeds in a system is vital in complex systems to fully identify repetitions, queues and delays. The FAT allows for the:

- ✚ Analysis of flow across more complex processes,
- ✚ Identification of activities that are value-adding and where wastes occur and
- ✚ The understanding of roles and responsibilities relating to managing an effective flow.

The FAT looks at the process from a unit or departmental perspective, bringing a number of process maps together to look at the workflow.

2.2.4 THE EMPLOYEES

Work in organizations is performed by people working together to accomplish tasks and achieve goals. Therefore, people are required for performance improvements of systems or processes. For the best to be obtained from people, organizations must understand the true value of employees who are first individuals with aspirations, beliefs and individual differences. One objective of business is to get everyone contributing to the long-term prosperity of the business.

When people have a shared sense of mission (which sets the foundation of the organization's business and reminds everyone of the reason of the organization's existence), vision (which motivates the workforce to continually strive for improvement and excellence) and values, (a framework for acceptable behavior to follow), with which they agree to, they can effectively work towards achieving common goals and being responsible and accountable. A people-based

improvement effort is one that respects the individual and recognizes teamwork which maximizes organizational learning. Teamwork harnesses the resources (wealth of knowledge and ideas) available in employees and this contributes effectively to improvement. Again, with globalization encouraging different people with different backgrounds and cultures coming together in the workforce, the proper management of such diversity can lead to greater creativity and decision-making, and subsequently, better organizational performance.

In his experience while pursuing Operational Excellence, *Stubblefield (2005)* states that focus on employees led to customer satisfaction, given that only happy and fulfilled employees provide the highest level of healthcare to patients. From the Operational Excellence definition, for employees to know when something is wrong and get it fixed in good time, the organization must create a work environment where the workforce is satisfied, motivated, engaged and empowered to perform at their highest levels and thus create and sustain a desirable culture. The organization must walk the talk with respect to its values such as integrity, respect for employee contributions, rewards and celebration of successes and achievements and maximization of employee loyalty. *Wallace (1992)* concludes that organizations must focus on people empowerment, creating efficient workgroups, ensure employment security and compensation plans and train and educate the workforce adequately for it to be operationally excellent.

2.3 OPERATIONAL EXCELLENCE TECHNOLOGIES

As stated in the previous chapter, a variety of improvement technologies and methodologies have been developed and applied over the years, each from a slightly different perspective, with a different focus, for different specific industries, and as solutions for different requirements, all to enhance and sustain performance. Operational Excellence technologies when properly defined and deployed lead to an improved organizational productivity and success. Some of them are mentioned and discussed briefly.

- I. **Lean:** having evolved from the Toyota Production System (TPS), it is applied to improve processes through the rigorous elimination of waste. It is also touted to be the closest of any of the Operational Excellence technologies to a complete management system encompassing not only a continuous improvement method but a set of lessons concerning the effective management of business processes. Its successful application helps organizations attain world class standards by applying tools such as VSM, design modification, mistake-proofing and others, some of which fall under the 5-S: sorting, simplifying, sweeping, standardization and sustaining process developments. These tools are aimed at streamlining all aspects of business processes which translate to excellent customer experiences and satisfied employees.
- II. **Six Sigma:** this is a disciplined approach to improvement designed to achieve near perfection in product and service quality through variation, error and defect reduction. Originating from Motorola, it is considered a very successful improvement initiative given that it methodically enables a systematic analysis of an organization's

current process performance and provides a detailed roadmap to analyze and eliminate the root causes of poor performance. Its objective is to improve the ability of an organization to satisfy the VOC so as to increase its competitiveness on a constant basis. It is implemented by green and black belts and its success factors include the complete alignment of the program with an organization's strategic business goals and objectives, control of the program at a high level by senior executives and the accurate identification of projects that would increase productivity. Six Sigma deployment follows the five sequential phases in the Define-Measure-Analyze-Improve-Control (DMAIC) methodology:

- **Define:** define the project, possibly utilizing the SIPOC (Supplier-Input boundary-Process-Output boundary-Customer) process, set objectives, inputs and deliverables, decide on applicable metrics, identify customers and their requirements from the VOC, draw up a team charter and decide on effective teams to be formed.
 - **Measure:** determine the objectives, inputs and deliverable of this phase, draw up a measurement plan which contains the data types, sampling, collection and display methods and acceptable variations; take measurements of the Key Process Output Variable (KPOV). Tools required here may include Measurement System Analysis (MSA), Capability Analysis, Cause-and-Effect diagrams and matrix, statistical sampling.
 - **Analyze:** analyze the collected data using any of the following tools such as Root Cause Analysis (RCA), process maps, Pareto charts, scatter plots, hypothesis testing, simple linear regression and correlation.
 - **Improve:** improve the KPOV by changing one or more Key Process Input Variables (KPIV). Applicable tools include brainstorming and affinity diagrams, lateral thinking, assumptions challenging, full factorial designs, response surface designs and fractional factorial designs.
 - **Control:** identify barriers and put process into control. Tools include Failure Mode and Effects Analysis (FMEA), risk assessment, process control charts, procedures and standards, capturing and sharing lessons learned, best practices, solutions feedback and evaluation and a host of others.
- III. **Policy deployment:** best practice in business; operational and strategic planning that produces explicit vertical alignment across organization units and levels. It is not an improvement methodology but a technology to ensure that all elements of the business are aligned with goals, objectives, strategies and policies of the organization.
- IV. **Quality function deployment:** this concerns ensuring horizontal alignment – aligning the products and services of the business with the needs and requirements of the business in an effort to maximize the value of those products and services. Also used to better align the services of public sector organizations and the needs of citizens and client groups.

- V. **Experimental design and evolutionary operations:** conscious conduct of experiments in the enterprise; applying experiments to business and production processes with the view to optimizing business processes by generating product change across the organization.

According to *Martin (2008)*, for reasons such as having common tools, competing for available resources or an organization's need for technologies to work synergistically to achieve envisaged goals, some technologies have been integrated into one program rather than being run independently. An example would be where it is required to improve process workflows by reducing or eliminating waste, improving yield and productivity, an integrated program consisting of Lean, Six Sigma and Total Productive Maintenance (TPM) would suffice. Here, Lean would simplify and standardize the processes, TPM would ensure all machinery are available when called upon, that is, ensure increased system availability and capacity and reduced operational cycle times within product or service design limitations and Six Sigma would be applied to increase process yield.

2.4 PERFORMANCE METRICS AND MEASUREMENT

Business decisions have consequences, and thus must be based on facts and reliable data rather than gut feeling. Performance measurement therefore provides the type of information required for such decisions to be based upon for improvement. It builds upon the foundations of Statistical Process Control (SPC) to provide comprehensive analysis of organization performance.

Measurement also provides evidence and improves understanding as to how, or how well, systems and/or processes are functioning. Metrics are used to define measure, control and identify performance gaps for improvement in the process workflows characterizing organizational systems. They must be aligned with the high-level strategic goals and objectives and link across an organization. Their alignment is also important to ensure that resource allocations are made within those areas of an organization that will provide the greatest productivity opportunities.

Martin (2008) states that metrics can be classified in several ways relative to the following:

- **Organizational impact:** Organizational impact can be broken into categories of time, cost and quality. Within these categories, each organizational function develops and uses metrics specifically designed to measure, analyze, control and continuously improve process performance.
- **Specific format:** metrics can be categorized based on their format such as business, financial, operational and compensating metrics. Business metrics are used by organizations to linearly deploy metrics throughout the organization to enable their aggregation at a local process workflow level, local business unit level or organizational level. Business metrics are typically measured on a percentage-of-total basis such as percentage of recordable accidents or percentage of equipment uptime. Financial metrics are directly correlated to business

metrics and show the impact of the business metric on organizational financial performance and productivity. Operational metrics are used to measure, analyze, improve and control local operations at a local process workflow level. Compensating metrics are used to balance the impact of business and project metrics on the workflow operations.

Metrics must be relevant and correlated to the overall strategic decision of the organization. Company specific metrics must be established in the context of the competitive environment and must relate directly to major value creating opportunities. Effective management of profitable growth and overall value creation requires a relentless focus on operating and service metrics so that management can act speedily and accordingly to allocate talent and resources to correct operational issues.

Best-in-class metrics are characterized by their focus on customer value, how well an organization designs its process workflow systems to meet its customer needs and value expectations, the speed of product or service delivery, the flexibility of its systems to increase or decrease available capacity, the ability to foster continuous process improvement and the ability to increase productivity. According to *Pusala (2006)*, four important considerations regarding metrics are:

- ❖ Understand, define and establish the right metrics
- ❖ Measure, track and disseminate accurate information to the right audiences
- ❖ Diagnose and act on seeming performance results, variations and analysis of data which must be in context.
- ❖ Hold people accountable for their actions or inactions with respect to performance metrics.

A good performance measurement system must accurately and reliably convey performance information so that people can take effective action. Attaining Operational Excellence requires a performance improvement-focused way of thinking, measuring and managing and can only be gauged by appropriate measurement. Management teams who regularly evaluate their metrics and put in place processes for acting upon the data received are equipped to build and maintain Operational Excellence in high growth in a challenging environment.

2.5 BENCHMARKING AND STANDARDIZATION

Davis et al (2003) refer to benchmarking as the comparison of an organization's performance in given areas with that of other firms in its industry and/or with firms that are identified as world-class competitors in specific functions and operations. It can also be defined as the continuous process of measuring products, services and practices against the toughest competitors or those recognized as industry leaders. It is also said to be the continuous search for best practices that leads to superior performance. Continuous search and measuring indicate that benchmarking is an iterative process with no end because with acceptable levels of performance constantly changing for the better,

organizations must constantly monitor their performance alongside that of the competition so as to continue in the race for excellence.

Martin (2008) classifies benchmarking into two, internal and external benchmarking. Internal benchmarking is conducted across similar organizational functions within the same organization or within a single function based on operational assessment analysis. It is appropriate for organizations with multiple locations and is often the starting point for identifying best practices that currently exist within the organization. Poorer performing facilities can learn from those performing at a higher level.

External benchmarking is a process used by many organizations to baseline their performance by comparing their internal workflows to best-in-class external systems or organizations. It provides for a comparison between an organization's performances against that of its best direct competitors. This type of benchmarking may be difficult given the unwillingness of competitors to share critical information but helps organizations improve their performance relative to key financial and operational metrics. It may be useful for organizations to externally benchmark current process workflows against those from completely different industries. Also, this type of benchmarking across industries and technologies may lead to greater productivity improvement for an organization if it emulates competitors or similar industries.

Steps in benchmarking are:

1. **Planning:** identify areas that need benchmarking, the specific organization to be benchmarked, type of data to be collected and ways to collect such data.
2. **Analysis:** this focuses on obtaining an in-depth understanding of the organization's existing practices and processes as well as the other organizations to be benchmarked against.
3. **Integration:** use the findings from the planning and analysis phases to define the target areas where change is required. Benchmarking concepts must be implemented in the corporate planning process and accepted by all levels of management.
4. **Action:** the benchmarking findings and associated goals must be transformed into action.
5. **Maturity:** an organization reaches maturity when the best business practices identified have been incorporated into the relevant business processes, thereby ensuring superior performance for the organization as a whole.

In summary, benchmarking studies question what an organization is currently doing, identifies opportunities for improvement and often provides the momentum for implementing change. Therefore, organizations aspiring to be operationally excellent must strive to attain world-class status in performance parameters that are critical for success in their respective industries and market segment. Benchmarking is an important aspect of attaining this.

Another critical aspect considered in the pursuit of Operational Excellence is conforming to industry standards. For an organization to be competitive, *Martin (2008)* writes that standards must control how the products and services are designed, produced and sold to the customer. Standards form the basis of the rules and evaluation criteria organizations must jointly use, as an industry, to regulate their product and service performance. An advantage of using industry standards is that they are usually well written by volunteers from the various stakeholder organizations within an industry based on many years of experience. They contain very useful information regarding a consensus of the best practices of how a product or service should be designed, measured or produced.

Organizations must also investigate and develop proprietary information that is relevant to their specific needs. Internal standards that exceed those minimally required by an industry group may also help an organization differentiate its performance from that of its competitors. Again, the extent to which an organization satisfies local standards relative to its competitors, its products and services will be attractive to the customers. Note that every country has its own unique standards. Examples of standards:

- The International Standards Organizations (ISO)
- Food and Drug Administration (FDA)
- Occupational Safety and Health Administration (OSHA)
- Supply Chain Operations Reference (SCOR) Model

2.6 THE ROLE OF INFORMATION TECHNOLOGY (IT)

The use of technology by organizations has raised the performance bar by allowing them compete on several dimensions simultaneously without the limitation imposed by trade-offs. The effect of automation, robotics and computer-aided designs in manufacturing for example, is evident to how technology supports superior performance. *Cobb (2003)* provides a summary of the role of information technology (IT) as an enabler. This table is attributed to the work of Thomas H. Davenport and is presented in Table 2.2.

In IT, *Davis et al (2003)* write that the emergence of a new generation of software management systems that link functional areas within an organization and which facilitate transactions by providing a single platform and database has altered the way business is conducted. Known as Enterprise Resource Planning (ERP) systems or Enterprise technologies, *Pretko (2006)* states that the challenges of fragmented and disconnected data which result in the generation of information that are of little use, the prevalence of systems with little flexibility which consequently slow a company's reaction to changing business conditions and the high IT costs required to integrate and maintain the different

systems, are laid to rest with the deployment of an ERP. The author concludes that managers must understand how the technology fits the needs of users and customers and then drive it from a clear business perspective.

Impact	Explanation
Automational	Eliminating human labor from a process (also reduces errors in tedious, repetitive tasks)
Informational	Capturing process information for purposes of understanding.
Sequential	Changing process sequence or enabling parallelism
Tracking	Closely monitoring process status and objects
Analytical	Improving analysis of information and decision making.
Geographical	Coordinating processes across distances
Integrative	Coordinating between tasks and processes
Disintermediating	Eliminating intermediaries from a process

Table 2.2 Roles of Information technology. Cobb (2003)

Examples of ERP systems are SAP, Oracle, JDE and PeopleSoft. Their benefits include providing a significant competitive advantage by reducing the number of errors through the use of a common database, faster customer response time, and better overall communication and efficiency within the organization. However, it must have the full backing of top management for the adequate allocation of resources for the procurement and maintenance of a suitable system for the organization and the training of users so as to reap its full potential which includes being a powerful tool for achieving Operational Excellence and profitable growth.

2.7 OPERATIONAL EXCELLENCE AS ORGANIZATIONAL CULTURE

According to *Slater (2007)*, often times manufacturers find avenues to improve productivity through the application of technologies (manufacturing and IT), but fail to address the underlying management culture and processes that ensure that maximum value is extracted from investment. This may, in the long run lead to results which are unsustainable and the eventual loss in market share. Operational Excellence is achieved by applying the framework and tools to change both how business is managed and what is managed within the business. This includes addressing business influencers such as culture, discipline, policies and procedures.

Martin (2008) writes that culture is the driving force behind an organization's competitiveness and that competitive organizations know that their strength lies in the quality of their culture and people, given that the ability of an organization to change its structure, work habits and systems to meet competitive threats is dependent on its culture. *Wynn (2008)* agrees to this by stating that an organization has to respond as a whole, to evolve organically with changes in the environment like changes in society, market opportunities, competitive threats, and legislative requirements, and this can be achieved only with the right culture in place.

Noble (2008) goes ahead to state that Operational Excellence is an approach to instill a culture of effective business management on an ongoing basis across complex organizations, which if successful, delivers exceptional service at optimal costs and with manageable risks. In their work, *Harris and Brannick (1999)* note that the underlying purpose of an operationally excellent culture is to create processes that quickly recognize bottlenecks and unnecessary costs and thus eliminate or minimize them while maximizing productivity and efficiency. This culture frames its process improvement foundation principles on scientifically based information and on quality and lean technologies from which it extracts the best blend of ideas with which to pursue excellence in business.

To achieve Operational Excellence in business, organizations must create an adaptable organization culture by the development of a coherent vision and strategy and the deployment of initiatives to improve core competencies. As *Stubblefield (2005)* puts it, culture will drive or drag strategy and that lasting change can only be achieved with a complete transformation of how things are done. However, an organization's culture is difficult to change. The difficulty arises usually from, amongst so many reasons, skepticism, resistance to change, cultural barriers, individual perceptions and behaviors and lack of trust in the intentions of top management. Organizations will only change if they see real value in changing its ways of doing things. Therefore, change initiatives must create an observable business benefit and be driven by all employees with total commitment. Majority of the people in the organization must consistently practice the desired behaviors which will happen if only they are a motivated, respected, satisfied, encouraged, passionate and engaged workforce.

2.8 ACHIEVING OPERATIONAL EXCELLENCE

Before presenting Operational Excellence models as applicable in various industries, provided in this section are the ways some authors see that Operational Excellence can be generally achieved.

Besides equipping employees with the necessary tools and mechanisms they require to carry out their job functions correctly the first time, and controlling daily operational costs which arise from deviations, non-conformances and situations caused by human error, *Bigelow (2002)* writes attaining Operational Excellence involves the return to basic building blocks of any organization: the clear establishment of requirements, their effective communication and periodical assessment.

- I. **Clear establishment of requirements:** the author states that this is a priority. Requirements proceed from a variety of sources which include customers and suppliers, regulatory bodies such as the state, federal and international bodies, test and inspection methods, corporate policies and procedures, qualification and validation protocols. Established requirements clearly define what must be done, why, how, when and by whom. They must accurately establish responsibilities, frequencies, time frames, materials, equipment, components, qualities, methods, documentation and environmental conditions. They also must be appropriate for intended use and readily assessed.
- II. **Effective communication of requirements:** this is achieved through employee training programs, subject matter discussions with employees and new employee orientation. Subject matter discussions entail periodic informative discussion meetings intended to keep employees up-to-date on current on-the-job and company related matters. Training programs encompass formal instruction sessions to provide employees with knowledge, skills, competence and expertise in specific subject matters or job functions. It would cover refreshers and re-training.
- III. **Continually assess the communicated requirements:** to ensure compliance with communicated requirements, continuous assessments and audits must be performed to determine compliance levels, verify actual practices and challenge the requirements' effectiveness.

Beyond these three building blocks, *Bigelow (2002)* writes that an organization seeking Operational Excellence must have a commitment to quality, continuous improvement and total compliance. They must be willing to invest in the training and development of their requirement writers, trainers and auditors to ensure that requirements are always clearly written, effectively communicated and continuously assessed by properly trained personnel.

In an article retrieved from www.capgemini.com, the unlisted author provides five key stages to the deployment of Operational Excellence. They are:

1. **Assess:** analyze and assess the current (As-is) situation, including the business strategy processes, resources and assets. Define the future (To-be) vision of what Operational Excellence can deliver.
2. **Design:** develop a clear route map showing the actions and milestones on the road to Operational Excellence, including both short and long term actions.
3. **Optimize:** select the methods, tools and techniques to be used.
4. **Deploy:** apply the tools to the improvement areas identified. Tools can be applied sequentially or simultaneously.
5. **Sustain:** go beyond achievement of excellence, establish the fundamental process and cultural changes necessary to sustain excellent performance. Focus on continuous improvement, skills transfer, continuous performance measurement and the use of appropriate IT support tools.

2.9 OPERATIONAL EXCELLENCE MODELS

Various models of Operational Excellence exist as applicable in differing industries. Some of these models have been developed by consultants in various fields of business such as banking, manufacturing and service organizations. Below are presented some of the models.

2.9.1 Operational Excellence in Banking

According to *Noble (2008)*, an Operational Excellence framework in banking provides the means by which an institution “manages by process”, meaning it manages itself around processes in the same way as it may manage itself around customers, products and markets. The processes which are core to the business are identified and directly managed to ensure that each process is owned, controlled and run as a business serving its perspective stakeholders.

The framework presented below is comprised of three key components which establish principles, practices and procedures in the areas of

- ✓ Leadership
- ✓ Knowledge and
- ✓ Execution.

Process leadership establishes processes as an organization imperative with specified objectives, strategies, tactics and accountabilities assigned within the leadership organization. Process knowledge provides the organization with the framework, skills and management systems with which to manage business assets on an ongoing basis. Process

execution delivers the mechanisms and the organization culture through which the organization effects day-to-day and continual improvement in a consistent and controlled, but also rapid and sustainable basis.

Noble (2008) goes ahead to state that the adoption of such a framework by financial services companies is designed to instill a deeper culture of excellence and a common discipline of process management across the organization, all of which are targeted to drive greater consistency in customer experience, as well as in operating efficiency and effectiveness, and in the management of risk.

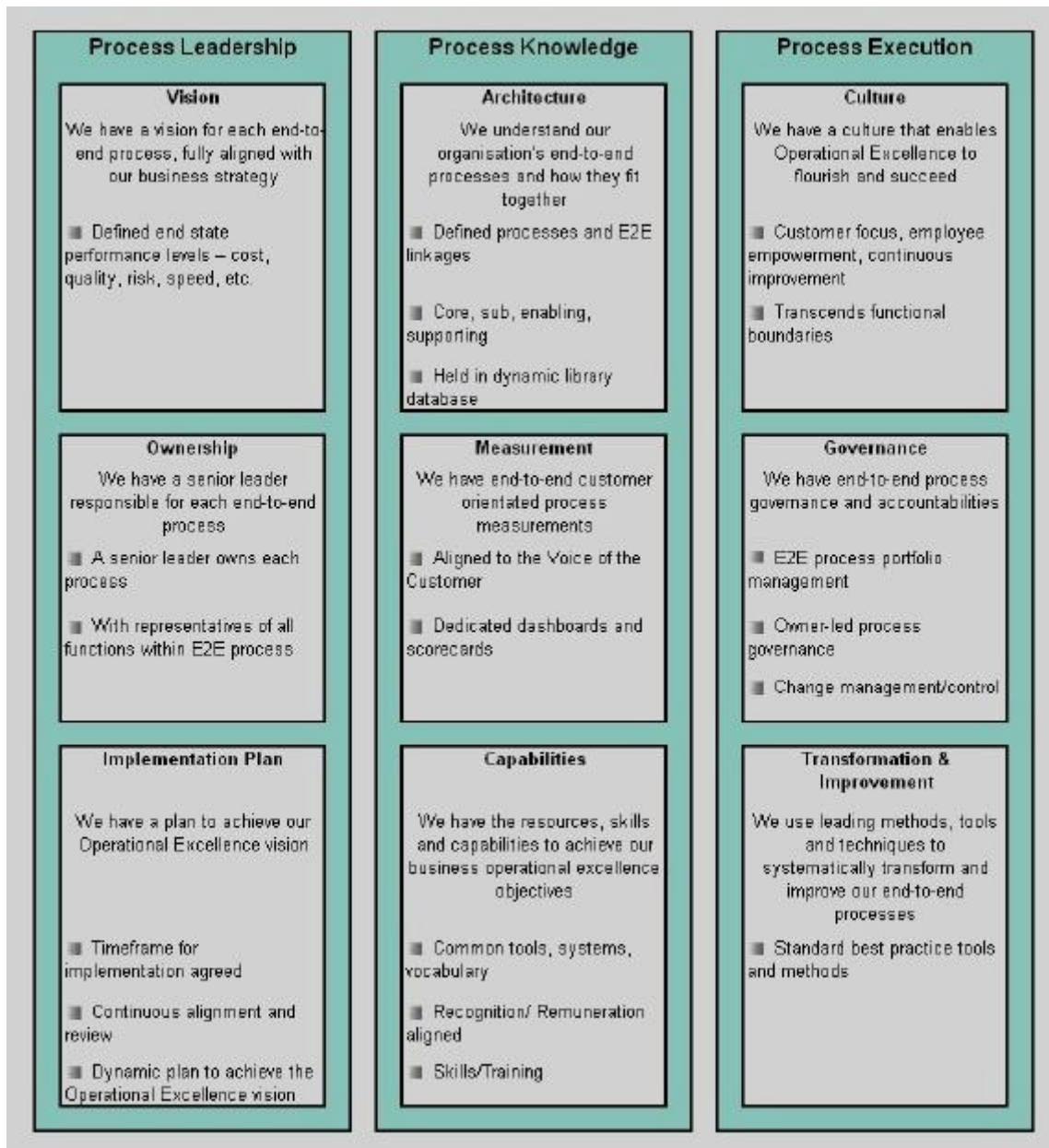


Figure 2.2 Operational Excellence Framework for the banking industry. Noble (2008)

Again, institutions who successfully implement this type of framework stay ahead in their industry through consistent execution and thus exhibit the characteristics of an excellence-focused company which include:

- A clear market leader
- A culture of genuine customer focus
- An organization designed around business-critical processes
- A scalable platform for growth
- A single but flexible company-wide approach
- Best people empowered with the challenge of changing the business and
- Managing by data – not by gut feeling.

