IMPLEMENTATION OF BUSINESS PROCESS REENGINEERING AND BENCHMARKING AT KENYA PORTS AUTHORITY

BY

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DECLARATION

The work contained in this project is my original work and has not been previously submitted for a degree in any other university.

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This project has been submitted for examinations with our approval as the university supervisors.

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DEDICATION

Special dedication to God almighty and to Jesus Christ the Bishop of my soul, for the ever replenishing inner strength.

To my wife, Hoglah, our children, David, Caleb and Faith for their patience.

To God be all the glory.

ABSTRACT

Studies in regard to business process improvement on port industry had been rare in the Kenyan environment. The purpose of this research was to present an assessment of business process reengineering (BPR) and benchmarking implementation at Kenya Ports Authority (KPA), their impact on port performance and challenges faced.

The research used both primary and secondary data drawn from interviews with five senior managers representing five KPA divisions and performance data from KPA's bulletins of statistics. Content analysis and structural break analysis was performed on primary and secondary data on port performance respectively to establish the presence and impact of the improvement approaches.

The findings of the study showed that BPR and benchmarking were undertaken at the port, even though the correctness of their implementation was unconvincing. Structural break had occurred on ships waiting time over the 1995 - 2009 period and overall port throughput showed continuous improvement rather than breakthrough. The main challenges to improvement efforts at KPA were political interference, wrong attitude to change and frequent changes in top management, which most likely led to the watered down implementation of the improvement approaches and consequently, the full impact of BPR and benchmarking projects on port throughput was not realised.

The study recommended that business process improvement initiatives at KPA need to be divorced from external interference if success in the magnitude intended was to be achieved. This research provided a window to all stakeholders of Mombasa port on how to assess internal improvement efforts by KPA and the associated challenges that affected the big picture of port performance improvement and overall port throughput.

TABLE OF CONTENTS

DECLARATION I

ACKNOWLEDGEMENTS II

DEDICATION III

ABSTRACT IV

TABLE OF CONTENTS V

LIST OF ABBREVIATIONS AND SYMBOLS VII

LIST OF TABLES IX

LIST OF FIGURES X

LIST OF EQUATIONS XI

CHAPTER ONE: INTRODUCTION 1

1.1 Background 1

1.1.1 Benchmarking 2

1.1.2 Business Process Reengineering 3

1.1.3 Kenya Ports Authority 3

1.2 Statement of the Problem 5

1.3 Objective of the Study 8

1.4 Importance of the Study 8

CHAPTER TWO: LITERATURE REVIEW 10

2.1 Conceptualization of Process Improvement Approaches 10

2.2 Benchmarking 12

2.2.1 Types of Benchmarking 13

2.2.2 Categories of Benchmarking 16

2.2.3 Benchmarking Challenges 16

2.3 Business Process Reengineering 18

2.3.1 Variants of Business Process Reengineering Approaches 21

2.3.2 Process Redesign 21

2.3.3 Process Innovation (New Process Design) 22

2.3.4 Business Process Reengineering 22

2.3.5 Information Technology and Business Process Reengineering 23

2.3.6 Business Process Reengineering Implementation Challenges 24

CHAPTER THREE: RESEARCH METHODOLOGY 27

3.1 Research Design 27

3.2 Data Collection Techniques and Procedures 27
3.3 Data Analysis and Presentation 28
CHAPTER FOUR: DATA ANALYSIS, RESULTS AND DISCUSSION 30
4.1 Introduction 30
4.2 Respondents Profiles 30
4.3 Business Process Re-engineering Approach 31
4.4 Benchmarking Approach 33
4.5 Challenges Facing Implementation of Business Process Improvement 34
4.6 Port Performance Data and Analysis 36
4.6.1 Port Throughput 36
4.6.2 Number of Ships Worked 37
4.7.1 Structural Break Analysis 38
4.7.2 Ships Waiting Time 39
CHAPTER FIVE: SUMMARY, CONCLUSION AND RECOMMENDATIONS ... 44
5.1 Summary of Findings 44
5.2 Conclusions 45
5.3 Recommendations 48
5.4 Limitations of the Study 49
5.5 Suggestions for Future Research 50
REFERENCES 52
APPENDICES 59
Appendix I: Introductory Letter 59
Appendix II: Kenya Ports Authority Organisational Chart 60
Appendix III: List of Kenya Ports Authority Division 61
Appendix IV: Interview Guide 62
Appendix V: Secondary Data Collection Form 66
Appendix VI: Net Average Waiting Days per Ship 67

LIST OF ABBREVIATIONS AND SYMBOLS

BPI	Business Process Improvement
BPR	Business Process Reengineering
CI	Continuous Improvement
df	Degree of freedom
DWT	Deadweight Tonne
EABL	East African Breweries Limited
F	F-statistic
ICT	Information Communication Technology
ISO	International Standards Organisation
ISM	International Safety Management
ISPS	International Ship and Port Facility Security
IT	Information Technology
JIT	Just-In-Time
k	Number of parameters being estimated
KPA	Kenya Ports Authority
KWATOS	Kilindini Waterfront Terminal Operating System
MBNQA	Malcolm Baldrige National Quality Award
n	Number of observations
PMAESA	Port Management Association of Eastern and Southern Africa
R^2	Coefficient of determination
RSS	Residual Sum of Squares
RSS_c	Residual Sum of Squares the Whole period
RSS_R	Restricted Residual Sum of Squares
RSS_{UR}	Unrestricted Residual Sum of Squares

RVR	Rift Valley Railways
SAP	Systems Applications and Products
t	t-statistic
TEUs	Twenty-foot Equivalent Units
TQM	Total Quality Management
UNCTAD	United Nation Conference on Trade and Development
USA	United States of America
VSM	Value Stream Mapping
X_t	Number of ships waiting in time t
$\hat{Y}_t$	Estimate of waiting days in time t
σ^2	Variance
$\hat{\sigma}^2$	Variance estimate

LIST OF TABLES

Table 1: Period worked with KPA 30

Table 2: Period in the current job position 30

Table 3: Number of employees per division 31

Table 4: Factors hindering improvement efforts 34

Table 5: Port throughput 36

Table 6: Number of ships worked 37

Table 7: Ships waiting time 39

Table 8: Net average waiting days per ship 67

LIST OF FIGURES

Figure 1: Port Throughput 36

Figure 2: Ships worked 37

Figure 3: Ships waiting time (1995 – 2009) 40

Figure 4: Ships waiting time (1995 -2001) 41

Figure 5: Ship waiting time (2002 - 2009) 41

Figure 6: KPA organisation chart 60

Figure 7: Net average waiting days per ship 67

LIST OF EQUATIONS

Equation 1: Estimate of waiting days between 1995-2009 40

Equation 2: Estimate of ship waiting days (1995-2001) 40

Equation 3: Estimate of ships waiting days (2002-2009) 41

Equation 4: F-computed value against F-critical value 42

Equation 5: Error variance estimate for sub-period one 42

Equation 6: Error variance estimate for sub-period two 42

Equation 7: Two sub-periods estimates for variances against F-critical value 42

Equation 8: F-computed value for variances 43

CHAPTER ONE: INTRODUCTION

1.1 Background

Business processes have been identified by the continuous improvement and the business process re-engineering movements, as basic parts of organizations where these processes are seen as interconnected activities that can be restructured to improve quality and productivity (Kock, McQueen & Baker, 1996).

Originally coined by James Harrington in 1991, business process improvement (BPI) is used as an umbrella term to cover a range of improvement techniques, from incremental continuous improvement (CI) to radical re-engineering methodologies commonly referred to as business process reengineering (BPR) (Adesola & Baines, 2005; Povey, 1998). Those using CI believe in stepwise increments in performance while those using BPR look for dramatic results, however, Bond (1999) contended that the two approaches to improvement are not mutually exclusive routes to progress but rather complementary. For instance, an organisation with a drive to increase its cycle of continuous improvements and add an external perspective to its internal activities may take the benchmarking approach. This may be necessitated by the belief that there exist the best in industry whose practices can be copied to achieve dramatic improvement in performance.