2.9.1.1 Implementation of the Operational Excellence framework in Banking

Noble (2008) goes on to state that the key design principles of this framework are that it applies common minimum standards across each of the prerequisite components in order to deliver group-wide business results, and that it allows a degree of flexibility in its specific application in order to accommodate the existing operating models. The core components of the framework adopt industry best practices in order to address each of the nine critical elements proven consistently to deliver excellence through structured process management disciplines.

Full implementation, preceded by a controlled pilot implementation in one business area to ensure that the framework is completely fit for the organization, would require a significant behavioral change across the entire organization in order to achieve the desired common approach, and thus would require also full sponsorship at an appropriate senior level of management. Again, the framework can be rolled out sequentially across divisions, provided that this is effected to the established common standard.

2.9.1.2 Risks and Challenges of Implementing the Framework

Risks and challenges associated with the implementation of this framework as listed by the author to include

- I. The risk of doing nothing: risks of not progressing with a dedicated Operational Excellence framework manifests itself in the likelihood of falling behind major competitors and losing market share, and the growing risks of regulatory and/or market breaches as a direct consequence of lack of process ownership, accountability, transparency and discipline.
- II. Prevailing dismissive attitude to process: process discipline has been regarded as stifling and thus, operational industry best practices such as group-wide standardization and centralization can be seen in negative light. The framework offers a means by which a company can foster its cultural differentiators while managing its

processes and risks with uncompromising professionalism. With a solid platform of processes and Operational Excellence, the organization would be better placed to leverage capabilities in delivering customer intimacy and product innovation.

- III. Initiative fatigue: attempts to change an institution behaviorally as well as organizationally incur risks. Therefore the new framework ought to demonstrate immediate results in order to overcome any cynicism within the organization, given that many financial organizations already suffer from “initiative fatigue”.

2.9.1.3 Benefits of Implementing the Framework

Stating the benefits of implementing this framework, the author asserts that a common Operational Excellence framework across an organization based on industry best practices will deliver

- I. Greater consistency in client experience leading to improved customer service and retention, measured by independent customer satisfaction and market share rating
- II. Improved end-to-end cost efficiency for product and service delivery, measured by tangible and audited financial results
- III. Increased understanding, transparency and awareness across processes leading to an improvement in risk mitigation and control, measured by reduced incidences of complains, operating errors and regulatory breaches
- IV. A culture of continuous improvement and enhanced ownership and accountability across processes
- V. Improved management decisions based on facts rather than assumptions
- VI. An improved capability to integrate acquisitions.

2.9.2 Operational Excellence in Manufacturing

Two Operational Excellence models in manufacturing are presented below: one, a template for the design of a desired model, depending on the industry, and the other from an organization that consults for others on Operational Excellence.

2.9.2.1 The “Reliability” Operational Excellence Model

Ginder (2010) states that reliability, amongst so many other factors, is core to contributing to Operational Excellence. He asserts that if reliability is lacking, then plant performance fails no matter the range of techniques and tools applied to sustain it.



Figure 2.3 The “Reliability” Operational Excellence Model. Ginder (2010)

This model indicates five foundational elements: People, Processes, Systems, Technology and Equipment.

- ❖ **People:** this implies reliable people - a motivated and educated workforce that consistently carries out their defined roles and responsibilities, while being accountable for results and working as a team.
- ❖ **Processes:** well defined and reliable processes; appropriate production and business (work management) processes in which the workforce is educated and trained. The processes are revalidated or updated on a continuous basis, and training is reinforced periodically in both the classroom and the work floor.
- ❖ **Systems:** reliable systems are computerized systems that mirror and support the business processes. These systems are designed and configured to support business objectives by providing data and other information that is required and ready for analysis and decision-making.
- ❖ **Technology:** reliable technology implies state-of-the-art tools to feed the systems with timely data or provide data analysis leading to problem prevention, or their resolution if they already exist.
- ❖ **Equipment:** reliable equipment is an outcome of the previous four elements and also a result of the selection process when the manufacturing unit is built, before people, processes, systems and technology to operate and maintain it are in place.

Summarily, reliability in, and integration of each of these elements lays the foundation for success. Although an overlap exists among the elements, the overlap serves also as the potential link of one to another.

The potential of achieving Operational Excellence lies in the installation of “fit-for-purpose” equipment and have it operated and maintained by a motivated and educated workforce, supported with designed business processes, systems and technology.

Along with the foundation elements, the model contains five pillars of Operational Excellence:

- ✚ **Organizational alignment:** having an organization structured to succeed, with personnel moving together in concert toward agreed upon and understood goals and objectives. With mission and vision statements to make sense, they have to be effectively applied.
- ✚ **Asset reliability:** strong reliability and maintenance practices are recognized as being critical to an organization’s success.
- ✚ **Regulations and compliance:** for an organization to be in business, it needs to be in compliance. Safety and environment sanctity cannot be compromised. Standards in these areas are likely to get more stringent with time. Overall, an organization has the responsibility to safeguard the lives its personnel and protects its host communities.
- ✚ **Manufacturing:** manufacturing processes and methods contribute majorly to Operational Excellence. Flexibility and speed, carried out in a cost-effective and quality manner, are crucial to winning customers. The Lean manufacturing concept can be said to be an encompassment of the items listed under it in Figure 2.3
- ✚ **Energy:** with growing focus on the costs associated with energy, and the development and utilization of renewable energy and going “green”, energy can be added as a pillar of Operational Excellence. This is because optimizing the purchase and use of energy is currently a major concern for companies, some of which have “energy czars”. The current trend might indicate that in the future, an organization may only be considered to have achieved Operational Excellence when energy concerns and opportunities have been addressed.

2.9.2.2 DuPont Operational Excellence Model

The DuPont organization describes itself as a global science company that engages in various business categories such as electronic and communication technologies, performance materials, agriculture, nutrition, and safety and protection. With about 200 years of manufacturing experience, the organization states that it has more than 30 years experience in providing consulting and training services. As part of its consulting service, it helps client organizations maximize business results by applying the DuPont expertise, technology and process knowledge. In achieving this, DuPont utilizes an Operational Excellence model, which helps clients apply best practices with respect to

- Asset productivity
- Capital effectiveness and

- Operational risk management.

DuPont defines Operational Excellence as an integrated management system that drives business productivity by applying proven practices and procedures in three foundation blocks as indicated in the bullet points above, with each foundation block containing a number of specific system elements. To achieve Operational Excellence, DuPont combines best management practices, globally recognized technology, Six Sigma methodology and a proven culture-change model to provide an integrated solution.

DuPont states that installing a culture of Operational Excellence results in significant and sustainable competitive advantage. It therefore helps organizations achieve these by subjecting them through a change-management process which involves:

- ✚ Assessing a client organization against established benchmarks and best practices
- ✚ Identifying areas of improvement with corresponding return on investment
- ✚ Align the organization with the reason for change and a vision of the future state
- ✚ Implementing appropriate processes and practices to realize the benefits and
- ✚ Providing a continuous improvement framework for sustainability.

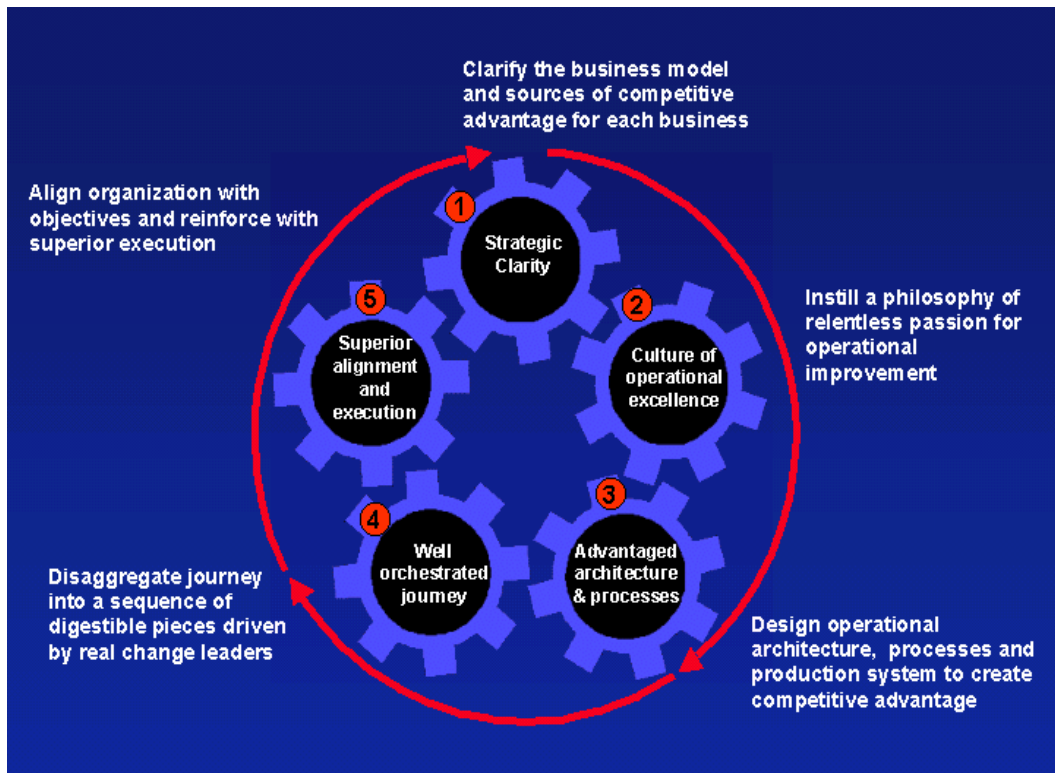


Figure 2.4 DuPont Change Management Process. DuPont (2005)

In Table 2.3 below, the DuPont Operational Excellence model is presented with brief explanations of the specific system elements, all of which work together in the pursuit of world-class performance.

- I. **Asset Productivity:** a process for extracting the maximum value from a manufacturing asset base which comprises of people, materials and investment, resulting in increased cost productivity.
 - **Maintenance and Reliability Systems:** an integration of functional disciplines combining technology, work management systems and change processes, applied in a systematic way to lower unit maintenance costs by finding and resolving the root causes of unacceptable process reliability and poor equipment performance. Examples of delivery components include work-managing processes, reliability-focused maintenance and preventive/predictive maintenance strategies.

OPERATIONAL EXCELLENCE INTEGRATED MANAGEMENT SYSTEMS		
Organization – Roles & Responsibilities – Standards Guidelines – Practices – Procedures – Audits		
ASSET PRODUCTIVITY	CAPITAL EFFECTIVENESS	OPERATIONS RISK MANAGEMENT
<ul style="list-style-type: none"> • Maintenance and Reliability Systems • Manufacturing capacity • Energy Optimization • Facilities Infrastructure • Mechanical Integrity • Product Quality and process Control 	<ul style="list-style-type: none"> • Business Planning • Facilities Planning • Project planning • Project Implementation • Start-up & Initial Operations • Value-improving Practices • Contractor Effectiveness • Shut-down/Turnaround Planning 	<ul style="list-style-type: none"> • Technical & facility Safety Systems • Electrical • Fire & Explosion • Environmental • Product Stewardship • Distribution • Occupational & Industrial Hygiene
	DuPont Technology & Science	

Table 2.3 Dupont Operational Excellence model. E.I. DuPont de Nemours Company (2005)

- **Manufacturing Capacity:** a process focused on improving operations through increased throughput, cycle-time reduction, eliminating bottlenecks and improving workflow by modeling and analysis capabilities. Delivery components include Materials and Product Flow analysis and Continuous Flow manufacturing.
- **Energy Optimization:** improving energy efficiency, safety, reliability, cost and operability for the current fixed asset base by applying technology and thus creating savings.
- **Facilities Infrastructure:** re-establishing asset integrity to handle the constant pressures to increase earnings and reduce costs that can create a culture in which it becomes normal practice to defer maintenance.
- **Mechanical Integrity:** a component of both Process Safety Management (PSM) and Risk Management Programs (RMP) that integrates technologies to create a program that focuses on regulatory compliance and on reducing emissions and failures. It is reliability-based and establishes a framework to rank mechanical-integrity activities.
- **Product Quality and Process Control:** creates manufacturing processes of sustainable advantage through improved quality and yields, by applying Process Dynamic Analysis, Control Strategy Synthesis, Design for Process Operability, Application of Statistical methodologies and Quality Improvement Practices.

II. **Capital Effectiveness:** with the view to reducing capital budgets and increasing yield, DuPont developed a well defined Facilities Engineering Process, identified the most critical steps in that process, created best practices to guide the execution of the critical steps and developed assessment tools to measure how well the steps are executed. Summarily, the eight elements under Capital Effectiveness fall under the following stages:

- **Planning:** business objectives are recorded, understood and accepted after which they are transformed into project objectives and a project capital budget. The project objectives are then transformed into a production design basis and authorization estimate.
- **Implementation:** production design, procurement and construction are launched;
- **Facilities operation:** plant commissioning, operations and maintenance activities commence; value-improving practices are used to improve cost, schedule and operability; contracted work are identified and completed for best value; more effective shutdowns with longer intervals in-between are carried out while increasing uptime.

III. **Operations Risk management:** in recognition of the benefits associated with understanding and controlling risks, and negative consequences of not doing so, the DuPont model consists of seven elements covering Process Safety Management (PSM) and behavioral safety. The organization states that it uses a full range of techniques to help clients understand risks and develop effective mitigation measures, then implement sustainable continuous improvement processes to manage risk in each of the elements. The seven elements are:

- Technology and Facility Safety System
- Electrical
- Fire and Explosion
- Environment
- Product Stewardship
- Distribution and
- Occupational health and industrial hygiene.

Generally, each process starts with assessments and a metric analysis to understand the current state as compared to regulations, industry standard, corporate policy, improvement opportunities and other key KPIs based on client inputs; management goals and objectives are then developed and organizational roles and responsibilities are defined to accomplish the set goals.

Further, systems are put in place to track and analyze performance and other metrics, and to develop Critical Operating tasks (COT) based on goals, metrics and objectives. The client organization management subsequently assigns responsibilities to specific individuals when COTs and their completion dates are agreed upon.

2.9.2.3 The DEB-LOREX model of Lean Transformation and Operational Excellence

Sarkar (2008) approaches Operational Excellence through the implementation of Lean, stating that a management system built around Lean is not only an enabler of achieving Operational Excellence, but also helps bring flexibility in the way operations are managed. The author defines Lean as “a systematic approach to identifying and eliminating waste (non-value-added activities) through continuous improvement by flowing a production (or service) only when the customer needs it, in pursuit of perfection”.

Again, the author states that while several models of Operational Excellence are in existence, mostly with a bias to manufacturing, his model is tailored to achieving Operational Excellence in the service industry and offices given that

Lean can no longer be confined to manufacturing organizations but can be successfully applied within service organizations.

This approach aims to manage the organization in a fashion that breeds overall efficiency improvement, achieve sustained benefits through improved service time, lower costs and better quality. It changes the mindset of employees and works towards building capabilities and cultures that support continual improvement, problem prevention and workplace excellence.

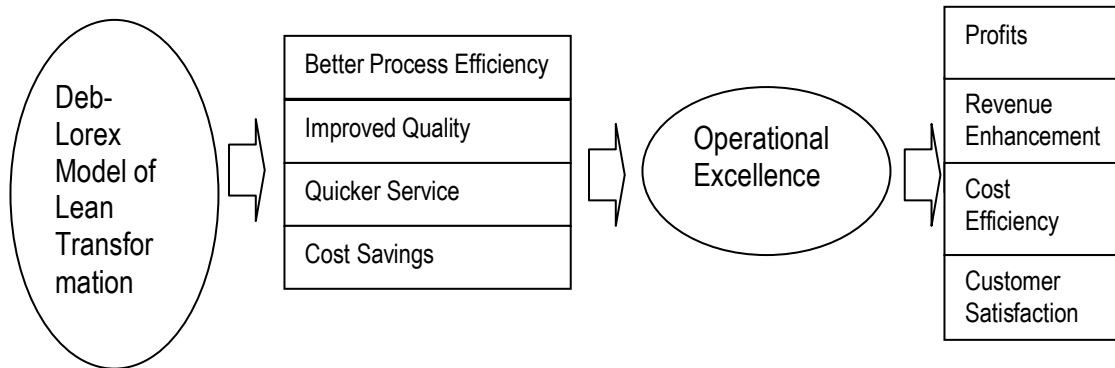


Figure 2.5 DEB-LOREX Overall Representation for Lean Transformation and Operational Excellence. Sarkar (2008)

Again, the author writes that organizations which adopt the DEB-LOREX model of Lean transformation and Operational Excellence will exhibit, amongst many, the following characteristics:

- Visible commitment of the leadership team to lean transformation
- Well defined vision, implementation plan and structures and
- High level of process awareness and lean consciousness among employees.

Sarkar (2008) goes on to state that the philosophies driving the Deb-Lorex model are lean thinking and systems thinking. Lean thinking refers to a management approach proposed by *Womack and Jones* which details the five principle of Lean. It is said to be a brilliant approach to producing Operational Excellence in organizations because it creates and meets organizational objectives by eliminating waste in all forms. Systems thinking aids the understanding of how things work by going beyond events to reveal the interrelationship of components that are responsible for the pattern of behavior of an event. It goes beyond ways of correcting a problem by further seeking ways to prevent the recurrence of such a problem.

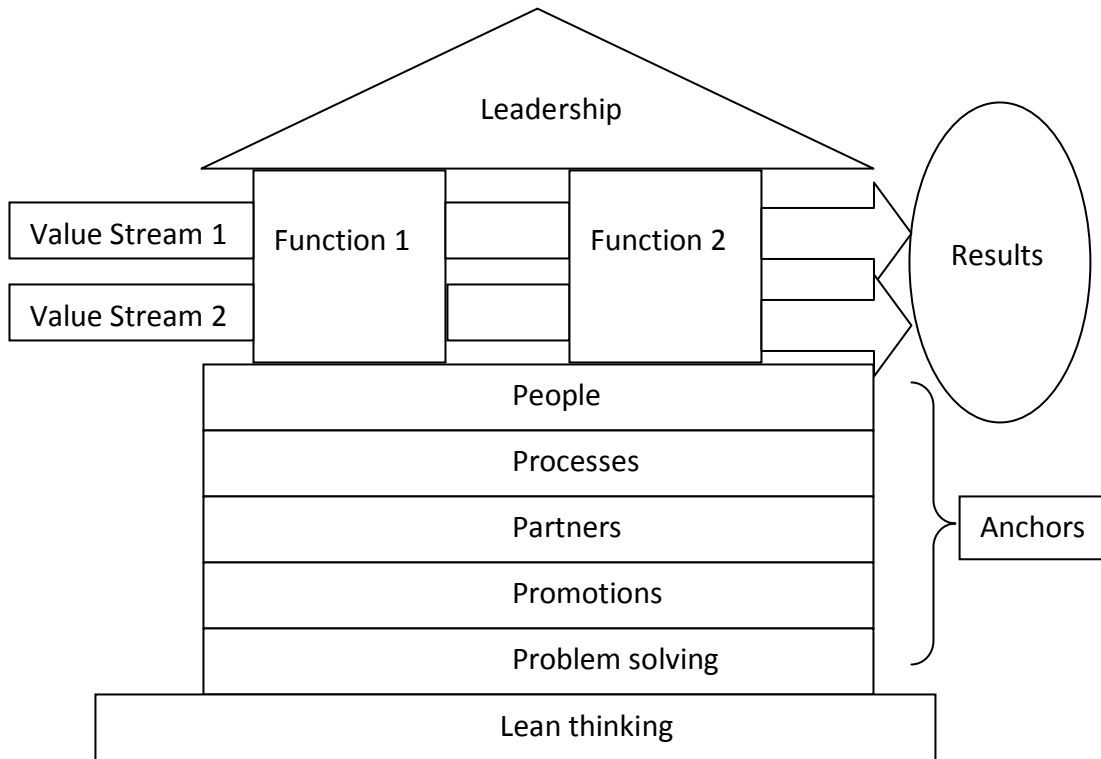


Figure 2.6 DEB-LOREX Model for Lean Transformation and Operational Excellence. Sarkar (2008)

As indicated in the Figure 2.6 above, the DEB-LOREX model consists of components or enablers which ought to function in harmony and implemented properly in order to deliver sustained benefits. These include leadership, functions, value streams, anchors, lean thinking and results. Inadequacies in any would impair the overall expected performance of the organization.

In pursuit of Operational Excellence, the author provided a blueprint for Lean implementation as given in the following steps below:

1. **Leadership alignment:** Lean Management System (LMS) begins under the sponsorship of the Chief Executive Officer (CEO), with the conviction from the entire leadership team that LMS is a business need and they will own its implementation. After crafting a compelling vision, leadership must agree on the culture required to support the LMS implementation, a culture built on customer-centricity and employee loyalty. Financial and non-financial metrics are listed for relevant areas that will provide a holistic overview of progress and finally, readiness to deploy LMS must be ascertained before commencement.
2. **Identify value stream for product families:** this has been discussed in previous sections.

3. **Form implementation team:** some integral members of the team include the Value Stream Owner, Chief Improvement Officer, LMS managers, assessors and process auditors, Dashboard managers, Lean navigators and a host of others, each with a defined set of responsibilities.
4. **Firm up implementation charter:** this is a document that states an organization's commitment to embark on a lean transformation journey. It provides an overview of all the work that will be required to build an LMS and details all information pertaining to the business that will be relevant during implementation.
5. **Redesign the structure of the organization:** a pre-requisite for LMS implementation is that the organizational structure be re-configured to facilitate achievements of designed strategic business objectives. Without this modification, the desired results from the LMS may be missed. It is a major realignment of the organization and brings about a change in the way the firm functions.
6. **Install anchors:** anchors are the building blocks that support the architecture of an LMS. They are individuals, infrastructure pillars, processes, entities and behaviors that support the implementation and sustainability of the LMS. While the organizational structure provides the basic construct of the company, the anchors are the levers that translate strategy to results. The anchors are people, processes, partners, promotions and problem solving. These five anchors are closely linked and work together in a chain to deliver expected results.
7. **List all processes in the value stream:** inventorying the processes in an organization and its respective value streams is an important step in the LMS implementation. Inefficiencies may be generated because of the lack of a structured approach to managing the operations in the organization. Employees must recognize which processes are core to the success of the business and must appreciate what roles they ought to play to attain results.
8. **Build relevant capabilities:** capability-building is a key facet in LMS implementation. It is required also for sustainability of the efforts, and so organizations must ensure that required capabilities are eventually created in-house to deliver the programs on an on-going basis. Capability building requires that the following be delivered: awareness programs, technical and certification programs, leadership programs and people programs.
9. **Select the value stream(s) on which to focus:** among the numerous value-creating processes, the organization may decide to take up the processes that have the maximum opportunity for improvement.
10. **Ascertain what the customer values and requires:** this also has been dealt with earlier
11. **Carry out value stream mapping and analysis**
12. **Deploy lean initiatives:** having identified waste in the processes, the team would need to brain-storm to obtain Lean solutions for the desired state of the processes.
13. **Decide on measurements and dashboards:** having implemented lean, decisions on what measurements to take are made. The metrics should reflect the following:
 - Voice of the process: metrics that capture the nominal process performance.