On the other hand, while acknowledging that continuous improvement strategies are fundamentally sound and effective, Attaran and Wood (1999) argued that these strategies lack a sense of urgency and high-impact result. Jain, Chandrasekaran and Gunasekaran (2010) also contended that using information technology (IT) as the primary facilitator, quantum improvements could be achieved through rethinking and redesigning the way business processes are carried out using the BPR approach.

Alavi and Yahin (2008) observed that changes in the competitive environment have forced organizations in many industries to formulate new strategic responses that capitalize on proven management philosophies to improve performance. They listed these philosophies to include total quality management (TQM), just in time (JIT), continuous improvement, job reengineering, process reengineering, organizational restructuring, benchmarking, among others.

1.1.1 Benchmarking

Benchmarking was pioneered by Rank Xerox in late 1970s at Xerox Corporation in response to competitive pressure and loss of market share, when traditional competitor analysis was found to be inadequate. Since then benchmarking has been used as a technique to add in external transferable best practices into an organisation's inferior performing processes, thereby achieving breakthrough improvement in process performance (Elmuti & Kathawala, 1997; Zairi & Hutton, 1995). Harrington (1995) viewed this external focus as enabling a company to enjoy meaningful long term continuous improvements through working with benchmarking partners.

According to Pulat (1994) benchmarking can be considered as a re-engineering on one hand and continuous improvement technique on the other as popularised by the Malcolm Baldrige National Quality Award (MBNQA) in the USA. Thus benchmarking may be treated as either one-off event or as a continuous improvement tool by which organizations continually challenge their practices. Elmuti and Kathawala (1997) claimed that faithful usage of benchmarking strategies can achieve cost savings in the order of 30% to 40% or more.

1.1.2 Business Process Reengineering

Reengineering is not like other process improvement (PI) approaches as it focuses on what should be rather than what is (Siha & Saad, 2008). Tennant and Wu (2005) observed that BPR is one of the major techniques of change within organisations and that gains in quality, productivity, production cycle time reduction, profits and improved customer satisfaction, have been reported for those who have carried out BPR successful.

Business Process Reengineering has the potential of impacting all aspects of a business as it can transform an organisation on the verge of bankruptcy to profitability or make a company stay on top of competition (Hesson, 2007). It is claimed by Ahire and Waller (1994) that successful reengineering efforts could result in magnitude of performance improvement of 100% to 1000% or even more. However, Hesson (2007) cautions that such enviable success has the other side of total failure.

1.1.3 Kenya Ports Authority

Kenya Ports Authority (KPA) is mandated to maintain, operate, improve and regulate all scheduled seaports along the Kenya's coastline. These ports include Mombasa, Lamu, Malindi, Kilifi, Mtwapa, Kiunga, Shimoni, Funzi and Vanga. The port of Mombasa being the only one fully developed with modern equipment is also the major port in the region. The core business of KPA is to provide safe navigational aids and pilotage for vessels coming into and out of the channel, tugging ships to berths and schedule berths occupancy, mooring services (securing ships with anchors and cables), pollution control, providing loading and unloading services to ships (stevedoring), shore handling and storage services (Kenya Ports Authority, 2009).

Further, KPA provides logistics services to Kenya and its neighbouring countries of Uganda, Rwanda, Burundi, Eastern Democratic Republic of Congo, Northern Tanzania, Southern Sudan and Ethiopia. The port also offers shipping services for cargo owners to key destinations around the world, with major markets being Western Europe, Asia, Far East, the Americas and the rest of Africa. Regular feeder services are between Mombasa and Dar-es-salaam, Durban, Mogadishu, Djibouti, Salalah and Dubai (Kenya Ports Authority, 2009).

Cargo throughput at the port of Mombasa had been increasing consistently for eight years, especially the container segment from 305,000 Twenty-foot Equivalent Units (TEUs) handled in 2002 to 619,000 TEUs handled in 2009 (Kenya Ports Authority, 2009). Between 2002 and 2009 an increase of about 9 million tons in total cargo throughput had been recorded, from 10.2 million tons handled in 2002, to over 19 million tons in 2009. The consistent growth was largely attributed to efficiency gains arising from BPR and modernization of equipment (Mulewa, 2009). In 2009 alone, the throughput increased by 16.5% to 19.06 million tons, the increase being attributed to productivity resulting from automation of port operational process (Mulewa, 2010).

However, the rise in cargo volume had not been matched with the growth in infrastructure as the present container terminal was designed for 250,000 TEUs but had been receiving in excess of 600,000 TEUs. On the other hand faster cargo off-take especially by rail had been hampered by the ineffectiveness of the Rift Valley Railways (RVR) which was given a 25 year concession to operate freight services in Kenya and Uganda and passenger services in Kenya, due to financial troubles it was experiencing. This created operational and logistical challenges at the port (PMAESA, 2008; "New Investment for Rift Valley," 2010).

It was estimated that 6 billion Kenya shillings had been spent between 2002 and 2007 for the port modernization strategy. Nevertheless, KPA was still being confronted with consistent congestion problems resulting from insufficient reliable equipment for faster cargo handling, limited space for cargo placement, poor cargo off-take coupled with long procedures of cargo clearance and inefficient yard planning (Kenya Ports Authority, 2008).

To address these challenges of inefficiency, container congestion and customer dissatisfaction and transform the port of Mombasa into a world-class port, a series of initiatives were undertaken. Key of these initiatives were the comprehensive ICT system that encompasses Enterprise Resource Planning Systems, Water Front System and Community Based System–all web enabled. Others were, to fully re-equip the container terminal, plan for a second container terminal, acquire modern tugs and pilot boats, adopt a 24-hour service delivery, to acquire international safety management (ISM) and international ship and port facility security (ISPS) compliant codes, get ISO certification, dredge the port channel and widen the turning basin (Kenya Ports Authority, 2010).

1.2 Statement of the Problem

Benchmarking and BPR are two improvement approaches that fall under the generic term BPI. While benchmarking has commonly been used as a continuous improvement tool, BPR is a radical one step breakthrough improvement approach (Harrington, 1995; Hesson, 2007).

KPA publications had consistently indicated that benchmarking and BPR were taking place at the port. For instance, efficiency gains of 2008 were attributed to BPR and equipment modernization (Mulewa, 2009) and those of 2009 as arising from

automation of port operational processes. On the other hand the corporate mission statement alluded that efficiency at the port was attained through progressive benchmarking operational targets to international standards. Further, towards achieving its vision 2010, KPA had worked towards attaining the ISO 9001:2008 Quality Management System (QMS) certification awarded on 29th June 2009 which was said to have placed the port to a world class port facility (Mulewa, 2010).

Whereas marked improvement on productivity had been reported at the port of Mombasa, with container vessels turn-round time having dropped from 5.1 days in 2008 to 3.1 days in 2009 and at the same time average container dwell time declining from 12.1 days to 6.0 days during the same period (Mulewa, 2010), experts had queried whether KPA's vision to become one of the 20 most efficient ports in the world by 2010 was achievable. They contended that capacity increases alone would not necessarily boost efficiency and sustain it. Instead they wanted to see more efficient customs and internal management processes, as well as improved road and rail links ("Mombasa Efficiency", 2008).

Bagchi and Paik (2001) did argue that little had been published studying ports in developing countries and evaluating which strategies can be applied successfully. Papers on port operations such as benchmarking on port services (Cuadrado, Frasquet & Cervera, 2004), Electronic data interchange in port operations (Garstone, 1995) provided a general view on how these approaches could be used to improve efficiency and competitiveness but did not address unique port situations.

Some studies in relation to BPR and benchmarking in the service industry had been done on the Kenyan environment. As regard to breakthrough improvement, Gitagama (2008) did a case study on the relationship between BPR and organisational

performance at East African Breweries Limited (EABL) and suggested other similar studies in large diversified organisations. Other studies on BPR were those of Owino (2009) on determinants of BPR project success in Kenya a study of selected companies in Nairobi while Kaptoge (2009) studied the implementation of BPR for competitive advantage the case of Wrigley Company. Namu (2006) did a literature review that revealed that there was scarce research into benchmarking applications in the Kenyan context, more so in the service sector, while Ogollah (2006) in a research on relationship between benchmarking and performance at Barclays Bank of Kenya, suggested a pursuance of the same study in other different organisations in Kenya.