- Voice of the customer: outcome metrics of the process performance from the customers' point of view.
 - Voice of the business: metrics that capture the overall performance of the business or the value stream.
 - Voice of the employees: metrics that measure the engagement of the employees in the implementation of the LMS
 - Voice of the LMS implementation: a holistic measurement of the health of the LMS in the organization.
14. **Implement and institutionalize the processes:** organizations should commence with the implementation of the new Lean processes and the management processes that support the Lean processes to sustain their gains. Examples of such management processes include Performance management, change management, maintenance management, process management architecture, process governance and Root Cause Analysis (RCA).
15. **Ascertain the health of the LMS and processes through assessments and audits**
16. **Launch ongoing improvement regimens:** launching a regimen of continual improvement is very important in a Lean transformation journey. Improvements should happen on an ongoing basis and should comprise both large and local improvement projects.

The author concludes that organizations that apply the DEB-LOREX model look at all organizational processes from an end-to-end perspective and build all capabilities and enablers for ongoing sustainability. This leads to managing the organization through processes that cut across functional silos and thus, ensuring the achieving the objectives of being operationally excellent.

2.9.2.4 Operational Excellence in Information Technology (IT) Management

Hamilton (2008) writes that the IT function plays a number of significant roles within the organization and provides value in many ways. However, its core contribution is to enable the smooth running of the organization's transactional processes and management systems in all their complexity. Therefore, it has to be a robust, reliable, secure and flawless operation that is always available. The system must respond quickly to changes in the environment and service changes must be managed safely and seamlessly with no disruptions. Added to this, the service must be provided as economically as possible.

Competitive advantage from IT would be achieved by a disciplined commitment to Operational Excellence in IT management. Success would result from meticulous preparations and hard work, following proven practices and a commitment to executing high quality IT processes that are tightly coupled with the business processes they serve, a strong focus on managing details and a pervasive culture of continuous improvement.

Steps to Operational Excellence	Enabling IT response Mechanism
Understand what the Internal Customer Needs	Business Alignment, Strategic Planning and IT Governance
Create a Blueprint to Guide What You Build	The IT Architecture
Deliver Service to the Customer	Manage IT Systems as Services
Excel at Managing Change	Project Management Discipline
Organize for Success and Effectiveness	The IT Organizational Model
Manage the Most Critical Resources	Develop and Nurture the IT Staff
Leverage In-house Capabilities	Use of Contracted Services, Outsourcing and Offshoring

Table 2.4 Seven Steps to Operational Excellence in IT Management. Hamilton (2008)

To fully achieve the goal of Operational Excellence in IT, seven critical areas of focus have been identified and addressed by the author as shown in Table 2.3 above. In the table, the steps to achieving Operational Excellence are outlined, and beside each step, the corresponding IT response mechanism is given. A summary is given below in bullet points.

1. Understand What the Customer Needs/Business Alignment, Strategic Planning and IT Governance:

- ✓ Ensure there is a strong senior business executive commitment and support for the adoption of the Operational Excellence model for managing IT services.
- ✓ Ensure business alignment and do the right things. This should be accomplished by a strategic planning process and ongoing verification and adjustment via department and corporate governance boards.
- ✓ Establish an effective strategic planning process, engaging both the business and IT leadership team to define broad principles and strategies and establish and periodically update a portfolio of projects.
- ✓ Set up governance processes to guide the development of plans and programs, approve projects and funding, and steward results. Governance boards should consist of senior business and IT executives.
- ✓ Commit to standardization, consolidation and best practices as a foundation strategy.
- ✓ Consolidate and centralize IT budget and billing processes
- ✓ Develop and communicate corporate policies and guidelines governing the development and use of IT services.

2. Create a Blueprint to Guide What You Build/The IT Architecture:

- ✓ Define and maintain an enterprise IT architecture with guidance and application selection and deployment, data definitions and usage, and approved technologies.
- ✓ Ensure the application and data architectures are mapped to the business process model and driven by the strategic plan.
- ✓ Eliminate duplication and proliferation of applications, technologies and tools.
- ✓ Implement a comprehensive Security and Controls Architecture with supporting policies, processes and procedures.
- ✓ Establish a suite of Architecture Services to guide IT practitioners and users, and to ensure compliance with standards and practices.

3. Deliver Service to Customer/Manage IT Systems as Services:

- ✓ Manage IT applications and systems as end-to-end services to the customer.
- ✓ Ensure each service has an owner responsible for service delivery, improvements, enhancements and performance stewardship.
- ✓ Implement service management processes similar to the ITIL (Information Technology Infrastructure Library) model.
- ✓ Commit to pacesetter service levels, benchmarking to verify performance, and continuous improvement to maintain or improve standing.

4. Excel at Managing Change/Project Management Discipline:

- ✓ Implement a disciplined project management methodology across the company with supporting processes, tools, reports and templates.
- ✓ Track and steward the entire portfolio of projects, flagging any projects with significant deviations for management review and corrective action.
- ✓ Establish the requirement that all changes that meet the definition of a “project” must follow the standard project management discipline.
- ✓ Establish a Project Management Office to manage the methodology, provide expert guidance/training/support, and facilitate project portfolio planning and performance tracking.
- ✓ Commit to formal benefits capture plans and a minimum threshold Return on Investment (ROI) for return projects.
- ✓ Conduct independent reviews of major projects or projects in difficulty at critical stages to ensure a high probability of success.

5. Organize for Success and Effectiveness/The IT Organizational Model:

- ✓ Establish a global functional organization for service delivery with a structure that is closely mapped to the major service line definitions
- ✓ Superimpose a customer account management layer to ensure business alignment. This hybrid organization structure provides the right balance of business/customer alignment and Operational Excellence in service delivery.
- ✓ Clearly define roles and accountabilities for all key groups and principals.

6. Manage the Most Critical Resources/Develop and Nurture the IT Staff:

- ✓ Establish and live by the principle that people are the most critical resource.
- ✓ Commit to career-long training and development of the workforce.
- ✓ Enhance the complete life-cycle process of recruitment, development and staff placement through the appointment of IT resource managers, working in partnership with Human Resources (HR).
- ✓ Utilize contractors for staff augmentation and to manage through cycled in staff demand
- ✓ Implement a job family career model to encourage and assist employees map out and attain career goals.
- ✓ Develop and keep current succession plans and development plans for key positions and high potential employees respectively.
- ✓ Communicate people values, policies, principles and programs clearly and repeatedly to the staff.
- ✓ Provide highly competitive compensation and benefits.
- ✓ Frequently recognize and reward exemplary behaviors and results.

7. Leverage In-house Capabilities/Use of Contracted Services, Outsourcing and Offshoring:

- ✓ Leverage internal partnerships with Procurement, legal and other sections to ensure standard and professional practices are followed.
- ✓ Engage consultants for special needs not being met in-house.
- ✓ Utilize contracted services for well defined commodity services and work packages, such as wide area network services and desktop break-fix services.
- ✓ Outsource only these that cannot be satisfactorily performed in-house, and ensure the contract is carefully developed and managed.
- ✓ Utilize in-house offshoring for only those transactional type activities that can be easily and economically transitioned, and take care of all displaced staff in a professional and sensitive manner.

The author concludes by stating that given the pervasiveness and criticality of IT services in organizations today, a high performing IT function is an absolute pre-requisite if the enterprise as a whole is to be successful. Excellence in IT

management begins with the notion that Operational Excellence is the guiding principle and driving force for the IT function design, the operating culture and the management and decision-making processes from which organizations will enjoy an enduring competitive advantage from superior performance in areas such as flawless execution, robust and reliable operations, lower costs, effective change management and a great deal for the customer.

2.10 CHALLENGES TO ACHIEVING OPERATIONAL EXCELLENCE

While the benefits of achieving Operational Excellence abound, there exist challenges which must be considered in its pursuit. Taken from different research papers and other literature, they include the following:

- a. **Effecting cultural change:** Operational excellence is truly a transformation of culture, and a culture change usually meets with resistance. Change will only be achieved when the people involved see real value in changing the way work is executed.
- b. **Deploying the right talent:** the failure of an Operational Excellence effort may result from people leading the initiative lacking the required training, skills and knowledge. Initiatives must be driven by people who are well trained or certified like the black belts and greenbelts in the case of Six Sigma. They can either be hired externally or develop internally.
- c. **Operational silos:** this represents the single greatest obstacle to allowing a holistic view of operations across processes and throughout the enterprise and thus, to achieving operational excellence. The resulting poor visibility applies not just to the lack of visibility of operational activities across the value chain, but to the lack of visibility of the strategy as well as performance. Without visibility, the organization cannot react to change quickly. Long term planning is impaired also.
- d. **Inefficiencies in execution:** when the strategic vision which is to be implemented at the tactical level through one or more competencies is not effectively executed, this hampers the pursuit of Operational Excellence. This is also referred to as the lack of an execution culture.
- e. **Compliance and risk management:** this is another problem area that can impede operational excellence. Some organizations lack internal and/or external controls. Others may knowingly be committing violations, or suffering from product quality or safety issues. This can lead to complaints, regulator investigations and high added costs of warranty or compensation claims and penalties.
- f. **Reactive operational culture:** this, along with resource constraints, impairs Operational Excellence. Companies focus on day-to-day operations to the exclusion of the long-term strategic view. They take a reactive rather than a proactive approach to improvement and innovation. The attitude and ways are exacerbated by the lack of tools, resources or skills. The result is a lack of competitiveness that translates into weaker performance against industry peers.

2.11 CRITICAL SUCCESS FACTORS OF OPERATIONAL EXCELLENCE

There are factors critical to the successful achievement of Operational Excellence by organizations. These include the following:

- a. **Leadership support:** Leadership is the largest single factor responsible for the success of Operational Excellence. Leaders are accountable not only for achieving results, but achieving them effectively and efficiently. Competitive failure is often self-induced through poor leadership coincident with an inability to form a coherent strategic vision and effectively execute it. Successfully identifying and eliminating operational wastes and barriers to the implementation of Operational Excellence requires a strong foundation provided by organizational leaders. Corporate leadership has to believe in the importance of a set of tools and methodologies to drive value for customers and shareholders and visibly demonstrate a commitment to Operational Excellence. Leaders must view the organization as performing a set of business processes that extend across functions. Thus, they must collaborate across functions and work for the greater good of the organization, not functions. They must institute a strong governance structure by ensuring policies, procedures, regulations, organizational structure, metrics, defined roles and responsibilities are all in place. They must see to it that all elements of the organization's structure are aligned throughout the organization and directed in a way that drives desired behaviors and unwavering organizational discipline. They must ensure that initiatives are well integrated, organizational focus well defined and appropriate resources are applied to priorities.
- b. **Ingrained in company strategy:** Operational Excellence must become part of the organization's DNA. Everyone in the organization must endeavor to think it, believe it and live it at all times in pursuit of world-class performance.
- c. **Technical proficiency and strategic understanding:** specific tools that top level executives must understand include data collection and analysis, VSM, Process Mapping, SPC and hypothesis testing, among the lot. Operational Excellence leaders must be able to quickly assess and quantify the impact of identified metrics and the impact of Operational excellence initiatives on the desired organizational performance targets. They must also have strategic understanding of the customer.
- d. **Project planning and execution:** the ability to plan and execute is a required competency of Operational Excellence execution. At its core, this is the ability to develop and support the implementation of a comprehensive Operational Excellence program. Skills required include managing resources, change management, communication, teaming and collaboration.

2.12 CHAPTER SUMMARY

In this chapter, the definition of Operational Excellence was provided and dissected to reveal its integrated components and the levels of their importance, without any of which the achievement of Operational Excellence would be impossible. These include organizational strategy, the customer and customer value, waste elimination, the employees and performance metrics and measurements. Also discussed were benchmarking and standardization, Operational Excellence as organizational culture and the role of IT in its pursuit. Also presented were some authors' views on how Operational Excellence can be achieved and the models adapted and utilized in various industries such as banking, manufacturing, service organizations and offices, and IT. Finally, challenges to the achievement Operational Excellence and critical factors necessary for its success were stated.

3.0 RESEARCH DESIGN AND METHODOLOGY

3.1 INTRODUCTION

In the previous chapter, relevant literature surrounding Operational Excellence was presented. This included various concepts, elements, approaches to achieving Operational Excellence and models applicable and adaptable to different industries. This chapter focuses on the research design of the investigation of the problem statement, with a view to achieving the stated objectives of this research.

Again, the objectives of this research work are:

1. Quantifying the benefits of implementing the Operational Excellence philosophy for continuous improvement in an oil producing facility in Nigeria.
2. Determining the degree to which organizational performance is improved by the adoption and successful implementation of Operational Excellence.

3.2 RESEARCH DESIGN

To realize the objectives of this research work, an exploratory approach was undertaken in the form of a case study of an organization that adopted, and is currently implementing, the philosophy of Operational Excellence for improved organizational performance and competitiveness.

In general, the scope of the study includes identifying the mission, vision, values and objectives of the case study organization, its area and depth of operations, its performance level prior to the need for change, its need for adopting the Operational Excellence philosophy and thus, the Key Performance Areas (KPAs) and the corresponding Key Performance indicators (KPIs). Also identified are the processes and procedures designed and implemented to achieve world-class performance, the documented trend of improvement (or lack of it) in the areas of interest and the subsequent benefits that Operational Excellence has presented. Added to this, a survey would be carried out so as to obtain first-hand information from selected respondents about their experiences and concerns as regards the Operational Excellence philosophy itself, its implementation and the perceived benefits, as compared to what was previously on ground.

Finally, *The Oliver Wight ABCD Checklist for Operational Excellence (2000)* would be used, where applicable, to determine the areas of strengths and weaknesses in the implementation of Operational Excellence. This checklist, according to the publishers, was derived from a collection of “experiences of people in hundreds of companies and compiled over a period of more than twenty five years” and is designed to serve as “an industry standard for operational performance measurement, thereby helping companies achieve world-class levels of performance”. It is aimed at helping companies become the best they can – and some more.

It is an important tool that helps firms determine if they are doing the right things, and on their way to achieving world-class performance, by appraising an organization’s effectiveness in developing the right processes to utilize the many technologies available to companies. It assesses organizational processes such as strategic planning, people and teamwork, total quality and continuous improvement, new product development and planning and control.

Finally, it helps managers focus, align, and engage in what is required to become more competitive and achieve world-class levels of performance. Regular use of the checklist generates a consistent means of assessing progress. Problems are identified in good time and allow corrective processes to kick in. Further, the comparison of the organization’s performance against established best practices motivate people to work in a more effective manner.

From the foregoing, a relevant hypothesis for this research was formulated, and is as stated below:

“The successful implementation of Operational Excellence philosophy as a continuous improvement culture, irrespective of the business environment, leads to improved organizational performance and competitiveness”

3.2.1 Proprietary and Confidentiality Issues

Due to proprietary and confidentiality issues surrounding the information required for this work, the identity of the case study organization was agreed to be withheld from print. Thus, a pseudonym was adopted for the organization. This organization will be presented in the next chapter.

3.3 RESEARCH TACTICS

It was not practical to conduct an organization-wide survey to obtain the necessary qualitative information as regards the implementation and benefits of Operational Excellence in the organization due to a very large population size and other constraints such as geographical location, cost and time. A representative sample was thus selected for discussions and interviews.

A sample plan was put in place to address the following:

- ✓ Target population
- ✓ Units of analysis
- ✓ Sampling method
- ✓ Sampling frame

3.3.1 Target Population

This refers to the community of people who possess the information sought for this research study. The identified target population includes:

- ✚ Production manager
- ✚ Platform supervisors and operators
- ✚ Production engineers and technicians
- ✚ Environment, Health and Safety (EH&S) Supervisor and representatives
- ✚ Asset management team
- ✚ Area Operational Excellence champions
- ✚ Maintenance and Reliability Supervisors, engineers and technicians
- ✚ Finance personnel
- ✚ Aviation personnel
- ✚ Construction group
- ✚ Marine personnel
- ✚ All other organizational personnel

3.3.2 Units of analysis

This refers to individuals or artifacts (books, journals and other publications) which can be physically identified and consulted to obtain relevant information. Individuals within the target population interviewed include:

- ✚ Each platform supervisor and his alternate
- ✚ Each EH&S representatives on each production platform and the tank farm
- ✚ Senior operators and operators, and technicians from different crews and shifts
- ✚ The reliability engineer
- ✚ Maintenance supervisor and technicians on each production platform
- ✚ Aviation supervisor and helicopter dispatcher
- ✚ Marine supervisor

- ✚ Operational Excellence representatives on each platform
- ✚ Finance analyst

Artifacts utilized to arrive at results include primarily:

- ✚ Well test profiles
- ✚ Equipment availability and reliability records
- ✚ Environmental/community impact reports
- ✚ Injury/illness reports and records
- ✚ Occupational hygiene records
- ✚ Safety bulletins, reports and flyers
- ✚ Operational expenditure records
- ✚ Oil production records
- ✚ Behavior-based safety (BBS) records
- ✚ Emergency management plans

3.3.3 Sampling method

In this work, personal judgment and accessibility informed the choice of individuals identified for interview, and materials for analysis. People with greater knowledge of Operational Excellence, and who were readily accessible were rather chosen to be interviewed.

Available materials chosen for analysis were those deemed to be of utmost relevance to the research purpose. Materials that were protected were inaccessible.

3.3.4 Sampling frame

The sampling frame used for the collection of data included database of all personnel identified for interview, their telephone numbers, work crews and shift duties, their availability for interviews or discussion, and the willingness to provide personal insights into the organization's performance with respect to Operational Excellence. Personnel on vacation were left out.

3.4 DATA COLLECTION TECHNIQUES

Data obtained for this research were derived from two sources:

1. **Primary data sources:** these were collected from respondents via structured interviews and discussions. Since the respondents involved were individuals fully participating, and directly involved in activities leading to the

achievement of Operational Excellence, information elicited from them were deemed very relevant, coming from their varying experiences.

2. **Secondary data sources:** these are information already in processed form, and were obtained from organization performance reports, reliability scorecards, safety bulletins, production reports, Operator Routine Duty (ORD) checklists, platform and wellhead reports and other relevant reports and records. These data were mostly in existence prior to the commencement of this research but are relevant since they are designed to lead towards improving the performance of the organization.

3.5 METHODOLOGY

As stated previously, to carry out the case study investigation appropriately in the bid to achieve the objectives, four tasks were identified to be executed. They include:

- I. The identification of the organizational model, processes and procedures developed in pursuance of the Operational Excellence objective and their proposed effect on improving performance in KPAs.
- II. An analysis of organizational performance results in the identified KPAs to ascertain levels of performance improvement, or the lack of it, as a result of the adoption of the Operational Excellence philosophy.
- III. An assessment of basic organizational processes against *The Oliver Wight ABCD Checklist for Operational Excellence* to determine if they are in line to helping the organization achieve world-class performance.
- IV. A qualitative survey of respondents to elicit information so as to validate the claims of the success of the results achieved by the organization as a result of the implementation of Operational Excellence.

3.5.1 Identification of Operational Excellence model, organizational processes and KPAs

This involves the identification of the implemented Operational Excellence model and the KPAs critical to the organization's survival, growth and competitiveness and the corresponding processes and procedures designed and implemented to ensure the achievement of the desired performance levels in the areas. It also includes the determination of the intent behind the processes and the benefits to be achieved with their implementation. This was achieved by obtaining the necessary documents from files and the organizational intranet.

3.5.2 Analysis of organizational performance results

Documented organizational performance results would be analyzed for trends in improved performance in the KPAs as a result of the implementation Operational Excellence model. The results would be taken from the period of implementation to show over the years, the levels of improvement or lack of it, achieved by the organization.

3.5.3 Assessment of processes and procedures against the Oliver Wight checklist

The Oliver Wight ABCD Checklist for Operational Excellence consists of business processes to be rated by the respondents. The business processes include Strategic Planning, Total Quality and Continuous Improvement, People/Teams and Planning and Control. The utilized checklist is attached as Appendix A in this work. The respondents were required to determine how well the organization is performing in the execution of the processes using the checklist as a benchmark.

Under each business process appears “Overview” items which are required to be rated. To aid in the rating of these “Overview” items where a respondent may need assistance, sub-items are provided which are rated. However, these sub-items are only simplifications of the “Overview” items and are intended to aid in the rating of the “Overview” items. That is, the scores of the “Overview” items are not averages of the scores for the sub-items. The statements are rated as ‘4’ for Excellent, ‘3’ for Good, and ‘2’ for Fair, ‘1’ for Poor and ‘0’ for Not doing.

Having obtained scores for all “Overview” items, an average is calculated so as to obtain a rating for the business process itself. This average score for the business process and the subsequent class rating is an indication of how well that business process is executed. This helps in identifying what has been done and what remains to be done, and can serve as an impetus for continuous improvement. In areas where the word “Overview” does not appear, the item/statement presented is taken as the overview, given that sub-items are not provided. This exercise is detailed in Chapter Four.

Due to the nature of the questions, given that they are business-planning oriented, it was determined that the respondents who would best provide the most relevant information would be those at supervisory or managerial positions, people who had acted in such capacity and people with long years of service with the required knowledge and experience. Therefore, the respondents chosen to carry out the assessment of the organizational processes and procedures against the Oliver Wight checklist include the production manager, platform supervisors, senior engineers and operators and Operational Excellence champions. These respondents were required to rank all the statements, and ensure they related each statement as best as possible to the organization even where it appeared vague. They were encouraged to seek clarification were needed and to make notes and comments if necessary.

3.5.4 Qualitative survey of respondents

It was determined that a qualitative survey of respondents would suffice in order to obtain first-hand information as to whether the published and accepted organizational performance results were representative of what the people observed or felt. This took place in the form of informal interviews where respondents were asked to share their

experiences which include the highs and lows, relating to the organization's pursuance of world-class performance through the adoption of the Operational Excellence philosophy. While it was agreed to be a no-name interaction, respondents were encouraged to share the challenges encountered in the workplace which might hinder the attainment of the desired objective.

Since it was not practical to interview every individual in the organization, the respondents were chosen from each workgroup, crew and shift so that each work unit was represented. They were drawn from the units of analysis as given previously.

With the execution of the four tasks given above, the information arrived at would serve to achieve the objectives of this research work, and thus support the hypothesis as stated.

3.6 RESEARCH VALIDITY

This refers to the accuracy with which a research study was carried out (*Maylor & Blackmon, 2005*). It concerns receiving enough responses to justify a claim and using the correct processes to measure a concept. In his article, *McManus K.* writes that attributes to gauge Operational Excellence include a high level of employee engagement as a requisite; documentation and validation through interviewing people to verify that what is on paper is obtainable in the organization; and a demonstration of how systems in place have been consistently improved overtime and have led to improved results in all areas of importance. For this case study, data validity was carried out by eliciting and comparing respondent information with those obtained from relevant records and reports alongside determining the level of employee engagement. Again, the basic organizational processes will be assessed using *The Oliver Wight ABCD Checklist for Operational Excellence* which represents established best practices. The organizational performance will subsequently be rated from which it can be determined if it is on the right track to achieving world-class performance.