Whereas the above studies dealt with some aspect of BPR or benchmarking they were not set to capture the unique port environment on which KPA operated. Further, there seemed to be no research on both BPR and benchmarking being implemented concurrently in the same organisation, especially on the Kenyan situation. Consequently, the studies could not be used to draw conclusions on port operations for the Kenyan environment. The port industry presented a crucial and unique service industry whose process changes and challenges affected the economies of the entire region of east and central Africa.

On the other hand, a lot of activities towards improvement were suggested to be on going at the port. The question begged whether the series of initiatives underway at the port were the actual BPR and benchmarking methodologies or just capacity increases as questioned by the marine experts. Was the marked improvement on productivity reported at the port, breakthrough or just incremental? The researcher therefore, sought to determine the presence of BPR and benchmarking at the port, assess their impact to port performance and find out challenges faced.

1.3 Objective of the Study

(i) To establish the status of business process re-engineering implementation at Kenya Ports Authority.

(ii) To establish the status of benchmarking implementation at Kenya Ports Authority.

(iii) To determine whether there had been any structural change in improvement trend at Kenya Ports Authority.

(iv) To determine challenges faced in the implementation of the business process re-engineering and benchmarking approaches.

1.4 Importance of the Study

(i) **Theoretical contribution:** This study provides port management and the wider corporate world with a reconciliation of theoretical concepts of BPR and benchmarking methodologies and their practical implementation, enabling them to identify missing links and improve thereupon. Conceptually, the study will add to the body of knowledge in academic researched work on process improvements and especially on port industry.

(ii) **Practical contribution:** The port of Mombasa serves a large market cutting across several countries in the great lakes region and the horn of Africa hence its performance affects the economies of the whole region. The research gives a snap shot on the improvement efforts made by KPA and an understanding of the work processes at the port. The adoption of business process improvements strategy by KPA management is a good sign of a public organisation embracing competitive management approach that used

to be rare in government-run organisations. Successes in the implementation of such strategy will generate interest in the local environment for other public organisations to adopt similar strategies of process improvement.

CHAPTER TWO: LITERATURE REVIEW

2.1 Conceptualization of Process Improvement Approaches

Bond (1999) remarked that improvement should be a way of corporate life and that improvement can either be small incremental change also called kaizen in Japan or innovative step change commonly referred to as process re-engineering. Hindle (1997) perceived that all work is accomplished through a process that has inputs and outputs.

A process then can be defined as a sequence of value-added tasks that are linked to create a specific product or service output (Chang, 1992). In Hammer's (1991) perspective (as cited in Tinnila, 1995) business process is a set of interlinked activities that takes one or more kinds of input to create a value-added output to the customer. Hindle (1997) saw core business processes as those that contribute significantly to the attainment of key organization goals. He argued that if these core business processes can be identified and focused on and supporting processes and resources be pulled to them, then organizations can streamline operations and achieve costs cuts, waste reduction, products and services improvement.

Using the big umbrella concept of BPI, Lee and Chuah (2001) identified three aspects of process improvement strategies commonly adopted by organizations as continuous process improvement (CPI), BPR, and business process benchmarking. However, Paixao and Marlow (2003) writing on how to increase port competitiveness and agility suggested a host of improvement approaches that could be used in port operations environment. They represented them as lean production, JIT, BPR, TQM, integrated with information technology (IT) or information systems (IS) if implemented in coordinated phases as suitable methodologies.

Paixao and Marlow (2003) went on to propose a five-phase implementation for the whole port improvement approach with BPR consisting the first phase, second and third phases that engage JIT preparation and running JIT operations respectively, combined with ISO 9001/2000 and ISO 14000 incorporated with value stream mapping (VSM) in the phases. Phase four employing lean production techniques and phase five that brings the port to the required agility. Paixao and Marlow, however, did not mention benchmarking as among their proposed methodologies applied in port industry.

Some of the suggested methodologies are interrelated as portrayed in the literature. For example Singh, Garg, Sharma, and Grewal (2010) stated that VSM has been used as lean technique while Moayed and Shell (2009) saw lean as an extension of JIT, and Moriones, Pintado and Cerio (2008) contended that JIT needs TQM to succeed. Dahlgaard and Park (2006) argued that both lean production and six sigma comprise management and manufacturing philosophies and concepts of the same origin as the management philosophy of TQM. They went on to argue that the principles, concepts and tools of lean and six sigma should not be taken as alternatives of TQM but rather as collection of concepts and tools that support the overall principles and aims of TQM. This study focused on benchmarking and BPR as they were suggested to be on going at KPA.

Port operations uses measures called port performance indicators to determine performance. These performance indicators are grouped into four major categories: indicators of output, indicators of service, indicators of utilization and indicators of productivity. Indicators of output are, berth output or berth throughput that measures total tonnage of cargo handled at a berth in a stated period, ship output that captures

cargo handled to and from a vessel at berth and gang output which is the average tonnes of cargo handled by one gang in one hour (Measurement of port performance, n.d.).

Indicators of service are ship turnaround time which gives an excellent measure of the speed of service of being provided to ship operations and can be used in determining maritime transport costs. Ship turnaround time can be divided into two components: waiting time (the delay between the ship's arrival at port and its tying up at berth) and ship's time at berth which is the total time a vessel spends at the berth whether loading or discharging cargo or just lying idle (Measurement of port performance, n.d.).

Indicators of utilization measures how intensively berth facilities and resources are used. These are berth occupancy (which measures the number of hours or days the berth is occupied in a given period divided by the total hours in that period multiplied by 100), berth working time (the part of ship's time at berth for which labour is scheduled to work). Indicators of productivity can be categorised as fixed costs and variable costs (Measurement of port performance, n.d.).

2.2 Benchmarking

Goncharuk and Monat (2009) acknowledged various publications about benchmarking having a variety of definitions of the concept but most definitions being narrow and not explaining all of the benchmarking's capabilities. Doing a comparative analysis of benchmarking, Amaral and Sousa (2009) defined benchmarking under four main elements: what it is, what it does, with whom it compares and expected results. They saw benchmarking as a continuous process tool that measures, evaluates, improves and learns about products, services, performance

and practices, and compares against world leaders, best-in-class and competitors as to achieve superior performance and compete.

Elmuti and Kathawala (1997) defined benchmarking as the process by which companies look at the best in the industry and try to imitate their styles and processes. Essentially, benchmarking is about comparison with the best in class and the best practice as seen and argued by Siha and Saad (2008) who perceived that when an organization benchmarks the best practice, it is actually performing a gap analysis to asses the difference between the two. In citing Champ (1989), Rohlfer (2004) noted that the concept of benchmarking suggests that benchmarking studies relate primarily to business processes and practices. He argued that selecting what to benchmark is most important because it determines the speed and kind of improvement a company can achieve.

Following Camp's (1989) suggestion (as cited in Magd & Curry, 2003) there are five phases of the benchmarking process that can be listed as, planning (what to benchmark and whom to benchmark against), analysis (performance gap determination), integration (relating gaps to organisational goals), action (improvement of business processes) and maturity (incorporating best practice into everyday business processes). Of recent, benchmarking has been used as a tool for organisations seeking ISO 9000 certification (Meybodi, 2009).

2.2.1 Types of Benchmarking

Benchmarking grew from reverse engineering of competitive product, to process benchmarking, to strategic benchmarking, and then to global benchmarking (Siha & Saad, 2008). Fong et al (1998) study (as cited in Anand & Kodali, 2008) provided a classification scheme of benchmarking with, "nature of referent other" as first group

comprising internal, competitor, industry, generic and global types of benchmarking, "content of benchmarking" comprising process, functional, performance and strategic types of benchmarking as second group, and "purpose for the relationship" consisting competitive and collaborative types of benchmarking as the third group.