-----CHAPTER FOUR-----

4.0 INVESTIGATION, RESULTS AND FINDINGS

4.1 INTRODUCTION

In this chapter, the research investigation, results and findings are presented. The case study organization is introduced along with its implemented model of Operational Excellence and the identified Key Performance Areas (KPA) and corresponding Key Performance Indicators (KPIs). The processes utilized by the organization, as contained in the model, are assessed and rated using *The Oliver Wight ABCD Checklist for Operational Excellence*. An analysis and validation of the results through interactions with the workforce follow, after which the research work is concluded with recommendations in the following chapter.

4.2 CASE STUDY ORGANIZATION: Aschio Petroleum Nigeria Limited.

Aschio Petroleum Nigeria Limited has its origins and history in petroleum product marketing dating back about 19 years. It is a foremost indigenous major oil marketer of refined petroleum products with a strong presence in Nigeria, having over 400 owned retail outlets along with dealer-assisted and dealer-developed outlets spread around the country. It engages also in the manufacture of high quality lubricants and chemicals for domestic and industrial use, and thus, has achieved immense success in business.

Having established itself as a giant in the downstream petroleum sector, Aschio set its sights on becoming one of Africa's leading integrated energy solutions providers. An opportunity to expand its business horizon presented itself about 10 years ago when some multinational organizations in the oil and gas industry divested some of their investments in swamp, land and offshore locations in the Niger Delta region where oil and gas exploration takes place. These organizations did this due to the following reasons:

- The business environment in the region was getting more difficult as a result of insecurity arising from the activities of militant groups who were agitating for a better deal from the country's government and the operating multinationals in the region. This led to frequent cases of production disruptions as a result of facility sabotage, the general inability to meet set production targets and incidences of kidnapping, hostage-taking, extortion and even fatalities.
- Consequent to the above, operating costs rose as a result of high security budgets and other cost drivers, leading organizations to adopt strategies to ensure business sustenance. One of these strategies was to divest from readily accessible facility locations on land, swamp and offshore where production was no longer optimal, and move to deep offshore areas where the risk of human interference was very low. Armed with advanced tools

and technology which would enhance exploration and production activities in these areas, it was deemed a viable strategy.

- Conclusively, to reduce the exposure of both human and material assets to the risks of injury, death and destruction, and to protect investments worth millions of dollars and stay active in business, some multinationals opted to move deeper into the waters armed with superior technology for oil and gas exploration and production activities and where the militant groups could not get at them. They sold off the easily accessible assets to indigenous organizations who would fare better with the communities given that these indigenous companies were owned and operated mostly by individuals from same communities.

With world oil demand on a steady increase, indicating good business prospects, Aschio Petroleum acquired oil field assets consisting of about 191 oil producing wells, 10 production platforms, and crude oil processing and storage facilities which comprise of a dehydration unit and a tank farm. These producing wells have an estimated combined production capacity of about 120,000 BOPD (Barrels of Oil Per Day) with about 177,000 BWPD (Barrels of Water Per Day) treated and disposed of. There is also a water injection facility which lifts, filters and de-aerates about 40,000 BPD (Barrels Per Day) of seawater for onward distribution to the well jackets in the field.

Thus in 2001, Aschio became an active player in the upstream sector with a workforce of about 700, and pulling its weight amongst peer indigenous organizations who had taken the same opportunity to grow their businesses.

4.2.1 NEED FOR PERFORMANCE IMPROVEMENT THROUGH OPERATIONAL EXCELLENCE

Having conducted business for close to five years, there was dissatisfaction with the upstream organizational performance in several quarters and the subsequent need for change. The major reasons for this were clearly discernable from a snapshot of the performance highlights as shown below:

<u>CATEGORY</u>	<u>2002</u>	<u>2003</u>	<u>2004</u>	<u>2005</u>
Workforce Fatalities	4	1	3	3
Days Away from Work Rate	8.325	5.295	6.270	6.694
Total Recordable Incident Rate	11.09	11.25	9.90	8.83
Petroleum Spills/Bbls	2500	7000	3000	NA
Number of Spills	15	18	11	14
Cost of Incidents	NA	NA	NA	NA

Table 4.1 Aschio Petroleum Nig. Ltd Organization performance highlights

1. It was apparent that the organization was not a very safe place to work, given its very poor Environmental, Health and Safety (EH&S) performance where a total of 11 fatalities were recorded in about five years of operation.
2. Added to this was the evident misgivings amongst the workforce, especially those recruited from other organizations, who insisted the organization could do better like their peers, but was more interested in 'scooping' and selling crude oil without concern for workers or the environment. There was thus, the possibility of losing some members of the workforce to the competition.
3. There was also pressure from regulatory bodies on the organization to conform to stated requirements, given that about five years of operation was time enough for the organization to have settled down to business.
4. Competition from peer organizations was getting stiffer; a management audit revealed that key measures and practices were missing. For example, there were neither measures to indicate how reliable and efficient operations were, nor measures to determine costs of incidents and lost production opportunities. Again, there were no real benchmarking practices going on. As a matter of fact, the figures presented in Table 4.1 were only put together in 2005, showing there was no real benchmarking in the previous years.
5. Managers generally operated in silos, thus there was no standard in decision-making and documentation, and information was decentralized and not readily accessible.
6. Stakeholders needed cost-cutting measures introduced so as to achieve a better bottom-line.

Aiming to become one of Africa's leading integrated energy solution providers, it was evident business could not continue to be conducted in this manner. Management therefore decided on change that would position the upstream organization for future expansion and challenges. This change was one that would be founded on the safety and protection of workforce and respect for social and environmental issues. It would be one that would foster competitive and sustainable growth and the achievement of desired superior financial performance as compared to the competition. This would be brought about by the adoption and successful implementation of Operational Excellence.

4.2.2 NEW GOALS: MISSION, VISION, VALUES AND OBJECTIVES

The need for change through Operational Excellence that would usher in an era of sustainable business growth and profitability led to the formulation of appropriate vision and mission statements that reflect the organizational intent, and the objectives to be pursued in order to attain world-class status in operations. They are as given below:

Vision Statement

"To become the preferred integrated energy solutions provider driven by Operational Excellence to achieving world-class performance and recognition."

Mission Statement

“To provide quality energy products and related services to all customers using high safety standards and best practices, while remaining profitable and socially responsible.”

A slogan used daily in the organization accentuates this mission state. It simply states “Have a **LIFE**” where **LIFE** stands for **Living Incident Free Every day**. It reminds everyone one to adhere to safety standards and procedures in place.

Values

Core values to be imbibed by the organization and practiced by all who represent the organization are Respect, Integrity, Passion, Teamwork and Professionalism.

Objectives

The objectives set out by the organization to be achieved by the implementation of Operational Excellence, having provided the processes, facilities, standards, training, discipline and work culture are basically:

- To ensure a safe work environment for employees devoid of injuries, incidents and health risks
- To ensure safe products for customers
- To ensure environmental protection through responsible waste management, use of resources, elimination of spills and prevention of the destruction of the ecosystem
- To ensure customer agreements are satisfied
- To ensure the protection of stakeholder assets

4.2.3 OPERATIONAL EXCELLENCE MODEL IMPLEMENTED

The Operational Excellence model implemented by the organization is represented in Table 4.2 below.

Operational Excellence			
Leadership ⇨ SMART Goals ⇨ People ⇨ Processes ⇨ Roles & Responsibilities Regulations ⇨ Standard Operating Procedures ⇨ Best Practices ⇨ Audits & Reviews			
Processes			
Base	<u>Asset Reliability and Efficiency</u>	<u>Environment, Health and Safety</u>	<u>Support</u>
Organizational Change Management	Well Reliability and Optimization	Environment Safety	Recruitment and Assignment
Emergency Management	Asset Integrity, Reliability and Optimization	Marine Safety	Employee Learning and Development
Incident Investigation and Reporting		Aviation Safety	Security of Personnel and Assets
Information Management		Behavior-based Safety	Compliance Assurance
Management of Change		Occupational Hygiene	
Environment, Health and Safety Risk Management		Hazard Communication	

Table 4.2 Operational Excellence model implemented by Aschio Petroleum Nig. Ltd

At the top, it indicates the components required to achieve a successful implementation. They include committed leadership and people who pursue SMART (Specific, Measurable, Attainable, Relevant, Timely) goals through the use of designed processes, standard operating procedures and best practices while adhering to regulations.

The processes in the model are divided into four. They are the Base processes, Reliability and Efficiency processes, Environment, Health and Safety processes and Support processes. Each process is verified at designated intervals for effectiveness through performance reviews and audits. They are discussed briefly below.

1. Organizational Change Management

This process was designed to effectively manage changes to the organization and/or personnel so as to be certain that such changes are within Operational Excellence related guidelines. Its scope covers the identification and control of Operational Excellence related hazards associated with changes in the organization and to guard against incidents which

may result from such changes, so that incident-free operations can be achieved and sustained. It also includes workforce job changes, re-organization and new job assignments.

Its objectives include ensuring that:

- Employees understand Operational Excellence related targets, responsibilities and the effect of organizational changes and thus, appropriate plans to mitigate such effects.
- These responsibilities are adequately passed on when people are recruited or leave the organization.

This process is measured by determining how often it is utilized for re-organization, staffing level changes and job evaluation and re-evaluation as against the number of changes carried out. Its effectiveness can be verified by audits to determine its high points and areas requiring improvement.

2. Emergency Management

This process was designed to provide organizational structures, management tools and procedures necessary to respond to emergencies so as to prevent or mitigate crisis situations, respond to incidents appropriately, and to restore or resume affected operations.

Its scope covers:

- crisis management and emergency response
- the response organization and related team structures,
- immediate notification and incident management procedures
- team training and drill programs.

Measurement of this process include determining the percentage of emergency response team members that have participated in a drill or actual response within a specified period; the percentage of process-related review action items completed per action plan schedule.

3. Incident Investigation and Reporting

The purpose of this process is to report and investigate incidents which including injury, near-misses, occupational illnesses, operational, environmental, reliability and community concerns. The process includes incident identification, the use of standard incident investigation techniques, the use of standard root-cause categories, and reporting and documentation.

To be meaningful in helping in the mitigations of hazards, all incidents, accidents and near misses must be reported so that they can be adequately investigated, root-causes determined and measures put in place to forestall future recurrence.

Measurement of this process include determining

- the percentage of reported incidents that have a completed investigation report within a specified time frame;
- the percentage of investigation action items that are completed by their due dates
- Workforce Total Recordable Injury Rate (TRIR); Days Away From Work Rates (DAFWR), Total Cost of Incidents and Spills volumes.

4. Information Management

This process ensures that critical information related to Environment, Health and Safety (EH&S), reliability and efficiency is developed, accessible and maintained such that the workforce has access to, and is using the most current information. It is designed to ensure that operating and maintenance procedures, process safety information and other required information are developed and updated regularly. Its scope covers the use of document management systems such as websites and computer storage areas, information protection and retention, metadata for information, publication of processes and related documents, and document control such as creation, revision, approval, storage, use, and destruction.

5. Management of Change (MOC)

The purpose of this process is to verify that changes to facilities, operations, documentation and products are evaluated and managed to ensure that EH&S risks arising from the changes are controlled. It is designed to control temporary, permanent and emergency changes, which includes the linkages with other systems, processes and procedures and its objective is to provide procedures and supporting tools to efficiently and reliably manage hazards for any assets, facility, operation or product.

Measurement for this process include

- percentage of trained personnel versus plan
- percentage of MOCs audited versus total number of MOCs
- percentage of MOCs closed within a specified period
- percentage of changes not managed by MOC but identified through Work orders versus total number of Work orders requiring an MOC

6. Environment, Health and Safety (EH&S) Risk Management

The purpose of this process is to identify and address EH&S risks of facilities and activities by assessing and prioritizing such risks. This is then followed by a planned application of resources to eliminate, minimize or control the probability and/or impact of the undesired event.

Its objectives include the following:

- the application of standardized approaches/procedures to EH&S to organizational facilities and activities
- to periodically re-validate and maintain EH&S risk assessments
- to achieve closure of all identified EH&S risk reduction action items
- to demonstrate continual improvement in the management of EH&S risks

The scope of this process covers facility design, construction, installation, commissioning and decommissioning, operational aspects of new and existing facilities, facility shutdowns and startups, major modifications and maintenance programs.

Measurement of the process includes the percentage of EH&S Risk Assessments completed versus annual Plan; the percentage of EH&S Risk reduction action plans versus annual plan.

7. Well Reliability and Optimization

This process is applicable to the different categories of well, either active and idle and includes producing or injection well types. It is designed to provide a uniform approach and minimum standards for improving and optimizing the reliability of the wells so as to maximize value. Its scope covers all equipment and parameters associated with both naturally flowing and artificial lift wells.

Measurement of this process includes determining production loss against a baseline or production variance, well test programs, frequency and compliance, well failure rate, and well workover success rate.

8. Asset Integrity, Reliability and Optimization

This purpose of this process is to systematically manage systems, strategies and activities aimed at maintaining plant assets in fit-for-purpose condition for the desired life of those assets. It is also designed to optimize existing organizational operated facilities systems/equipment by defining, modeling and analyzing the facilities, and identifying and executing opportunities for a more profitable and energy efficient operation. The scope of this process covers components, equipment, systems, facilities, complexes, fields and operating areas and is aimed at ensuring safer work environment and smoother operations with fewer downtimes, which translate to greater economic benefits.

This process is loaded with sub-process and procedures, some of which are:

- Work Management: Computerized Maintenance Management System (CMMS), Work Order Management and Prioritization, Maintenance Planning and Scheduling. Metrics include, amongst others, CMMS compliance, number of open work orders, percentage of weekly scheduled compliance.
- Materials Management: Spares and Inventory Management.
- Proactive Maintenance: Reliability Centered Maintenance (RCM), Preventive Maintenance (PM)/Predictive maintenance (PdM)/Corrective Maintenance (CM) philosophy, Alarm & Process Control Management.

- Equipment criticality: ranking of all facility equipment against a benchmark. Data for ranking is obtained from tools such as Failure Mode Effect Analysis (FMEA). Metrics include percentage of criticality assessment completed, Lost Production Opportunity (LPO), major Equipment Availability/Reliability figures and Mean-Time-Between-Failure (MTBF) rates.

Other measurements include determining the number of optimization opportunities identified, documented and completed; number of Worst Actors resolved.

9. Environmental Safety

This process was designed to ensure the prevention of environmental pollution in communities where the organization operates. It identifies potential environmental risks associated with organizational operations and puts in place safeguards to mitigate such risks. Its scope covers petroleum spills, gas flaring and venting, waste disposal and effluent water discharge. Metrics include petroleum spill number and volume, and effluent water quality.

An important tool in this process is the Environmental Impact Assessment procedure which is designed to consistently identify significant environmental aspects and their potential adverse effects or benefits.

10. Marine Safety

The purpose of this process is to identify the requirements and activities necessary to deliver world-class safety, reliability and efficiency in marine services. It is designed to ensure to incident-free marine operations and identifies safety issues peculiar to marine operations. Its scope covers personnel transfer, cargo handling, communication and hose management.

Measurements include the percentage of random inspections completed relative to business unit plans, and the percentage of corrective actions closed out by due dates. Others are Marine Days Away From Work (Marine DAFW) and Marine Total Recordable Incident Rate (Marine TRIR).

11. Aviation Safety, Reliability and Efficiency

This process is designed to address all organization locations and their use of fixed- and rotary-wing aircraft for personnel and cargo movement. It works to establish an extensive ongoing aviation capability and provides guidance to the organization so that they can manage and provide world-class aviation services so as to sustain incident-free, efficient and reliable operations.

Measurements include the number of critical audit findings affecting safety performance from internal and external audits; number of repeat findings from previous audits; number of audit items open longer than a year and number of incidents and accidents witnessed.

12. Behavior-based Safety (BBS)

This is a proactive safety management process which is an application of the science of behavior change to addressing safe and at-risk behaviors. It uses behavior as an upstream performance indicator and is aimed at preventing injury to employees through the reinforcement of safe behaviors, and reduction of at-risk behaviors in the workforce. The process requires the participation of every employee, and its success lies in the commitment of the entire workforce to identifying and discouraging behaviors that run against safety standards and procedures.

Its scope covers workforce behaviors as related to the work environment, Personal Protective Equipment (PPE), tools and equipment and ergonomics.

Measurement of this process includes the percentage of workforce participation in the BBS process and the percentage of safe and at-risk behaviors identified and addressed.

13. Occupational Hygiene

This process enables the organization maintain and monitor the health of its workforce by identifying, quantifying and controlling exposure to environmental agents that may affect the health of its workforce. Its implementation establishes a risk assessment procedure to periodically identify, assess and quantify the health risks related to facility operations and modifications. It also establishes a system of control for the identified hazards and contains occupational hygiene and medical surveillance procedures for the identification of workplace exposures that require ongoing monitoring and the surveillance of potentially affected personnel.

14. Hazard Communication

This process is in place to ensure that accurate information about chemical, health and physical hazards, and associated protective measures in the workplace are communicated to protect personnel who may be exposed to these hazards. Its objectives include systematically managing and communicating hazards to potentially exposed persons by maintaining chemical inventories and critical information, providing training to ascertain that workers understand the hazards and how to handle the chemicals, and maintain labels so that they can identify chemical hazards in their work areas.

Measurement of this process includes the percentage of employees who have successfully completed formal training and the number of employee injuries, illnesses or incidents related to hazardous chemicals.

15. Recruitment and Assignment

This process governs the way the organization ensures that it continues to employ and assign the best qualified individuals to positions consistent with the organization's long-term interest. It is a structured and consistent approach that helps to ensure that only highly talented and qualified employees are hired.

Measurement of this process include the percentage of shortlisted candidates versus number of applications received; number of candidates selected versus number of applicants; employee performance and turnover.

16. Employee Learning and Development

This process guides the coordination of the development, delivery and tracking of learning and development opportunities in the organization. In implementing this process, employees through various means such as training, develop themselves as part of the organizational strategy of achieving world-class performance. Its scope covers the following: all technical training, competency enhancement training, Operational Excellence training, documentation of training events and the participation and assessment of training effectiveness.

Measurement of this process include a training effort satisfactory survey; percentage compliance of training needs met; number of employees trained

17. Security of Personnel and Assets

The purpose of this process is to provide a secure environment in which business operations may be successfully conducted. It covers the development, implementation and maintenance of a risk-based security management plan relating to personnel and assets,

Measurement includes percentage of action items completed; number of security-related incidents in a specified period; cost of security-related incidents.

18. Compliance Assurance

This is a process to identify and record all applicable Operational Excellence requirements, including laws and regulations, compliance requirements, and policies. The process assures that employees understand and comply with identified requirements, develop, prioritize and implement programs of control. This process encourages employees to freely report existing or potential violations of law or organization policy without fear of any recrimination. The process addresses compliance with legal, safety, health, environment, reliability and efficiency requirements.

4.3 FOCUS KEY PERFORMANCE AREAS (KPA_s) AND KEY PERFORMANCE INDICATORS (KPI_s)

In 2005, a five-year strategic plan was designed and agreed upon for the achievement of improved organizational performance through the implementation of the Operational Excellence model. This plan, beginning in 2006, identified the KPA_s and corresponding KPI_s as listed below. While a large number of metrics are utilized daily as indicated under the processes, the KPI_s below are indicators of a combination of the results of all other metrics. That is, results from other metrics aggregate to these key indicators which are readily accessible and interpreted on an organizational scale.

The target or benchmark figures stated are based on industry figures of organizations with similar workforce strength and operations. Benchmarking agreements entered by the organization however do not allow the publication of exact figures attained by other organizations.

KPA 1: Environment, Health and Safety (EH&S)

With ever increasing awareness of the importance of the safety of lives, property and the environment, safety has become, and remains a very high priority for organizations. At all cost, people must be protected from work-related incidents and injuries, and equipment and the environment protected from damage. The KPIs with which this performance area is monitored are:

❖ **KPI 1: Workforce Fatalities; Target is 0**

This indicates the number of work-related deaths recorded in the organization. Target is zero because no one is expected to die on the job.

❖ **KPI 2: Workforce Days Away From Work Rate (DAFWR); Target is 2.78**

This indicates occupational injury or illness cases which result in an employee being unable to work a full assigned work shift. That is, the employee is let off from work until sufficient recovery from the illness or injury is made. Calculation of this rate is based on the Occupational Safety and Health Administration (OSHA) standard for 100 employees in an organization working for 200,000 hours. This 200,000 hour figure is arrived at by assuming that 100 employees each work 40 hours per week for a total of 50 weeks a year. That is, $100 \times 40 \times 50 = 200,000$.

Therefore, $DAFWR = (\text{Number of lost day cases} \times 200,000 \text{ hours} / \text{Number of hours worked})$.

The target rate of 2.78 implies that a no more than 2.78 days for every 100 employees would be DAFW cases.

❖ **KPI 3: Workforce Total Recordable Incident Rate (TRIR); Target is 6.25**

This describes the rate of recordable incidents per every 100 employees, following the OSHA standard. Its calculation uses the number of recordable injury and illness cases for 200,000 hours worked. Thus, $TRIR = (\text{Number of recordable incidents} \times 200,000 \text{ hours} / \text{Number of hours worked})$. The target rate of 6.25 implies that, for every 100 employees, no more than 6.25 incidents would be recorded.

It is worthy to note that while this figure may seem high to the undiscerning eye, it is so due to the low number of worked hours as compared to very large organizations. Therefore, it is only a rate with which organizations of similar sizes and strength can make comparisons.

❖ **KPI 4: Petroleum Spill Volume and Number; Target for both is 0**

For consistent environmental preservation and protection, spills are targeted to be avoided completely. Hence, the targets are zero for both spill volume and number.

❖ **KPI 5: Workforce BBS participation Compliance; Target is 3 observations/employee/month**

To reinforce the Operational Excellence safety culture, every employee is expected to carry out a minimum of three observations a month to look out for at-risk behaviors so as to correct them, and to encourage safe behaviors.

KPA 2: Reliability and Efficiency

Asset reliability and efficiency are key to organizational performance. Without reliable and efficient equipment, many downtime cases would be experienced, leading to economic losses. KPIs in this area are:

❖ **KPI 1: Organizational Production Efficiency; Targets: 2006=87%/2007&2008=90%/2009=94%**

This generally translates to availability levels of production plants and equipment. That is, it indicates the degree to which an asset or system is available to perform its required function when called upon. The targets for the periods are as indicated above.

❖ **KPI 2: Preventive Maintenance Compliance; Target is 95%**

This is an indicator for the compliance rate of Preventive Maintenance (PM) work activities. Others not included in this work are compliance rates for Predictive and Corrective Maintenance.

KPA 3: Cost reduction

Since all of the production locations are offshore, marine and aviation (rotary-wing) services are heavily relied upon. These therefore have a huge impact on organizational costs. Again, due to the prevailing levels of insecurity in the Niger-Delta region, security outfits have been engaged to protect human and material assets so that production can continue. This has however contributed to high costs, and will be discussed. The KPIs identified for this area are:

❖ **KPI 1: Security and Marine costs**

These are costs associated with security and marine services. Both are discussed together subsequently because they are tied together.

❖ **KPI 2: Cost of Helicopter Services**

For the fact that helicopters are the primary means of getting to wellhead jackets, the cost of this service sometimes presents a source of worry to the organization management, which has sought to identify ways to check the rise in this cost.

4.4 RESULTS AND ANALYSIS OF ORGANIZATIONAL PERFORMANCE

4.4.1 Environment, Health and Safety (EH&S)

4.4.1.1 Workforce Fatalities

Below are the table, column chart and graph of Workforce fatalities from the period 2002 – 2009. The information indicate four fatalities in 2002, two of which were attributed to electrocution, one to a marine incident resulting in drowning and the last due to asphyxiation resulting from a confined space entry incident. In 2003, a crane incident led to a fatality. In 2004, three fatalities were attributed to a marine incident while a fire incident caused the death of three people in 2005. In 2006, a shooting resulting from a kidnap/hijack incident led to the death of an individual.

Year	Number
2002	4
2003	1
2004	3
2005	3
2006	1
2007	0
2008	0
2009	0

Table 4.3 Workforce fatalities

It was determined after investigations that the general contributing factors to these incidents and fatalities included inadequate procedures and employee training. Poor attitude toward, and non-conformance to, laid down procedures was also identified. Such procedures included the Lock Out/Tag Out (LOTO) and work permit system. The training found insufficient included the water survival and fire fighting training.

Believing these incidents can be prevented, the organization, through Operational Excellence, put in place and enforced measures to forestall future occurrences of such incidents. This included a review of operating procedures, reinforced hazard identification and mitigating tools and more focused training.

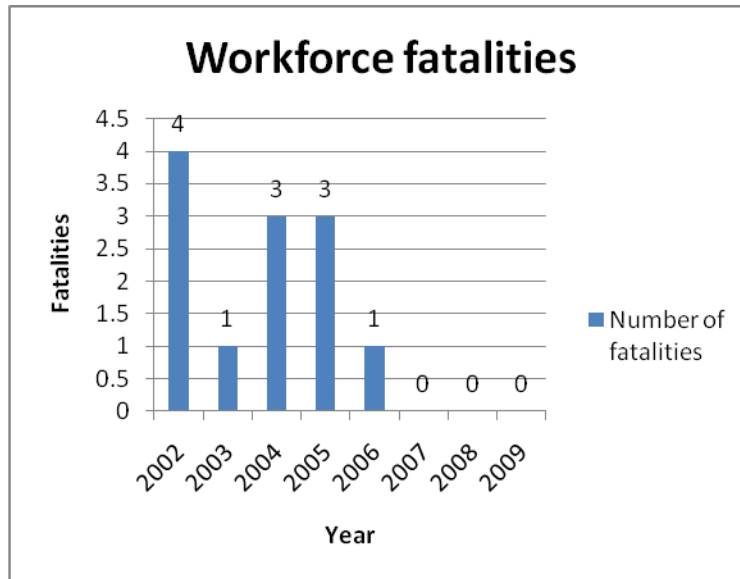


Figure 4.1 Column chart of Workforce fatalities



Figure 4.2 Graph representing Workforce fatalities

This led to the improvement in performance and the attainment of the target of zero fatalities in 2007 which has been sustained, resulting in an improvement in organizational respect, employee morale and reduced costs associated with incidents.

4.4.1.2 Workforce Days Away From Work Rate (DAFWR)

As seen from the table and figures below, the years preceding 2006 had had not set targets. This was because no real benchmarking activity took place then. However, with the implementation of Operational Excellence, there was a significant drop in DAFW cases and a corresponding drop in actual rates and the target set was achieved and even surpassed in the 2009 figure.

Year	Cases	Hours		Target
		Worked	Actual	
2002	24	576700	8.323	-
2003	16	604271	5.295	-
2004	19	606000	6.27	-
2005	22	657210	6.694	-
2006	17	709650	4.79	2.78
2007	12	717420	3.345	2.78
2008	9	713256	2.523	2.78
2009	4	706500	1.132	2.78

Table 4.4 Workforce Days Away From Work Rate (DAFWR)

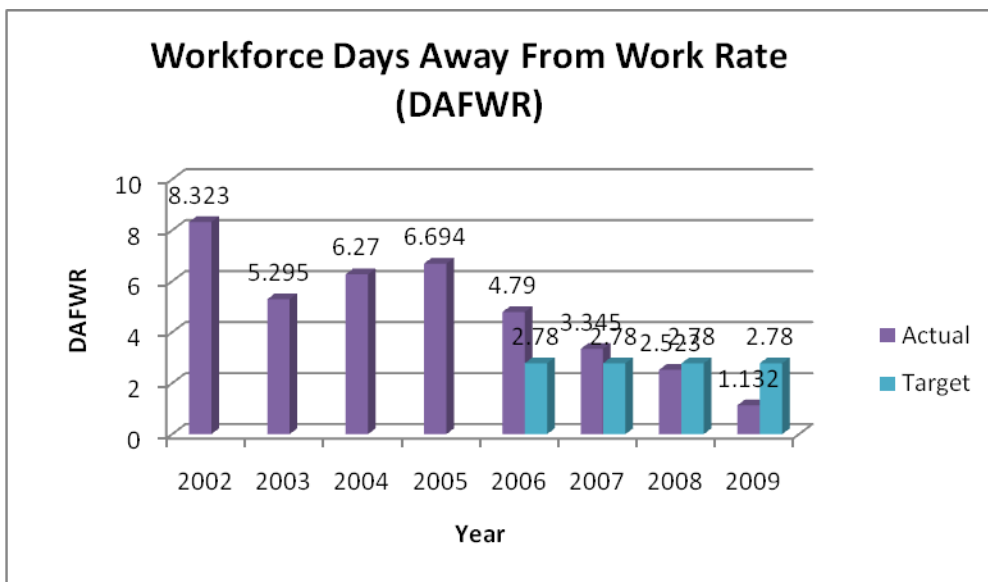


Figure 4.3 Column chart of Workforce Days Away From Work Rate (DAFWR)

This improvement in performance is attributed to improved safe work practices, strict adherence to operating procedures, attention to personal hygiene and best practices associated with Operational Excellence.

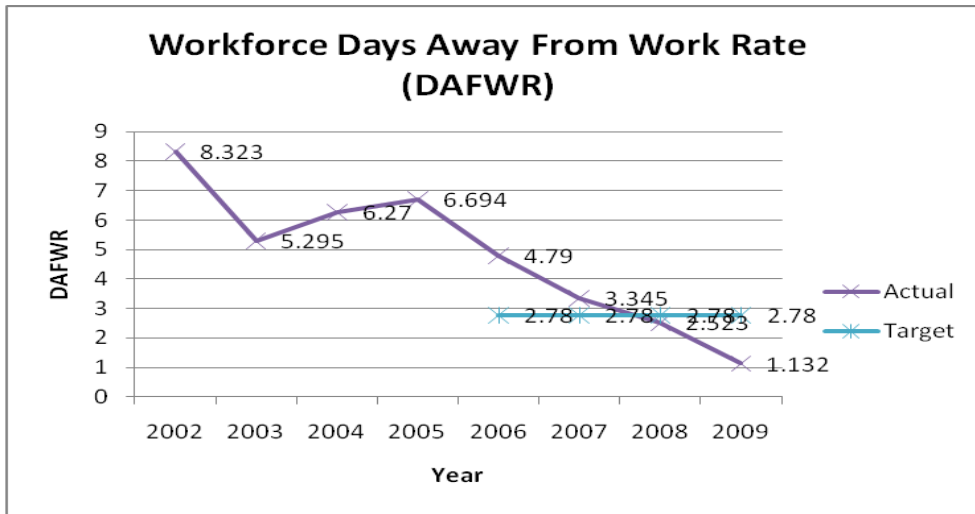


Figure 4.4 Graph representing Workforce Days Away From Work Rate (DAFWR)

4.4.1.3 Workforce Total Recordable Incident Rate (TRIR)

Similarly, the Workforce TRIR fell significantly from very high values and the benchmark figure was attained and surpassed in 2007. This translates to fewer cases of work-related injuries and illnesses as a result of better and safer work practices and attitude.

Year	Cases	Hours Worked	Actual	Target
2002	32	576700	11.09	-
2003	34	604271	11.25	-
2004	30	606000	9.9	-
2005	29	657210	8.825	-
2006	25	709650	7.045	6.25
2007	22	717420	6.13	6.25
2008	19	713256	5.327	6.25
2009	16	706500	4.529	6.25

Table 4.5 Workforce Total Recordable Incident Rate (TRIR)

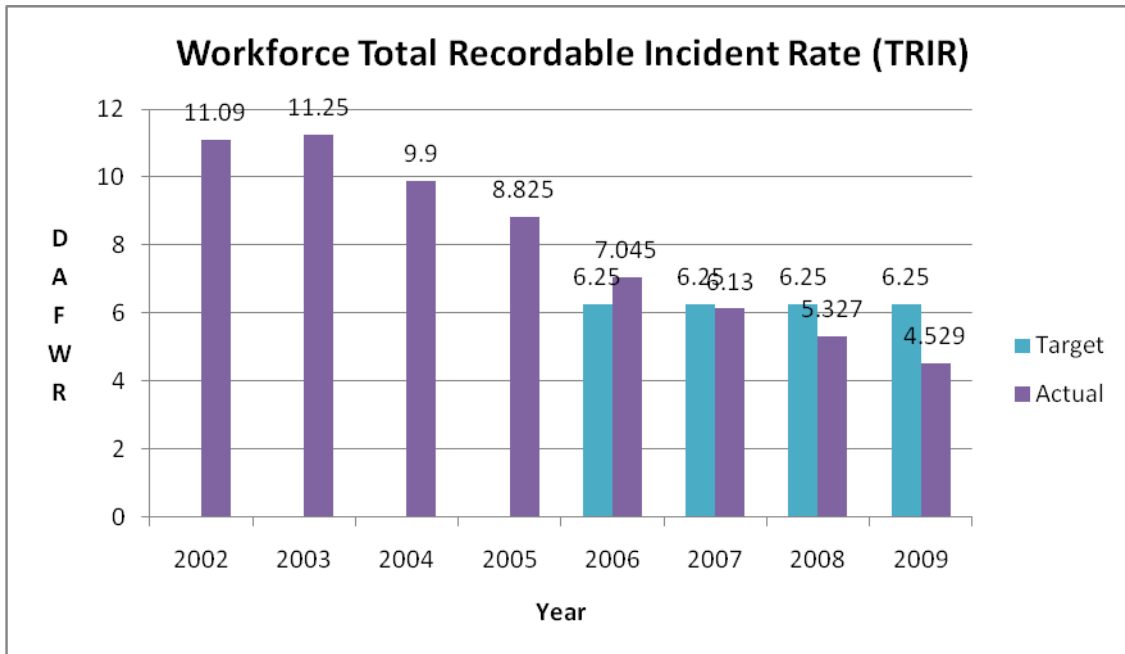


Figure 4.5 Column chart of Workforce Total Recordable Incident Rate (TRIR)

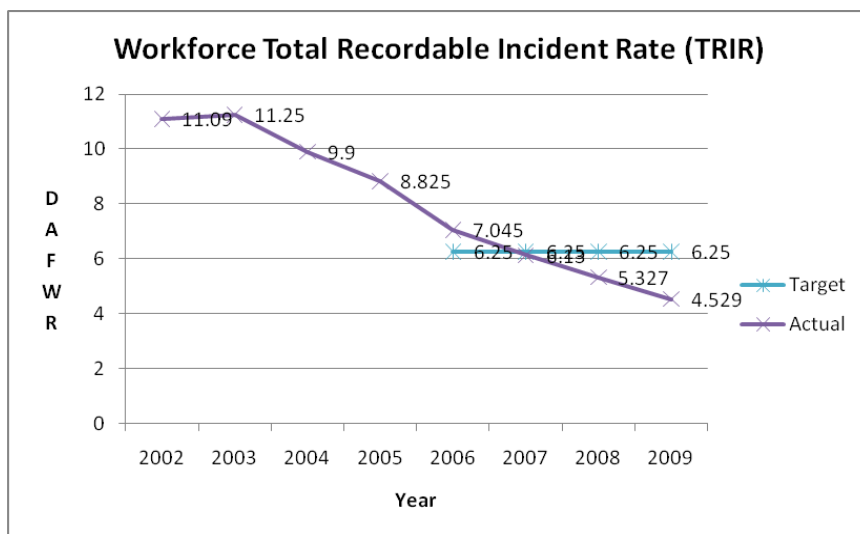


Figure 4.6 Graph representing Workforce Total Recordable Incident Rate (TRIR)

4.4.1.4 Petroleum Spill Volume and Number

With a zero target for petroleum spills, the table and figures indicate that besides 2008, the organization has not been able to keep a clean sheet. Reasons given for the spill incidents include sabotage, line rupture, operator error during start-ups and control equipment failure. Be that as it may, the organization continues to re-iterate the zero targets for spills.

Year	Spill Number Actual	Spill Number Target	Spill Volume Actual	Spill Volume Target
2002	15	-	2500	-
2003	18	-	7000	-
2004	11	-	3000	-
2005	14	-	-	-
2006	4	0	580	0
2007	4	0	50	0
2008	0	0	0	0
2009	3	0	70	0

Table 4.6 Petroleum Spill Volume and Number

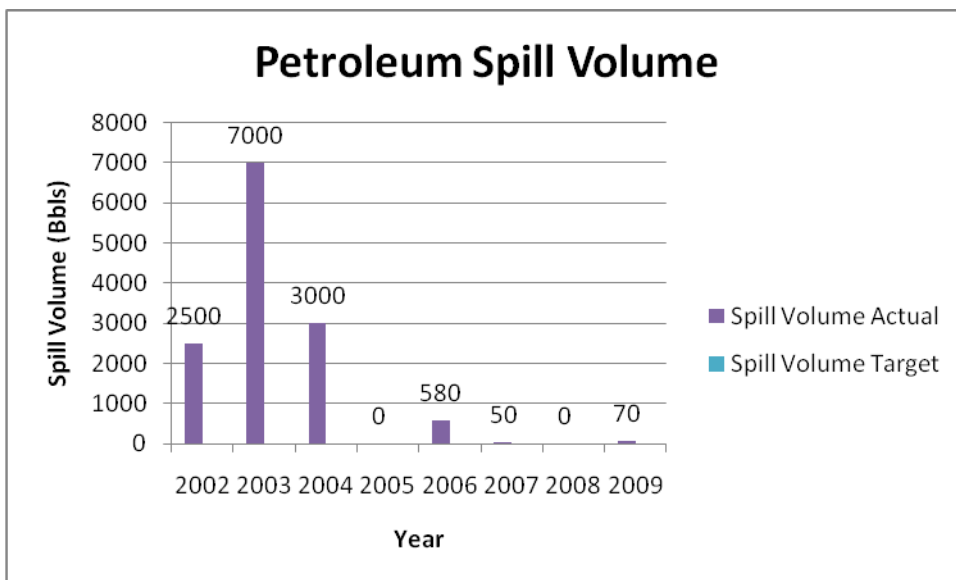


Figure 4.7 Column chart of Petroleum Spill Volume

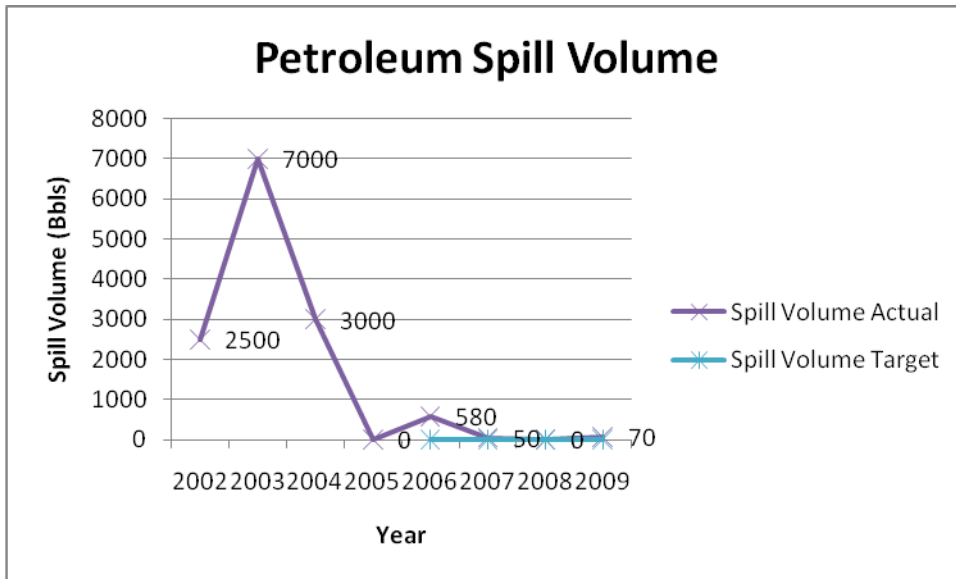


Figure 4.8 Graph representing Petroleum Spill Volume

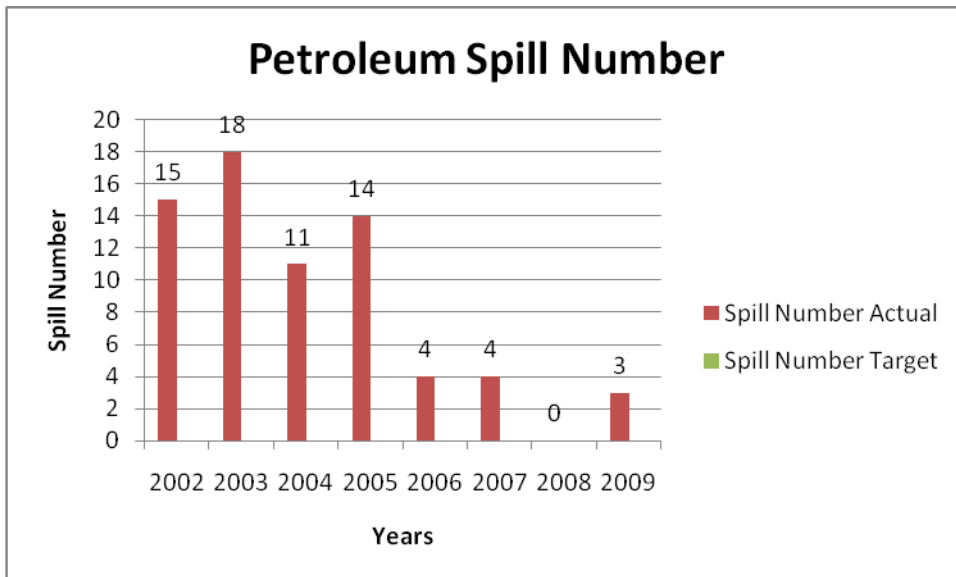


Figure 4.9 Column chart of Petroleum Spill Number

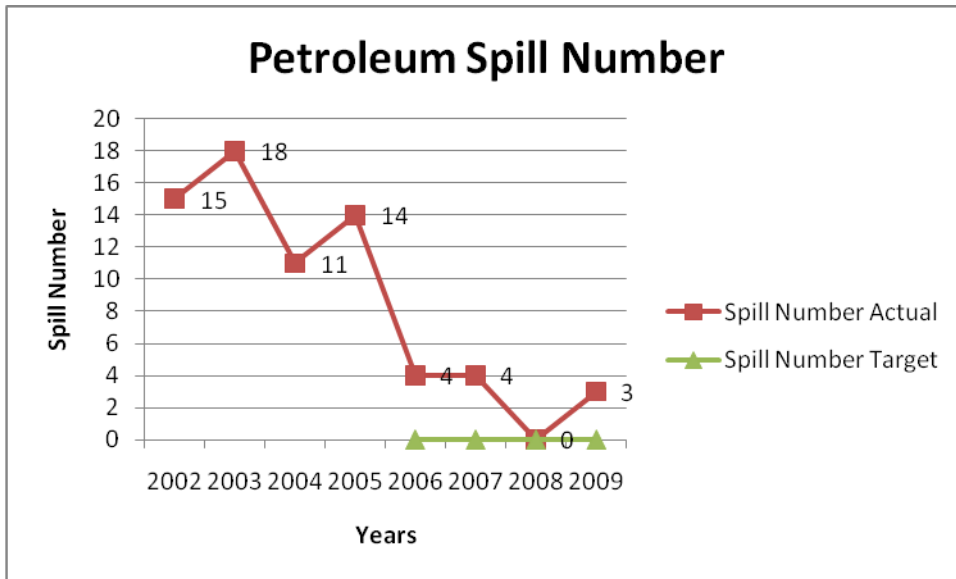


Figure 4.10 Graph representing Petroleum Spill Number

4.4.1.5 Workforce BBS Participation Compliance

While 100% participation of the workforce is required in the BBS process, targets for minimum compliance were set for the time-being starting in 2006. This was to enable the entire workforce accept and understand the new process and its benefits and eventually catch up to participating fully. The target for 2010 is 100% participation.

Year	Workforce Compliance (%)	Target
2002	-	-
2003	-	-
2004	-	-
2005	-	-
2006	66	80
2007	77	80
2008	89	90
2009	93	90

Table 4.7 Workforce BBS Participation Compliance

Along hazard identification and prevention tools, risk assessment tools and the permit system, the BBS process has contributed immensely to safety or personnel. High numbers of near-misses and potential incidents have been reported and addressed, leading to a much safer work environment.

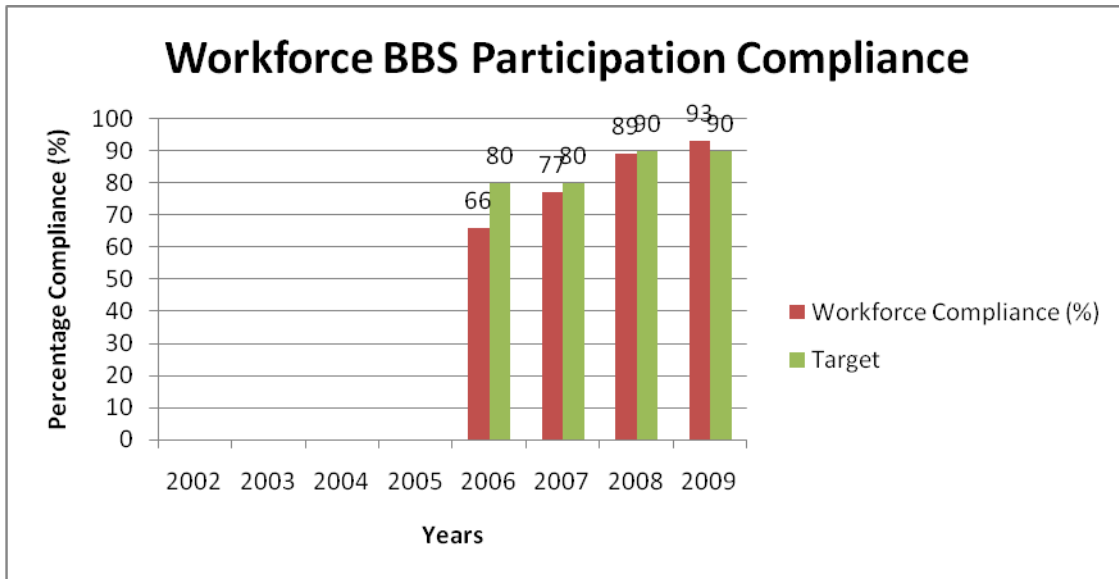


Figure 4.11 Column chart of Workforce BBS Participation Compliance

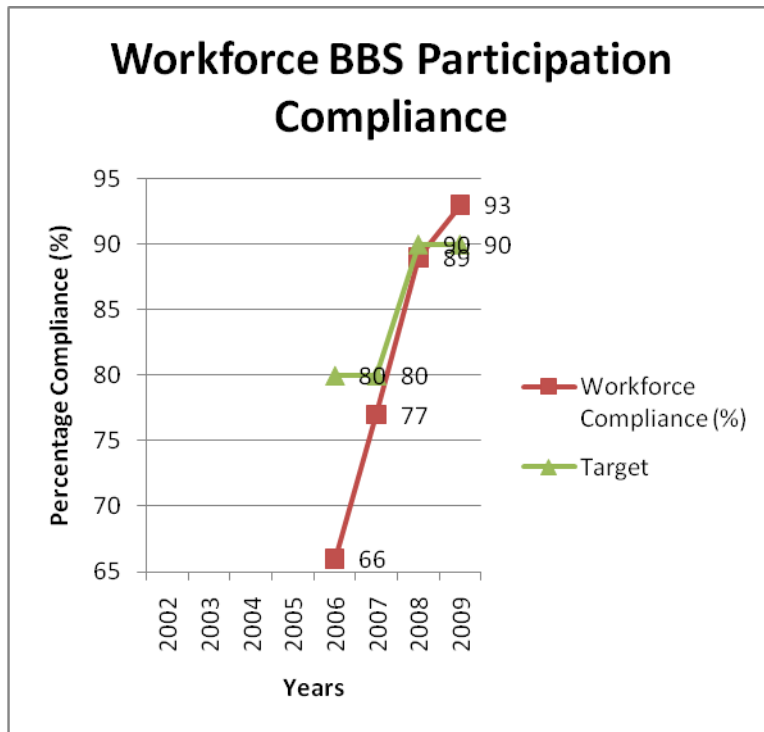


Figure 4.12 Graph representing Workforce BBS Participation Compliance

4.4.2 Reliability and Efficiency

4.4.2.1 Organizational Production Efficiency

Production efficiency levels always surpassed their target rates as indicated in the table below. Prior to 2006, this metric was not addressed. These figures show that the organization consistently meets with production targets.

Year	Target (%)	Actual (%)
2002	-	-
2003	-	-
2004	-	-
2005	-	-
2006	87.5	89
2007	90	93.9
2008	94	95.5
2009	94	96.1

Table 4.8 Organizational Production Efficiency

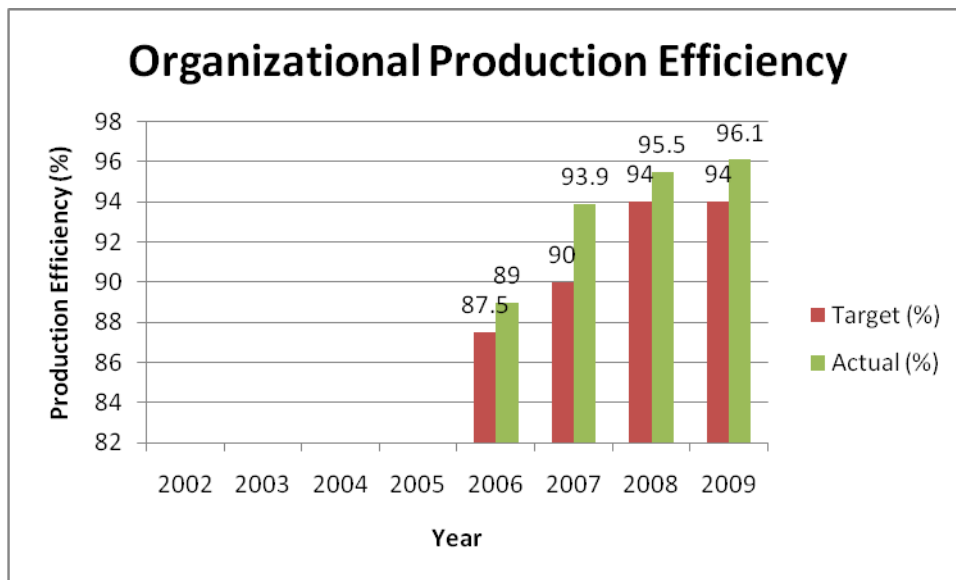


Figure 4.13 Column chart of Organizational Production Efficiency

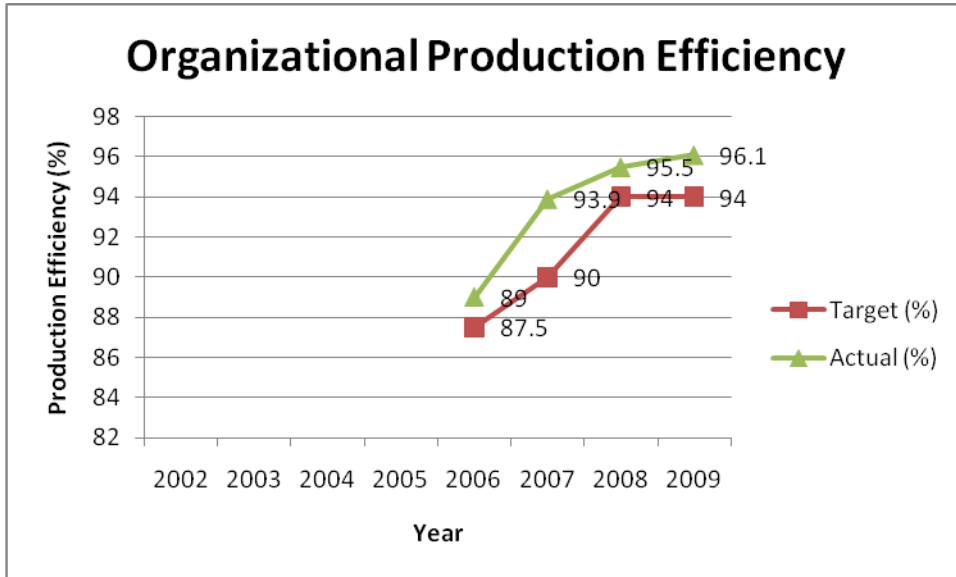


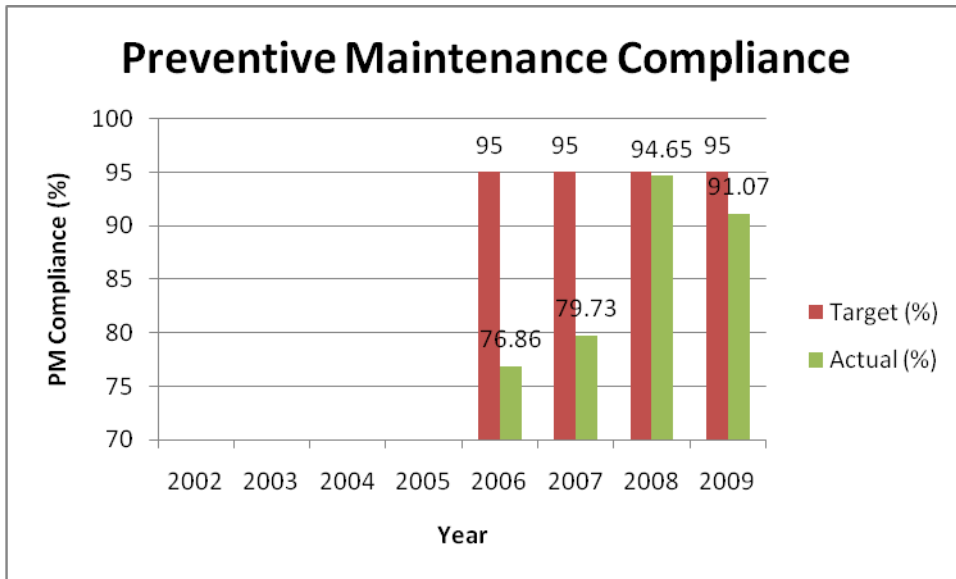
Figure 4.14 Graph representing Organizational Production Efficiency

4.4.2.2 Preventive Maintenance Compliance

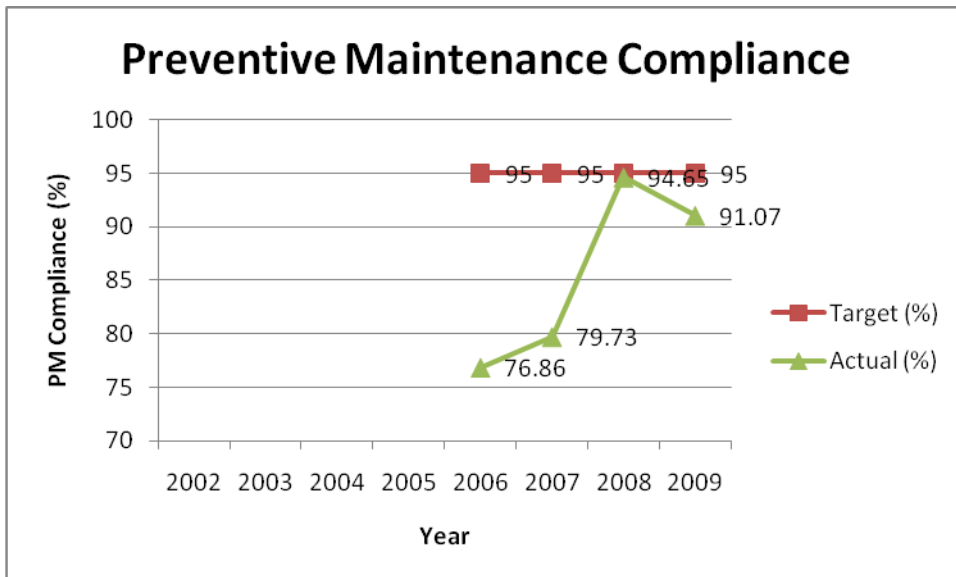
Preventive Maintenance (PM) compliance falls short of target values and presents a gap which must be closed as soon as possible before it begins to impact on the production efficiency. The trends for other maintenance programs' compliance have been left out here but PM compliance needs to be monitored adequately because it is basically responsible for preserving the life of assets, which translates to reliability and availability figures.

Year	Target (%)	Actual (%)
2002	-	-
2003	-	-
2004	-	-
2005	-	-
2006	95	76.86
2007	95	79.73
2008	95	94.65
2009	95	91.07

Table 4.9 Preventive Maintenance Compliance



4.15 Column chart of Preventive Maintenance Compliance



4.16 Graph representing Preventive Maintenance Compliance

Reasons attributed to the inability include unavailability of spares, poor weather conditions (rains and storms causing the inability of maintenance personnel to get to work locations) and lack of adequate manpower given that the maintenance department was understaffed.

4.4.3 Cost Reduction

While there is a general ongoing effort in all quarters to minimize cost by the efficient use of resources and materials, and the optimization of systems and processes, the costs associated with security, marine and aviation (helicopter) services have been sources of concern to the organization.

During this research, requests to obtain financial records of costs associated with these services mentioned above were denied. They were said to be totally confidential, and even after reassuring the people responsible that the organization's identity was protected by the use of an alias, all entreaties were rejected.

Therefore, while actual figures and the gains achieved by the cost reduction effort in these areas are not available for presentation, a general picture is painted for the reader's understanding.

4.4.3.1 Security and Marine costs

The Niger-Delta region is a marine environment. Thus, all supplies and material delivery are done by marine vessels. While this may have been factored into production costs, a new dimension to this was introduced as a result of the high level of insecurity witnessed in the region in recent years.

To protect the lives of members of the workforce and material assets, and prevent disruptions to production activities, marine security outfits were hired and attached to each production platform. This came to a total of 10 security vessels, each with a hiring cost of US \$5000/day exclusive of personnel pay packages. This translates to an annual approximate value of \$1.8 Million, an operations cost constituent that the organization can do without.

Again, the issue of insecurity contributed to the upward review of charges by companies doing business with Aschio Petroleum, thereby impacting on the bottom-line. A direct instance is where a very high security incentive has to be paid to specialists, expatriates or firms who are contracted to carry out specialized jobs.

To tackle this problem, the organization resulted to intensive community outreach programs. This culminated in the company providing assistance in education in the form of scholarships and grants, the provision of basic amenities lacking and the hiring of qualified semi-skilled individuals. Thus a relationship was forged that resulted to community policing of organization's assets. Here, the community itself would prevent outside forces from interfering with organizational activities given that they had become direct beneficiaries. There was therefore, no more need for so many security vessels and personnel. This approach is supposed to have reduced the security costs by about 40%. This claim can however not be verified due to reasons stated earlier.

Added to this, the organization supported fully the recent amnesty program initiated by the government where the militants were encouraged to lay down their arms and be integrated into society after being trained in skills that would

enhance their livelihood, while the government works towards addressing the issues as raised by them. This is supposed to yield great dividends in the form of a safer work environment of the people and for the business to thrive.

4.4.3.2 Cost of Helicopter services

Again, because of the nature of the landscape, personnel movement is primarily by helicopter services. This includes crew changes and visits to wellhead jackets housing the 191 wells for work purposes. The work purposes include opening of shut-in and tripped wells, valve line-up for well tests if the test is to be carried out at the production station, well tests on the jackets if they are so equipped, choke changes and product sampling and other production and maintenance activities.

With four helicopters providing services to all locations, analysis of the helicopter movement in carrying out these job requirements on a daily basis left so much to be desired. This movement was described as “random”, and greatly depleting the aviation budget. There was the need to optimize helicopter movements so as to run a cost efficient service.

An example of actions taken was to ensure, through the disciplined application of the relevant Operational Excellence processes, efficient planning and execution of production and maintenance activities. That is, maintenance must ensure that all equipment such as the surface safety valves and controls are reliable so as to avoid incessant well trip. Operations must ensure that during a visit to a jacket, all activities such as well tests, sampling, housekeeping and inspections are carried out for the month. With this optimization of activities, helicopter services was said to have dropped by about 20%

4.5 ASSESSMENT OF PROCESSES AGAINST OLIVER WIGHT ABCD CHECKLIST FOR OPERATIONAL EXCELLENCE

As stated in Chapter Three, *The Oliver Wight ABCD Checklist for Operational Excellence* is a very useful tool for organizations to determine their areas of strengths and weaknesses in the Operational Excellence implementation. It is used to carry out an assessment of organizational processes to determine their effectiveness in leading to the achievement of world-class performance.

The checklist is attached as Appendix A and the scores and ratings attainable as are given below:

- Average of 3.5 – 4 is rated as Class A
- Average of 2.5 – 3.49 is rated as Class B
- Average of 1.5 – 2.49 is rated as Class C and
- Average less than 1.5 is rated as Class D.

A total of 53 survey checklists were dispatched but only 44 responses were received, indicating a response rate of 83%. In the analysis that follows, the following are noteworthy:

- ✓ The response results were elicited at a given point in time and as such, responses were as a result of the immediate circumstances in the organization. This implies that, a month away from this research, responses of individuals may differ with the differing perceptions of circumstances prevailing in the organization.
- ✓ According to the authors, the attainment of a Class A rating in a particular business process should not be interpreted as having achieved the full utilization of potential. This makes good sense since there is always room for improvement.
- ✓ In Chapter Three, details were provided on how the assessment and rating are done. Thus, from the 44 respondents, average scores are arrived at for all overview items, and these are in turn used to rate each particular business process. This implies that, since individuals are bound to have different perceptions, the weight of the particular perception of individuals is overshadowed in the average. However, this is tackled by the validation exercise presented in the next section where members of the workforce are directly interacted with so as to elicit their individual opinions where they are observed to be markedly different from others.

1. **Strategic Planning process: Class A**

<u>Overview Item</u>	<u>Average Score</u>
Commitment to Excellence	3.4427
Leadership Team	3.7386
Vision and Mission	3.9090
Business Performance Assessment	3.6556
Analysis of External Environment and Internal Capabilities	3.6638
Case for Change	3.9621
Strategy Creation	3.7045
Establishing Strategic Goals	4.0000
People and Communication	3.7726
Business Plan Integration	3.8736
Goal Deployment and Implementation	3.7101
Measure Results	3.8295
Diagnosis and Review	3.6136
Reflection	3.9545
Ongoing, Formal Goal Setting and Strategic Planning	4.0000
Education and Training	3.7310

Table 4.10 Assessment and Rating of the Strategic Planning Process

From the table above, the average scores for the overview items indicate the confidence respondents have in the strategic planning process. The figures generally represent belief in management’s commitment to organizational success through the establishment of SMART goals, and commitment to the set vision and mission.

The strategic planning process receives a score of 3.59, derived from the overview item averages, and a rating of Class A. For this, the authors sum it up in qualitative characteristics as: “Strategic planning is an ongoing process and carries an intense customer/community, shareholder, and employee focus. The strategic planning process provides direction to all elements of the company and drives decisions and actions. Employees at all levels can articulate and share the company’s vision and its overall strategic direction. They can also articulate their roles in the implementation and execution of the strategic plan.”

However, if the overview items were to be considered and classified in isolation, a score of 3.4427 out of 4 for “Commitment to Excellence” indicates that the respondents are of the opinion that more can be done for greater effectiveness of this business process in the form of a more visible commitment in terms resources and actions.

2. People/Team Process: Class A

<u>Overview Item</u>	<u>Average Score</u>
Commitment to Excellence	3.7590
Culture	3.4544
Trust	3.8136
Teamwork	3.6312
Employment Continuity and Development	3.7999
Education and Training	3.6220
Work Design	3.8408
Congruence	3.5738

Table 4.11 Assessment and Rating of the People/Team Process

Table 4.11 indicates that the respondents believe that the organization is committed to a work culture that promotes teamwork and trust, and is also committed to employee welfare, training and development.

The people/team process receives a score of 3.68 and a rating of Class A. In qualitative characteristics of this rating, the authors write: “Trust, teamwork, mutual respect, open communications, and a high degree of employment security are hallmarks of the employee/company relationship. A formalized team structure is evident throughout the organization. Employees are very pleased with the company and proud to be part of it.

Again, when considered on its own, the average score of 3.4544 out of 4 for “Culture” indicates the need for improvement. The reason for this score was seen in the high number of responses provided as regards the existence of status distinctions between managers and workers. Respondents thus admitted that this glaring distinction was a source of barrier that discouraged a work environment that was open to free expressions, ideas and criticism.

3. Total Quality and Continuous Improvement Process: Class B

<u>Overview Item</u>	<u>Average Score</u>
Top Management Leadership for Quality and Continuous Improvement	3.2629
Focus on Customer	3.6422
Customer Partnership	3.5271
Continuous Elimination of Waste	3.6772
Routine Use of Total Quality/Continuous Improvement Tools	3.6789
Resources and Facilities - Flexibility, Cost, Quality	3.3311
Velocity	3.6514
Accounting Simplification	3.7727
Teamwork	3.5709
Education and Training	3.6220
Work Design	3.7880
Employment Continuity	3.9772
Company Performance - Quality, Delivery, Cost	3.8100
Setting and Attaining breakthrough Goals	3.6677

Table 4.12 Assessment and Rating of the Total Quality and Continuous Improvement Process

In Table 4.12, the Total Quality and Continuous Improvement process receives a score of 3.3786 and a rating of Class B. This falls short of the Class A ratings achieved in the previous ratings of business processes and indicates room for improvement. In qualitative characteristics of this Class B rating, the authors simply conclude: “Most departments, suppliers and customers are participating in these processes. Substantial improvements have been made in many areas.”

The average scores of the overview items make it clear that the organization is customer focused and active in waste elimination with respect to continuous improvement, but considered individually, the scores for “Top Management Leadership for Quality and Continuous Improvement” and “Resources and Facilities – Flexibility, Cost, and Quality” show that respondents think much more can be done in these areas.

4. Planning and Control Process: Class A

<u>Overview Item</u>	<u>Average Score</u>
Production Planning and Control	3.2639
Production Plan Performance	3.8814
Master Schedule Performance	3.7201
Education and Training	3.6220
Commitment to Excellence	3.5211

Table 4.13 Assessment and Rating of the Planning and Control Process

Table 4.13 shows high average scores for overview items in the Planning and Control process. This indicates that respondents are of the opinion that the organization is committed to excellence in production plan performance and education, and training as related to the process.

The Planning and Control process receives a score of 3.6017 and a rating of Class A. In qualitative characteristics of this rating, the authors write: "Planning and control processes are effectively used company wide, from top to bottom. Their use generates significant improvements in customer, employee, and stakeholder satisfaction as well as in customer service, productivity, inventory, and costs

The 3.2639 out of 4 score obtained in the "Production Planning and Control" overview item indicates an opportunity for improvement. A closer look showed that it scored that low because respondents felt that the inventory management could be optimized for better delivery and general effectiveness.

In conclusion, this assessment and the corresponding ranking of organizational processes that foster Operational Excellence show that the organization under study is currently on the path to world-class performance if process effectiveness remain the same, or even improved upon. The areas identified for improvement include management's commitment to excellence by investing adequate resources and being more visible in actions, and the creation of a work environment where status distinction is almost non-existent thereby, bringing out the best in people. Other areas include the optimization of inventory management and greater commitment of top leadership to quality and continuous improvement issues.

4.6 VALIDATION OF RESULTS THROUGH INTERACTION WITH THE WORKFORCE

Members of the workforce were presented with both the organizational performance results and the assessment of processes against the checklist and were asked to give their opinions on their correctness. While very many agreed with

both the performance results and assessment, a few spoke about the high points and challenges experienced by them, which directly or indirectly impact the results.

4.6.1 Highpoints

In general, people were very pleased with the organizational safety culture and record, and the fact that the organization had chosen EH&S as a focus area. Zero fatalities, reduced number of incidents and respect for the environment were certainly the way to go to be competitive, and on the way to business excellence. Individuals who witnessed the fatalities back then were relieved that such occurrences would no longer take place provided everyone took safety as a personal responsibility.

With regards to the assessment ratings of business processes, it was generally agreed that the organization's commitment to Operational Excellence was visible to a high degree, especially in their allocation of resources to improvement, support for education and training, encouraging two-way communication, teamwork, a culture of ownership, and trust. Again, the very clear vision and mission statements serve as motivation for people to aim for the best.

4.6.2 Challenges

Performance metrics are only as good as the data used to compute them. There were concerns that the data used in the computation was incomplete because some incidents were not reported. These included spill incidents, effluent/process water discharge to the environment and injury cases which some members of the workforce tend to be quiet about. The reason attributed to this behavior is the fear of the consequences. Reminded that reporting incidents was for mitigation measures to be put in place to avoid recurrence and not to punish people, individuals stated that what was obtainable differed sometimes from what was preached.

Another source for concern was the BBS program. It was gathered that some people did not carry out practical observations but only filled the cards with thought-up scenarios. Since emphasis was laid on completing three observations a month, some people simply turned in three filled cards to fulfill their monthly expectations. Thus, while the metric reads high participation rates, actual observations, the identification of at-risk behaviors and the encouragement of safe behaviors are not carried out.

As regards the assessment ratings of business processes, people generally agreed that the core organizational processes which enhanced Operational Excellence were very effective. However, issues raised include the following:

- Cancelled training and education events due to cost-reduction measures

- Lack of recognition and rewards even when outstanding performance levels were attained
- Credit for productive suggestions taken by supervisors and not by the actual contributors
- Cost reduction efforts impacting on Total Quality and Continuous Improvement

4.7 SUMMARY OF FINDINGS

Below is a summary of findings of the factors that work against the attainment of Operational Excellence:

- I. Cost reduction efforts were impacting on the training needs of the workforce. Since each supervisor was tasked with managing a tight budget, refresher courses and other courses previously identified to be taken by individuals were cancelled in the bid to manage that budget. Durations in-between refreshers were extended and only a selected number of individuals were allowed to proceed on training events. This had the tendency of creating disaffection among the workforce where it seemed only a few were marked for development. Added to this, the cost savings effort had an effect on inventory management, quality issues and maintenance. Supervisors were slow to approve inventory orders and maintenance expenditure except the need could no longer be ignored, and they were unwilling to request for an added number of maintenance personnel to make up the shortfall because of the cost implication. This evidently indicates that, if not well managed and a balance found, laudable initiatives such as cost reduction may hinder efforts aimed at organizational performance improvement.
- II. An environment where people are afraid of retribution in the course of executing their duties would certainly not bring out the best in them. A free environment that encourages freedom of expression and respect for individuals and their contributions would pave the way for quality and confident inputs from the workforce. It would ensure that all incidents are reported and addressed appropriately. This environment must be devoid of status distinction, and should center on what each and every member of the workforce can contribute to the benefit of the organization. Credit should be given to whom it is due and this would encourage greater participation from the workforce who usually have a wealth of knowledge of systems, equipment, processes and procedures.
- III. Reward and recognition plays an integral part in motivating people to perform better in the workplace. When an organization achieves remarkable performance, people or the units in which they work, ought to be recognized and possibly rewarded for their contributions to such results. This fosters the drive for improved performance. The absence of reward and recognition, or where the supervisor only is recognized, is a source of demotivation to workers.
- IV. Due to the diversity existing in the workforce of organizations today, training needs must give consideration to non-english speaking but highly skilled individuals since english is the language of choice in training in many organizations. These individuals neither understand nor appreciate what is being communicated to them and as

such pose as threats in matters of safety. Translators are thus required to pass the message along to ensure understanding and conformance to rules.

- V. Leadership is the most critical aspect in the drive to Operational Excellence. The leadership team must walk the talk by exhibiting behaviors that support the Operational Excellence objectives and show massive support in every way possible. They must ensure there is no disconnect between the building blocks of Operational Excellence: people, strategy, organizational processes and technology, and provide encouragement always along the way.

4.8 CHAPTER SUMMARY

In this chapter, the case study organization was presented along with its need for performance improvement, its new goals and the Operational Model implemented. Its priorities for improvement were in Environment, Health and Safety (EH&S), Reliability and Efficiency and Cost Reduction.

With the successful implementation of model, the KPIs indicate that most benchmark targets were achieved. These include zero fatalities, reduced incident rates and improved organizational production efficiency.

To verify that the organization was poised for world-class performance in its operations, its internal processes were subjected to an assessment using The Oliver Wight ABCD Checklist for Operational Excellence, a very useful tool which indicates how good an organization is doing on its path to world-class performance, and areas requiring attention. The results rated the organization as doing very well in its quest for Operational Excellence even though there was always room for improvement.

The organizational performance and assessment results were played against members of the workforce for validation. They provided insights to high points and challenges regarding the results. Finally, a summary of findings were given.

5.0 CONCLUSION AND RECOMMENDATIONS

5.1 CONCLUSION

This research was embarked upon to determine if the successful implementation of Operational Excellence by an organization in Nigeria actually results in improved organizational performance. This was because, while organizations in the western world are achieving great success with the implementation of this disciplined approach to improving performance to world-class levels, Operational Excellence is almost unheard of in Nigeria. This is as a result of a lack of awareness by some business owners, and skepticism on the part of others who are under the impression that imported business improvement models may not yield results in Nigeria where the business environment is hostile to investors due to poor infrastructure and a high level of insecurity.

This work was then set out to inform and correct the skeptics and thus, a research hypothesis was formulated:

“The successful implementation of Operational Excellence philosophy as a continuous improvement culture, irrespective of the business environment, leads to improved organizational performance and competitiveness”

To prove this, a case study was undertaken in an organization currently implementing the Operational Excellence philosophy, and the objectives of the study were:

1. Quantifying the benefits of implementing the Operational Excellence philosophy for continuous improvement in an oil producing facility in Nigeria.
2. Determining the degree to which organizational performance is improved by the adoption and successful implementation of Operational Excellence.

Results from the study showed that, under the period of implementation, the organization recorded impressive results in identified areas requiring improvement. These areas were in Environment, Health and Safety (EH&S), Reliability and Efficiency and Cost Reduction.

This implies that, even in a hostile business environment, the successful implementation of Operational Excellence can make the difference between organizations that survive and others that do not, thus proving the hypothesis correct. This is because Operational Excellence is a disciplined management system that promotes the application of best practices that lead to excellent organizational performance, sustained profitability and assured business growth.

The latest Nigeria Oil and Gas report forecasts that African regional oil demand would rise by 11.92% in 2014 and the country will account for 22.45% of that supply to meet the demand. Thus, the organization used as the case study, Aschio Petroleum Nigeria limited, has positioned itself for greater achievements in its area of business by implementing a continuous improvement model that would enable it lock onto, and sustain, future successes.

When organizations are committed to Operational Excellence, they are poised to withstand back-breaking events in the financial world because operations are designed to be efficient and effective. The recent economic recession which took its toll on many businesses, and the BP Gulf incident are events still fresh in our memories and should provide the motivation to seek means of ensuring business survival and profitability.

Finally, to underscore how much Operational Excellence is gaining grounds in the West, it is currently offered as Certificate and Master degree programs like in the Fisher College of Business, Ohio State in the United States of America.

5.2 RECOMMENDATIONS

The degree of financial benefits achieved from the implementation of Operational Excellence in organizations will serve as a direct motivation to adopt the philosophy. That is, when quantifiable figures of how much was saved due to the implementation of the continuous improvement initiative is provided, the message is much clearer to people. Thus, it is recommended that organizations provide this crucial information which will be an advantage to broadening the Operational Excellence Body of Knowledge. Even if actual figures are withheld, percentage savings and benefits ought to be provided.

For organizations in the same business as Aschio Petroleum, and indeed all other organizations seeking business excellence, it is recommended that metrics such as Lost Production Opportunities (LPO) and Total Cost of Incidents (TCI) be determined. This is important so as to know what the organization is losing during downtimes and the cost expended on addressing incidents. These metrics tend to motivate the organization to improve on reliability and efficiency, and also the elimination of incidents.

Various models of Operational Excellence were introduced in this work. They include models applicable in banking, manufacturing and information technology. It is recommended that future research work be done to modify these models for increased effectiveness and adapted to fit other industries. Again, future research is encouraged in various other business sectors as aerospace, construction, tourism and biotech and unique service industries. Added to this, there is

the need for researchers and authors to turn out more reference texts on Operational Excellence as there are in other integrated management systems.

The Oliver Wight ABCD Checklist for Operational Excellence is a powerful tool for any business to ascertain its current performance. It is very useful in evaluating an organization's approach to business management process and identifying gaps that limit organizational effectiveness. It is recommended that all businesses assess their operations using this tool so as to discover areas where they can improve, and in doing so, position themselves for excellence in performance.

-----APPENDICES-----

APPENDIX A

THE OLIVER WIGHT ABCD CHECKLIST FOR OPERATIONAL EXCELLENCE

1. **STRATEGIC PLANNING PROCESS**

1-1 **COMMITMENT TO EXCELLENCE**

OVERVIEW: The Company has an obsession with excellence and is not satisfied with the status quo. Executives provide the leadership necessary for change. They articulate the motivations for positive change and communicate them throughout the organization – by actions as well as words.

1-1a Commitment is demonstrated by the actions that the company is taking at all levels to achieve excellence. Communication and allocation of resources – time, people, and money – support the actions.

1-1b. Management is committed to learn from the people they serve in order to provide unparalleled quality products and service.

1-2 **LEADERSHIP TEAM**

OVERVIEW: The organization has a leadership team consisting of key executives who recognize they must sponsor and guide the members of the organization by taking a forward position and acting on key issues.

1-2a. Each member of the leadership team is committed to and involved in improving the way the business is run.

1-2b. The leadership team is focused on the direction of improving customer, share holder and employee satisfaction. The direction is consistent and constant.

1-3 **VISION AND MISSION**

OVERVIEW: Vision and mission statements for the organization exist. The vision statement focuses on the future of the business and shows employees, shareholders and customers what the organization wants to become. The mission statement outlines the purpose and nature of the business and reinforces the reason for its existence; these items include statements on products and/or services, customers, community and employees. They are a broad roadmap of where the company wants to be in the future and do not contain specific operational or functional measurements.

1-3a The vision and mission statements are leader—initiated and are shared and supported by all the members of the organization.

1-3b The vision is positive and inspiring. It is tested against the values of the company to support core beliefs, corporate structure, and standards of behavior.

1-3c The mission is clear and concise and provides information as to the nature and existence of the business, its products and services, and the value they provide to the customers and / or society.

1-4 BUSINESS PERFORMANCE ASSESSMENT

OVERVIEW: A process exists that assesses the company's business performance in the four areas of success: customer satisfaction, shareholder/stakeholder satisfaction, employee satisfaction, and community satisfaction.

1-4a Key drivers are identified within the customer satisfaction measures of success. They may include, but are not limited to, product fitness for use, price/cost service, delivery, quality, brand recognition and personal relationship.

1-4b Key drivers are identified within the shareholder satisfaction measures of success. They may include, but are not limited to, profit, growth, market share, cash flow, dividends, stocks price, return on assets, economic value added, and corporate image.

1-4c Key drivers are identified within the employee satisfaction measures of success. They may include, but are not limited to, pay, benefits, opportunities, job security, pride in work, pride in company, openness, fairness, friendliness, teamwork, camaraderie, and innovation.

1-4d. Key drivers are identified within the community satisfaction measures of success. They may include, but are not limited to, environmental protection, civic responsibility, stable employment, facility appearance, traffic flow, and other activities that make the company a responsible community member.

1-5 ANALYSIS OF EXTERNAL ENVIRONMENT AND INTERNAL CAPABILITIES

OVERVIEW: Assessment processes, using facts and data, exist to determine how well the organization is performing with respect to all the key drivers within the measures of success.

1-5a. In assessing customer satisfaction, there is a methodology that clearly hears the "voice of the customer". The customers' voices are quantified and documented against the key drivers. This assessment is compared to the customers' perception of the competitors' performance in each respective market for products and services. Customers' needs and expectations are also documented and included within this assessment.

1-5b. In assessing shareholder satisfaction, a methodology exists that clearly determines their satisfaction. Shareholder satisfaction is quantified and documented against the key drivers. Shareholder expectations are also documented and included within this assessment.

1-5c. The company continuously measures its Operational Excellence by benchmarking products, service and practices against the toughest competitors within and outside the industry. This information is used to identify "best practices" and establish performance benchmarks. Also, an analysis of the internal capabilities is made, with particular attention to the company's infrastructures and its work-force capability to execute, compete, and accommodate change.

1-5d. In assessing employee satisfaction, a methodology exists that clearly determines their level of commitment and the organization climate. Employee satisfaction is quantified and documented and included within these assessments.

INTERNAL CAPABILITIES

- 1-5e. This assessment examines the ability of processes such as strategic planning, planning and control, new product development and introduction, total quality and continuous improvement, supplier capabilities and performance, people, team-work, and organizational performance.
- 1-5f. This assessment includes consideration of existing and future financial resources and core competencies.

1-6 CASE FOR CHANGE

OVERVIEW: When the assessment of business performance indicates the existence of threats, opportunities and/or the necessity for improvement, a case for change is presented to all employees of the company.

- 1-6a. The case change flows from the vision and the key measures of success.
- 1-6b. The case for change is a compelling argument explaining the importance for change, what happens if change does not occur, and how the customers, shareholders, and employees will benefit from the change.
- 1-6c. The case for change is continuously communicated by the leadership team.

1-7 STRATEGY CREATION

OVERVIEW: The strategic planning process is initiated by Top Management and represents input from key people throughout the organization. Each and every strategy is documented and is linked to and supports the strategic goals.

- 1-7a. A method exists to create potential strategies based on the results of the external environment and of internal capabilities analyses, guided heavily by the principle of sustainable competitive advantage.
- 1-7b. A method exists to clarify and combine similar strategies and to prioritize and select strategies implemented.
- 1-7c. Selected strategies are tested against the company's vision, performance measures, and each other for congruence and/or conflict. These strategies represent the roadmap toward the achievement of the vision and provide adequate direction for all areas of the business.

1-8 ESTABLISHING STRATEGIC GOALS

OVERVIEW: Strategic goals are recognized as ends to which efforts are to be directed. Strategic goals require significant changes in the way in which the business operates and may take several years to implement.

- 1-8a. Strategies goals are established to overcome competitors' advantages or to extend the company's competitive position and exploit new opportunities.
- 1-8b. Strategies goals are stretch in nature, attainable, measurable, agreed upon, relevant, and time bound.

1-9 **PEOPLE AND COMMUNICATIONS**

OVERVIEW: It is recognized that the successful implementation of strategies is a direct function of people involvement and continuous communication.

- 1-9a The goals and Strategies are executed by people within the dominant structure of the organization, not by an outside team, and responsibility for implementation is clearly defined.
- 1-9b Leadership concentrates on important/non-urgent items.
- 1-9c It is recognized that education, training, and communication are management's most leveraged activities.
- 1-9d Communication flows from management throughout the organization and from the organization to management.
- 1-9e The customer/supplier relationship for every employee's process is the foundation for education and training.

1-10 **BUSINESS PLAN INTEGRATION**

OVERVIEW: All goals and strategies are integrated into the business plan which is used to develop and communicate annual financial plans that incorporate input from all operating departments of the company.

- 1-10a Goals and strategies and their respective measures of success, which were developed from the strategic planning process, are documented and integrated into the business plan.
- 1-10b All annual financial plans are congruent with the business strategies and include detailed finance information by department.
- 1-10c Resources required to support the strategies and goals are quantified and time-phased into the business plan.
- 1-10d Action plans required to implement the strategic goals and performance against these plans are reviewed quarterly and documented as part of the business planning and review process.
- 1-10e Corrective action plans are developed to keep goal achievement on track and include a mechanism to ensure that sales and operations plans are synchronized with the business plan.

1-11 **GOAL DEPLOYMENT AND IMPLEMENTATION**

OVERVIEW: A process exists whereby the goals and strategies are deployed throughout the organization to gain focus, alignment and engagement throughout the company.

- 1-11a. Barriers to change are recognized, addressed, and resolved.
- 1-11b. Objectives are systematically deployed through "sponsors" to the appropriate people in the organization, who have responsibility to contribute to the achievement of the goal(s)
- 1-11c. At every point in the organization where a strategic goal is deployed, detailed strategy and action plans are developed and documented to support the strategic goals.
- 1-11d. People at all levels who will implement the strategies and plans have a sense of ownership and are committed to success.

1-12

MEASURE RESULTS

OVERVIEW: It is recognized that strategic goals and strategies are deployed from management throughout the organization and that results are reported from the organization to management. A process exists to monitor progress against plans and to take corrective action when needed.

1-12a

Executive management focuses a sufficient amount of their time on ensuring that breakthrough strategic goals are being achieved.

1-12b.

A process which measures and reports results, including roadblocks and problems, does exist.

1-13

DIAGNOSIS AND REVIEW

OVERVIEW: Systematic reviews are done throughout the year to determine how annual goals are being achieved. These reviews include: methods employed, study of data, and comparison of plans against activities and plans against results.

1-13a.

Executive management exhibits leadership in goal deployment by selecting key goals and/ or strategies and physically walking through their implementation from the top of the organization to the bottom. They pay particular attention to employee understanding, performance to plan, root cause of the problems, and commitment.

1-14

REFLECTION

OVERVIEW: Executive management, individually or as a group, dedicates time to reassess the logic of their strategies and related goals and their achievements.

1-14a

Executive management assesses their progress against key drivers within the measures of success over time.

1-14b.

Progress, or lack of progress, stimulates executive management to reinforce, maintain, alter, or delete specific goals or strategies.

1-15

ONGOING, FORMAL GOAL SETTING AND STRATEGIC PLANNING

OVERVIEW: Goal setting and strategic planning are part of a formal process in which all executives managers have active, visible leadership roles.

1-15a.

The goals and strategies are reviewed at least quarterly (more frequently if necessary), and executive management, as a group, review progress on all major development and improvement initiatives at least monthly.

1-15b.

The review process uses a systematic method to document, analyze, and incorporate revision into the business plan.

1-16

EDUCATION AND TRAINING

OVERVIEW: Education and training is viewed as a strategic advantage and the knowledge gained is measured by successful application on the job.

- 1-16a Management views education and training as a strategic advantage, and their attitude and actions demonstrate commitment and involvement to educate and train all necessary people fully prior to the implementation of new processes and tools/ technologies.
- 1-16b. Education and training are aligned with the strategic initiatives to assure the right education and training is done and it is cost effective.
- 1-16c. The education and training program recognizes people at all levels as experts in their respective areas. The education program uses these people to communicate company goals and objectives, facilitate the required change process, and measures performance results.
- 1-16d. The education and training approach is based on the principals of process and people behavior change in an organization rather than merely on fact-transfer regarding specific tools or technologies.
- 1-16e. Employee performance evaluations are tied to successful application of the knowledge gained in the education and training sessions.
- 1-16f. The company has committed adequate resources, time, and finances to education and training.

2 PEOPLE/TEAM PROCESSES

2-1 COMMITMENT TO EXCELLENCE

OVERVIEW: All levels of management have a commitment to treating people with trust, openness and honesty. Teams are used to multiply the strength of the organization. People are empowered to take direct action, make decisions and initiate changes

- 2-1a. Top management demonstrates a strong commitment to teamwork and has a clear understanding of the concepts of group dynamics and group process.
- 2-1b. There is a clearly established policy to foster and reinforce teamwork throughout the organization.
- 2-1c. There is an “open door” policy evident throughout the different management levels within the organization.
- 2-1d. Team activities, resources requirements, and follow – up tasks are included as integral parts of the company’s business plan deployment.

2-2 CULTURE

OVERVIEW: A comprehensive culture exists to support and enhance effective people and team processes.

- 2-2a Employees are empowered to take direct action whenever they encounter a problem that is likely to impact customer satisfaction, product or service quality, cost, and/or schedule.
- 2-2b Operating decisions are made at the lowest possible level, flowing logically and expeditiously throughout the organization.
- 2-2c There are few “status” distinctions between managers and workers. There is a clear intention to minimize artificial barriers that would be detrimental to creating an open, highly empowered work environment.

- 2-2d Information – passing processes, such as team meetings and “state-of-the-business” assemblies, are a regular part of work.
- 2-2e A process is in place to help workers expand their roles to become team players; (highly skilled, knowledge resources, customer advocates, trainers, problem solvers, and decision makers). This process includes training and follow-up support.
- 2-2f A process is in place to help supervisors, managers, and technical support professionals modify and expand their roles to become coaches, facilitators, customer advocates, barrier busters, motivators, and leaders. This process includes training and follow-up support.
- 2-2g Major achievements stemming from the continuous improvement and empowerment efforts are formally recognized and rewarded.
- 2-2h Major improvements and lessons learned are documented and integrated into daily management processes and future organization development plans.

2-3 TRUST

OVERVIEW: Openness, honesty and constructive feedback are highly valued and demonstrated organizational traits. All employees are treated consistently and rewarded based on contribution to the business goal, regardless of function and/or job level.

- 2-3a Continuously improving communication between management and workers is emphasized and practiced as a routine task.
- 2-3b The information flow is adequate and timely enough for people at all levels to understand the current performance of the business (e.g., customers, competition, strategies, profitability) and effectively utilize operational data (e.g., quality, service level, schedule, etc.) for problem identification, resolution, and improvement recommendations.
- 2-3c Management and employees regularly provide customers/supplies feedback and setup opportunities for direct, face-to-face meeting between team members and customers/supplies. These communication linkages are regularly used to identify customer needs, leading to process product improvements.
- 2-3d A mechanism exists for manager and peer feedback to occur on a routine basis. Managers also receive regular feedback from the people they manage.
- 2-3e A performance-management system has been established to provide employee feedback and consistency in salary compensation based on key performance indicators that are directly linked to the company’s business plan, strategies, and goals, and to the performance of business processes.

2-4 TEAMWORK

OVERVIEW: Clearly identifiable teams are utilized as the primary means to direct, organize and perform the work, as opposed to individual job functions or independent work stations.

- 2-4a There is a team management structure which clearly defines roles, responsibilities, and functionality of the different types of teams:

- Lead teams (*management teams*) include top and middle managers whose main responsibility is to provide clear direction, focus, and follow-up to inter –functional project team activities that are directly linked to corporate strategies and goals.
- Project teams (*inter-functional teams*) include technical and professional personnel technical and professional personnel who have been specifically selected by management teams for their expertise on the subject matter at hand. This team’s main responsibility is to work on specifically assigned inter functional projects that are directly linked to corporate strategies and goals.
- *Process teams* are mainly cross-functional teams that support and operate the processes of the business. They concentrate their effort on main processes that cross the entire business, shortening the gap between customer and suppliers, so that information, goods, and services flow quickly throughout the supply chain. Process teams work to improve the performance of the whole process, as opposed to the optimization of departmental functional performance

- 2-4b All team members, managers, supervisors, and technical and support people have been formally introduced to the concepts of high performance works teams through company education programs.
- 2-4c The roles/jobs have been formally structured to support the work team approach.
- 2-4d. Teams have clear direction and complete understanding of their mission, scopes, responsibilities, and operating guidelines.
- 2-4e. Teams meet on a regular-scheduled basis and/ or on an as-needed basis to solve problems and explore opportunities in their respective areas of responsibility.
- 2-4f. Teams and the function they perform are almost entirely self-contained and managed by the group itself. Group members rely on one another for cross training, problem solving, handling, of administrative duties, and mutual support.
- 2-4g Teams use a structured and efficient problem-solving methodology to analyze, improve and control the work flow and processes in order to improve the effectiveness of the operation.
- 2-4h Teams have a defined process for gaining direct feedback from both external and internal customers.
- 2-4i The requirements of customers, external and internal are visibly integrated in the work area
- 2-4j Teams are directly involved in establishing quantitative and qualitative measurements to track the operational effectiveness of the group. This information provides feedback to the teams relating to their overall performance.

2-5 EMPLOYMENT CONTINUITY AND DEVELOPMENT

OVERVIEW: Employment continuity is important to the company, as long as the employee exceeds the minimum acceptable job requirements, and the level of business makes it viable.

- 2-5a The value of employment continuity is clearly articulated and widely communicated throughout the organization.
- 2-5b. Effective employment planning is in place to help reduce the negative effects of rapid change in demand and /or growth and to achieve employment continuity.
- 2-5c There is a clearly defined process for employee selection, induction, and placement, support by an employee development and career planning program.
- 2-5d A mechanism exists to re-deploy throughout the organization based on their skills and capabilities and the organizational needs.
- 2-5e There is a continuous performance appraisal program based on accomplishments (results-oriented) which simultaneously considers feedback from managers, employees, and other team members.

2-6 EDUCATION AND TRAINING

OVERVIEW: An active education and training program focused on business issues, customer issues and operational improvements is in place for all company personnel. Its objectives include enhancing people's skills, increasing process flexibility, sharing tools/technology understanding, and meeting future needs. Education and training are viewed as a strategic advantage, and the knowledge gained is measured by its successful application to the job.

- 2-6a Management views education and training as a strategic advantage, and their attitude and actions demonstrate commitment and involvement to educate and train all necessary people fully prior to implementation of processes and tools/technologies.
- 2-6b Education and training are aligned with the strategic initiatives to assure the right education and training is done and that it is cost effective.
- 2-6c Education is a participative process flowing in two directions (top to bottom and bottom to top) of the organization.
- 2-6d The education and training program recognizes people at all levels as experts in their respective areas. The education program uses these people to communicate company goals and objectives, facilitate the required change process, and measure performance results.
- 2-6e The education and training approach is based on the principals of process and behavior change in an organization rather than merely on fact-transfer regarding specific tools or technologies.
- 2-6f All education and training sessions clearly define the skills needed for each job, set the expectation that behavior will change, provide a process to assure that those skills are acquired, and hold supervisors / leaders accountable for administering the process.
- 2-6g The supervisor/ leaders and employee performance evaluation are tied to successful application of the knowledge gained in the education and training session.
- 2-6h The company has committed adequate resources, time, and finances to education and training.
- 2-6i An ongoing education and training program is used to refine and improve the use of business tools such as team-based technologies, integrated business planning process, software, etc.
- 2-6j At least annually, the company education and training schedule is updated and published. This education includes sessions covering company policies/ procedures, business processes, hardware/software, skill improvement, safety, health, environment, etc.
- 2-6k Areas of people improvement needs are continuously assessed.

- 2-6l Company personnel records are updated upon completion of education and training event.
- 2-6m A reference library containing published materials, education and videos, computer aided instruction disks, reference manuals, video support materials etc. is in place to assist people in their skill development. Policies and procedures are implemented to ensure availability and maintenance of library materials.

2-7 WORK DESIGN

OVERVIEW: Jobs are designed to reinforce the company goal of a team-based, empowered workforce.

- 2-7a The organization structure is designed to meet internal and external customer needs and to create flexibility in the decision-making process.
- 2-7b Skill training is formalized and managed to create the desired level of flexibility.
- 2-7c Performance-review sessions are conducted periodically to provide ongoing feedback to teams and individuals.
- 2-7d Behaviors and results that support the business strategy are recognized immediately and rewarded in order to reinforce teams and individual future performance.

2-8 CONGRUENCE

OVERVIEW: People policies, organizational development, and education and training are consistent with the company vision, mission, and business strategy.

- 2-8a Everyone in the organization can state the vision, mission, and main business strategy of the company and knows who are the key customers, key competitors, and key suppliers. They can also describe what differentiates the product/service they build/support from others in the market-place.
- 2-8b The performance-management factors for teams and individuals are reviewed and updated to reflect changes in the business objectives and the work process.
- 2-8c Employee satisfaction and organizational climate measures are taken and monitored periodically. Attributes such as employee attitude, absenteeism, and turnover are measured regularly. Baseline numbers have been established, and positive trends are evident.
- 2-8d The company has the means and the ability to attract, select, motivate, and reward the type of people it needs.

3 TOTAL QUALITY AND CONTINUOUS IMPROVEMENT PROCESSES

3-1 TOP MANAGEMENT LEADERSHIP FOR QUALITY AND CONTINUOUS IMPROVEMENT

OVERVIEW: There is a focus on meeting or exceeding both external or internal customer expectations through Total Quality/Continuous Improvement initiatives in reducing lead times, improving the quality of both products and services, and in reducing costs. There is a commitment to the use of Total Quality/Continuous Improvement tools and techniques in all areas of the business. Employee development and employee continuity are stated objectives.

- 3-1a Top management not only understands Total Quality/Continuous Improvement concepts, but also uses these tools and techniques as part of the management process.
- 3-1b Top management is in routine contact with customers and, suppliers, and employees.
- 3-1c Strategies and actions at all levels of management exhibit a belief in Total Quality Continuous Improvement.
- 3-1d Resources such as time, money, etc. are provided throughout the organization toward the Improvement of quality and innovation.
- 3-1e. Employees can articulate their company's strategic goals and focus their improvement activities to support them.
- 3-1f All employees are encouraged to contribute to improvement in processes and systems.
- 3-1g Management monitors the extent to which Total Quality/ Continuous Improvement tools and techniques are being utilized and routinely removes barriers to performance, innovation, and quality.

3-2 FOCUS ON CUSTOMER

OVERVIEW: A variety of effective techniques is in active use throughout all areas of the business to ensure that both internal and external customer expectations are identified, prioritized and either met or exceeded.

- 3-2a Strategic market segments are clearly identified and known. There is a clear and written description of the value chain for each segment. The position of the company versus its competitor is formally documented and monitored.
- 3-2b For all internal processes, the process owner, suppliers to the process, and customers of the process have been identified.
- 3-2c Mechanisms for developing both external and internal customer needs and expectations are regularly used.
- 3-2d Management ensures that all employees are aware of the customer needs and expectation. Goals have been established, and customer satisfaction is monitored and reported.
- 3-2e There is easy access by customers to information, and problem resolution is assured through customer-contact employees who have sufficient authority and who are empowered to resolve customer issues.
- 3-2f Customer feedback system are continuously evaluated and improved. Changes in customer patterns are monitored and evaluated as part of this process.

3-3 CUSTOMER PARTNERSHIP

OVERVIEW: Strong "partnership" relationships that are mutually beneficial are being established with key customers.

- 3-3a Marketing and sales view Total Quality/Continuous Improvement as a competitive weapon in the marketplace.
- 3-3b Long-term, mutually beneficial relationships with customers are being pursued to facilitate improvements in quality, cost, and overall customer satisfaction.

- 3-3c Direct communication between the company's operating departments and customer's operating departments have been established to simplify processes and to improve responsiveness.
- 3-3d The customer-order fulfillment cycle time is continuously being reduced.
- 3-3e Product replenishment by kanban is being used where applicable.
- 3-3f Total Quality/ Continuous Improvement initiatives are encouraged throughout the customer base. Information is freely shared. Goals are agreed upon. Cost saving are shared.

3-4 CONTINUOUS ELIMINATION OF WASTE

OVERVIEW: There is demonstrated discontent with the status quo, manifested by a company-wide commitment to the continuous and relentless reduction and elimination of waste. Waste is understood to be any activity that does not add value to the customer. A formal program is used to expose, prioritize and stimulate the reduction or elimination of these non-value added activities.

- 3-4a A formal, visible, and continuous process is in place to reduce changeover times, inspection, lead time, lot sizes, redundancy, safety stocks, queues, and all other types of no-value added activities. Employees at all levels and in all areas can articulate the essence of this process and are contributing ideas for, and are participating in, waste elimination initiatives. Goals have been set. Results are documented and publicized.
- 3-4b The concept that quality is "built in" not "inspected in" has become a way of life, and separate inspection activities are being reduced or eliminated. Employees are empowered to stop production rather than pass on a known defect.
- 3-4c A formal and active program exists to reduce scrap, rework, and shrinkage, and to increase yield. Goals have been set. Results are documented and publicized.
- 3-4d When appropriate, a Total Productive Maintenance (TPM) process has been implemented. Goals have been set. Results are being documented and publicized.
- 3-4e Engineering changes are analyzed using Total Quality/Continuous Improvement techniques to reduce their number and the associated costs.
- 3-4g Information is available to operations people in a timely manner. A goal exists to simplify, minimize, or eliminate the number of transaction and reports.

3-5 ROUTINE USE OF TOTAL QUALITY/ CONTINUOUS IMPROVEMENT TOOLS

OVERVIEW: Routine use of Total Quality/Continuous Improvement tools has become a way of life in virtually all areas of the company.

- 3-5a Each functional area has established a set of key internal and /or external customer satisfaction measures, tracks performance, and seeks the root cause of variations.
- 3-5b All members of the organization make decisions based on data.
- 3-5c Cause-and-effect diagram are used routinely throughout the organization.
- 3-5d Key problems under attack are shown in visible displays containing information about the team members, root cause and variation analysis, actions, and results.
- 3-5e Control charts are used where appropriate but are not the only Total Quality/Continuous Improvement tools in evidence.

- 3-5f Flow charts are used to document key processes in manufacturing and other areas.
- 3-5g Standardized work practices have been implemented to eliminate process variation. This has become a common practice in all areas of the company.
- 3-5h Multiple levels of Pareto charts are used to identify the roots cause where appropriate.
- 3-5i Inspection in all areas is viewed as waste. Inspection has been reduced or eliminated as process control has being achieved.

3-6 RESOURCES AND FACILITIES-FLEXIBILITY, COST, QUALITY

OVERVIEW: Resources and facilities required to meet the needs of customers profitably are continuously being made more flexible, cost effective, and capable of producing higher quality.

- 3-6a Plant and office layouts are being continuous improved to simplify and reduce the physical transport of material or sharing of information (e.g., distance and handling are minimized; communications and visibility are maximized)
- 3-6b Equipment is selected based on its contribution to improved quality, fast changeover, minimum lot sizes, flexibility, and overall throughput time. A policy exists to justify equipment based on these factors in addition to traditional selection criteria.
- 3-6c Authorization for capital spending places high value on the company's drive to improve quality and increase the velocity of product or information from suppliers through the plant and out to the customer.
- 3-6d Tools and fixtures are stored primarily at the point of use, where practical.
- 3-6f Setup and changeover times are being systematically and continuously reduced, thereby enabling manufacturing lot sizes to be economically reduced.
- 3-6g Unplanned machine downtime is documented and being reduced.
- 3-6h Where appropriate, material or information is stored primarily at the point of use and /or at the point of manufacture rather than in a central location.
- 3-6i Good housekeeping (orderliness) is being pursued as a high-priority item by ball personnel.

3-7 VELOCITY

OVERVIEW: The velocity and linearity of workflow is continuously being measured, reported and improved.

- 3-7a A stated company objective is to emphasize improvement in velocity and eliminate waste in all processes, including but not limited to, accounting, order entry, design, procurement, manufacturing, and distribution.
- 3-7b Non-manufacturing processes such as order entry, new product development, accounts receivable, and accounts payable are being simplified to improve velocity in these areas.
- 3-7c Process improvements are being made such that routings are being simplified, and bills of material are being flattened, or phantom codes are being used to improve velocity.
- 3-7d Production lines are being redesigned to enable mixed-model scheduling with a minimum of material handling.
- 3-7e Functional plant layouts are being replaced with cellular manufacturing where appropriate.
- 3-7f Lead times in areas are measured and reported, and are being reduced.

3-7g The time required to close the financial books each month is measured and reported, and is being reduced.

3-8 ACCOUNTING SIMPLIFICATION

OVERVIEW: Accounting procedures and paperwork are being simplified, eliminating non-value added activities, while at the same time providing the ability to generate information sufficiently accurate to use in decision making and satisfy audit requirements for the financial control of operations.

3-8a The use of work orders for the detail tracking of labor and material has been either eliminated or is used only where necessary.

3-8b Labor collection procedures are being simplified (e.g., groupings of direct and indirect labor operations, labor collection by exception, etc).

3-8c Cost drivers in the business are understood and managed by senior management.

3-8d The use of performance measurements has shifted from control to improvement. These measurements that inhibit versus encourage desired results (labor and machine efficiency, utilization, purchase-price variance, number of rejects by employee, etc.) either have been eliminated or their use has been minimized.

3-9 TEAMWORK

OVERVIEW: Clearly identifiable teams are utilized as the primary means to direct, organize, and perform the work, as opposed to individual job functions

3-9a All team members, managers, supervisions, and technical and support people have been formally introduced to the concepts of high-performance work teams through education.

3-9b The roles/jobs have been formally structured to support the work team approach.

3-9c Each team has developed a clearly defined charter/mission and operating guidelines.

3-9d Each team meets regularly and frequently to solve problems and explore opportunities in its work area.

3-9e The work teams and the functions they perform are almost entirely self-contained and managed by the group itself. Group members rely on one another for cross training, problem solving, the handling of administrative duties, and mutual support.

3-9f A structured method is used by work teams to examine workflow and processes to improve the effectiveness of the operation.

3-9g Each work group has a defined process for gaining direct feedback from both external and internal customers.

3-9h The requirements of customers, external and internal, are visible in the work area.

3-9i Work teams are directly involved in establishing quantitative and qualitative measurements to track the operational effectiveness of the group. This information provides feedback to the teams relating to their overall performance.

3-9j Quality problems and other opportunities for waste elimination are addressed by a team of the most appropriate people regardless of their reporting level in the organization.

3-10 **EDUCATION AND TRAINING**

OVERVIEW: An active education and training program focused on business issues, customer issues and operational improvements is in place for all company personnel. Its objectives include enhancing people's skills, increasing process flexibility, sharing tools/technology understanding, and meeting future needs. Education and training are viewed as a strategic advantage, and the knowledge gained is measured by its successful application to the job.

- 3-10a Management views education and training as a strategic advantage, and their attitude and actions demonstrate commitment and involvement to educate and train all necessary people fully prior to implementation of new processes and tools/technologies.
- 3-10b Education and training are aligned with the strategic initiatives to assure the right education and training is done and that it is cost effective.
- 3-10c Education is a participative process flowing in two directions (top to bottom and bottom to top) of the organization.
- 3-10d The education and training program recognizes people at all levels as experts in their respective areas. The education program uses these people to communicate company goals and objectives, facilitate the required change processes, and measure performance results.
- 3-10e The education and training approach is based on the principles of process and behavior change in an organization rather than merely on face-transfer regarding specific tools or technologies.
- 3-10f All education and training sessions clearly define the skills needed for each job, set the expectation that behavior will change, provide a process to assure that those skills are acquired and hold supervisors/leaders accountable for administering the process.
- 3-10g The supervisor/leaders and employee performance evaluations are tied to the successful application of the knowledge gained in the education and training sessions.
- 3-10h The company has committed adequate resources, time, and finances to education and training.
- 3-10i An ongoing education and training program is used to refine and improve the use of business tools such as team-based technologies, integrated business planning processes, software, etc.
- 3-10j Periodically, the company education and training schedule is updated and published. This education schedule includes sessions covering company policies/procedures, business processes, hardware/software, skill improvement, safety, health, environment, etc.
- 3-10k Areas of people improvement needs are continuously assesses.
- 3-10l Company personnel records are updated upon completion of education and training events.
- 3-10m A reference library containing published materials, education videos, computer aided instruction disks, reference manuals, video support materials, etc. is in place to assist people in their skill development. Policies and procedures are implemented to ensure availability and maintenance of library materials.

3-11 **WORK DESIGN**

OVERVIEW: Jobs are designed to reinforce the company goal of a team-based, empowered workforce. Work is standardized to ensure consistency of all business processes

- 3-11a Skill training is formalized and managed to create the desired level of flexibility.

- 3-11b A performance management system is in place to provide ongoing feedback to teams and individuals
- 3-11c A compensation strategy exists that re-organizes, rewards, and reinforces behaviors and results that support the business strategy.

3-12 EMPLOYMENT CONTINUITY

Employment continuity is important to the company, as long as the employee exceeds the minimum acceptable job requirements, and the level of business makes it viable

- 3-12a The goal of employment continuity is clearly articulated and widely communicated throughout the organization.
- 3-12b Effective employment planning is in place to help reduce the negative effects of rapid change in demand and/or growth and achieve the goal of employment continuity.

3-13 COMPANY PERFORMANCE - QUALITY, DELIVERY, COST

OVERVIEW: Company performance measurements emphasize quality, delivery and cost. Performance measures are communicated to all through visible displays that show progress and point the way to improvement.

- 3-13a Valid, timely information is collected and analyzed on all products and services for external customers and significant and targeted internal customers and supplies.
- 3-13b A data-and-information collection process exists measuring all aspects of the organization's processes, customers, and supplies. The data is focused and comprehensive. Any data and information collected has a specific purpose known by the data collectors and generators.
- 3-13c Information collected is timely, useful, accurate, and complete. Benchmark data exists for comparative purposes.
- 3-13d Routine, periodic checks are made to ensure the validity of data and information.
- 3-13e Appropriate, advanced technologies and tools are used in all data-and-information collection processes
- 3-13f Objectives have been established for production defects. Performance is measured, and goals are been achieved.
- 3-13g Quality measure includes parts per million (PPM) defect reporting where appropriate and cost-of-quality reporting.
- 3-13h Objectives have been established for production and supplier defects. Performance is measured and goals are been achieved.
- 3-13i Objectives have been set for cost of quality. Performance is measured, and goals are being achieved.
- 3-13j Delivery measures include linearity of output and on time deliveries.
- 3-13k The following measures have been eliminated or deemphasized:
- Labor efficiency(or derivations)
 - Machine utilization(or derivations)
 - Defects per person
 - Purchased part price variance

- Manufacturing overhead rate
- 3-13l Operating results are posted in a timely manner and made visible to company employees.
- 3-13m Key measures are usually shown with additional information that points the way to improvements (e.g., run charts plus multilevel Pareto charts).
- 3-13n Cost measures include inventory days on hand (or turns) and total asset turnover.
- 3-13o Manufacturing cost-of-quality report are presented as a routine part of management reporting. While it is difficult to obtain all costs of quality, at least the tangible numbers for appraisal, failure, and prevention are reported.
- 3-13p The concept of cost of quality is understood in non-manufacturing areas and reported when practical.

3-14 SETTING AND ATTAINING BREAKTHROUGH GOALS

OVERVIEW: Short- and long-term breakthrough goals that cause the organization to re-engineer or replace current processes are established, regularly reviewed and monitored. These breakthrough goals are targeted on improvements in total cost, cycle time and customer requirements.

- 3-14a Operational plans for achieving improved quality, improved response time, and reduced total cost goals carry clear priorities and accountabilities.
- 3-14b A formal process for establishing these goals and plans exists and is followed.
- 3-14c Both intuitive and quantitative information are used to identify areas of improvement. Benchmarking, customer requirements, process capability, and supplier requirements are regularly employed in this process.
- 3-14d Customers' expressed, expect, and exciting need, gaps, and issues are integrated into the planning process for both products and processes.
- 3-14e Benchmark data establishing best-in-class practices are used to establish improvement planning for quality initiatives.
- 3-14f All levels of the organization participate in the improvement planning process.
- 3-14g Key requirements in technology, training and education, and supplier quality are regularly assessed and factored into the plans. Future targets and current status are part of the factoring and prioritizing process.
- 3-14h An evaluation of the integrated business planning process is periodically conducted and targeted for improvement and corrective action.

4 PLANNING AND CONTROL PROCESSES

4-1 PRODUCTION PLANNING AND CONTROL

OVERVIEW: There is a planning process supported by a control process that creates, maintains, and synchronizes detailed production schedules. These synchronized schedules communicate valid manufacturing priorities via computer screens, dispatch lists and schedule boards.

- 4-1a Production is accountable to meet scheduled operation due dates, daily run rates, kanban replenishments, etc. in a timely manner.
- 4-1b Production understands the product, manufacturing process, and priority scheduling mechanism being used.
- 4-1c Process instructions are rapidly available for the various operations needed to build the product.
- 4-1d A formal job description exists that details the responsibility and performance measurement for the production function.
- 4-1e Production works to a formal schedule that is communicated through various methods.
- 4-1f The informal priority system, i.e., the hot list, has been eliminated. Emergency phone calls, expedite meetings, hot stickers, etc., are not honored in production.
- 4-1g The production floor is orderly, clean, and lacks clutter. Production flows in a uniform manner as defined in production policies and procedures.
- 4-1h Production personnel have been educated and trained in using the output from the planning and control system. Regularly scheduled training classes are held to ensure cross-training of production personnel in multiple skills and work areas.
- 4-1i Production is responsible for feeding back all potential production problems to the master scheduler if these problems affect the company's ability to meet the master scheduler.
- 4-1j The planning and control process includes a capability to display production schedules on a daily basis. These schedules are shown on the computer screens, reports, boards, graphs, etc.
- 4-1k The production schedules are expressed in weekly, daily, or smaller time periods. These schedules may work order- or rate-based and are re-planned daily (maximum weekly)
- 4-1l The planning and control process includes a capability to modify or override any system-created start or completion date.
- 4-1m The planning and control process includes the capability to report work status by operation or kanban replenishment cycle.
- 4-1n An anticipated delay reporting process is used to inform need-to-know functions of lateness of work and correction action being taken.
- 4-1o Regularly (daily or weekly) production meetings are held to ensure that every one in production understand the work priorities. These formal meetings are conducted using agendas and common schedules (single set of number)
- 4-1p Point-of-usage inventory in production is managed using formal inventory management principle. Inventory record accuracy measurements and cycle counting procedures are used in production much like they are used in the stockroom.

4-2 PRODUCTION PLAN PERFORMANCE

Accountability for production plan performance has been established, and the goals and method of measurement agreed upon. All goals, metrics, and performance results are communicated to appropriate company function.

4-3 MASTER SCHEDULE PERFORMANCE

Accountability for master schedule performance has been established, and the goals and method of measurement agreed upon. All goals, metrics, and performance results are communicated to appropriate company function.

4-4 **EDUCATION AND TRAINING**

OVERVIEW: An active education and training program focused on business issues, customer issues and operational improvements is in place for all company personnel. Its objectives include enhancing people's skills, increasing process flexibility, sharing tools/technology understanding, and meeting future needs. Education and training are viewed as a strategic advantage, and the knowledge gained is measured by its successful application to the job.

- 4-4a Management views education and training as a strategic advantage, and their attitude and actions demonstrate commitment and involvement to educate and train all necessary people fully prior to implementation of new processes and tool/technologies.
- 4-4b Education and training are aligned with the strategic initiatives to assure the right education and training is done and that it is cost effective.
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- 4-4e The education and training approach is based on the principals of process and behavior change in an organization rather than merely on fact-transfer regarding specific tools or technologies.
- 4-4f All education and training sessions clearly define the skills needed for each job, set the expectation that behavior will change, provide a process to assure that those skills are acquired, and hold supervisors/leaders accountable for administering the process.
- 4-4g The supervisors/leaders and employee performance evaluation are tied to successful application of the knowledge gained in the education and training sessions to the job.
- 4-4h The company has committed adequate resources, time, and finance to education and training.
- 4-4i An ongoing education and training program is used to refine and improve the use of business tools such as tem-based technologies, integrated business planning processes, software, etc.
- 4-4j Periodically, the company education and training schedule includes sessions covering company policies/procedures, hardware/software, skill improvement, safety, health, environment, etc.
- 4-4k Areas of people improvement needs are continuously assessed.
- 4-4l Company personnel records are updated upon completion of education and training events.
- 4-4m A reference library containing published materials, education videos, computer aided instruction disks, reference manuals, video support materials, etc. is in place to assist people in their skill development. Policies and procedures are implemented to ensure availability and maintenance of library materials.

4-5 **COMMITMENT TO EXCELLENCE**

There is a commitment by Top Management and throughout the company to use effective planning and control processes and tools.

APPENDIX B

A. Eight Characteristics of Effective Change

1. Establishing a sense of urgency
2. Creating a guiding coalition
3. Developing a vision and strategy
4. Communicating the change and vision
5. Empowering a broad-based vision
6. Generating short-term wins
7. Consolidating gains and producing more change
8. Anchoring new approaches.

Source: Martin (2008).

B. Ten Benchmarking Objectives

1. Determine benchmarking goals and objectives
2. Form a cross-functional diverse team
3. Create a project plan
4. Develop data collection strategy
5. Collect data in a standardized manner
6. Analyze data to understand best-in-class manner
7. Develop plans to change process
8. Communicate the proposed process changes
9. Change the process
10. Continually review and expand the benchmarking methodology

Source: Martin (2008)

C. Five Keys to Achieving Service and Operational Excellence

1. Create and maintain a great culture
2. Select and retain great employees
3. Commit to service excellence
4. Continuously develop great leaders
5. Hardwire success through systems of accountability

Source: Stubblefield (2005)

D. Pillars of Operational Excellence

1. People
2. Service
3. Quality
4. Financial
5. Growth

Source: Stubblefield (2005)

E. Operational Excellence Foundations

1. Customer-driven
2. People-based
3. Process and system focused
4. Scientific method
5. Purposeful

Source: Article retrieved from www.operationalexcellence.ca

F. Principles of Operational Excellence

1. Create lean value streams – apply lean guidelines
2. Make lean value streams flow – paper to performance
3. Make lean value stream flow visual – see end to end flow
4. Create standard work for the lean value stream – everything is normal
5. Make abnormal value stream flow visual – flow is starting to break down
6. Create standard work for the abnormal lean value stream – self-healing value stream
7. Teach employees to maintain and improve the flow to customers – self improving value to the Customer
8. Free management and executives to work on offence or growing the business.

Source: Duggan K.J.

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