Anand and Kodali (2008), however, contend that there is lack of consensus on the classification of benchmarking types. Four types of benchmarking as identified by Elmuti and Kathawala (1997) and Zairi (1994) in Moriarty and Smallman (2009) provide a middle ground, presenting them as internal benchmarking, competitive benchmarking, functional or industry benchmarking and Process or generic benchmarking.

Internal benchmarking is performed against operations within the same organisation. Since most companies have similar functions within their business units, immediate benefits can be achieved by identifying the best internal procedures and being able to transfer them to other units of the organisation (Elmuti & Kathawala, 1997). However, a major shortcoming of internal benchmarking is that, what is considered the best practice internally may fall short of being the best in the industry while another drawback may arise due to internal competition and rivalry making business units not cooperative as required by the benchmarking approach (Southard & Parente, 2007).

On the other hand, competitive benchmarking compares companies in the same markets with competing products or services. In this case the organization's business practices are re-evaluated in view that their primary competitors have demonstrated superiority in certain important elements of performance. Whereas this type of benchmarking can spur an organisation to achieve great performance, the biggest

challenge is in accessing competitor's information, as competitors may make their priceless information difficult to obtain (Elmuti & Kathawala, 1997; Zairi, 1994b in Moriarty & Smallman, 2009).

Another type of benchmarking is functional or industry benchmarking which is performed against industry leaders of best functional operations. As there is no direct competition between the benchmarking partners but rather sharing common technological and marketing characteristics, contribution and sharing of information may easily be achieved (Elmuti & Kathawala, 1997). Since market place competition is non-existent the use of IT, administrative and logistical processes encourage cooperation between organisations (Zairi, 1994b in Moriarty & Smallman, 2009).

The broadest form of benchmarking is the process or generic type of benchmarking as it is triggered by broadly applicable practices that significantly improve performance (Zairi, 1994b as cited in Moriarty & Smallman, 2009). Elmuti and Kathawala (1997) stated that process benchmarking focuses on the best work processes instead of business practises of a company by emphasising similar procedures and functions. The pointed out that process benchmarking is used across dissimilar organisations and though extremely effective, it is difficult to implement.

Through experience Harrington (1995) found out that for most processes, one should do process benchmarking to the point that one has obtained the best performance measurements for effectiveness, efficiency and adaptability before deciding whether to continue with the benchmarking approach.

2.2.2 Categories of Benchmarking

In comparing against best practice, Jaques and Povey (2007) pointed out that benchmarking can come under a number of categories, such as the best practice found in other companies through one-to-one benchmarking studies or one from reputable-verified databases or one incorporated within business models or from international standards such as ISO 9000 and the European Foundation for Quality Management (EFQM).

In reference to Appleby (1999) and Hinton et al (2000), Jaques and Povey (2007) summarized the categories as metric benchmarking that uses performance data comparison where quantitative data such as financial results, production figures and league tables are compared and concentrates on the outcomes. The other being process benchmarking that compares qualitative data such as management methods and operational techniques and concentrates on the organisational processes while the third as diagnostic benchmarking that not only compares both metric and process data but also compares with best practice or business excellence models.

2.2.3 Benchmarking Challenges

Siha and Saad (2008) asserted that benchmarking has been accused of limiting ambition, since the aspiration is just to be as good as the best in industry. They contended that even the definition of the best in industry is not clear as the best in a particular year may not be the best in another year. Moriarty and Smallman (2009) concurred, arguing that there is a gap within the literature resulting from the absence of clear primal definitions of benchmarking, that emphasise benchmarking contribution to organizational success through the principal process of organizational

adaptation triggered by the belief of better performance elsewhere and driven by the extent of its superiority.

Povey (1998) contended that managers should benchmark only the things that are strategically important to their organisations and not everything. He further argued that the benchmarking activities should form an integral part of business process improvement rather than a complete independent activity.

Elmuti and Kathawala (1997) cited several shortcomings of benchmarking as arising from focusing so much on data which is the outcome as opposed to the processes used to result in the data. They listed several factors such as focus on numbers, lack of clarity on where the data originated, losing focus on the customers and employees, resistance by some employees and lacking proper implementation procedure as some of the arising problems of benchmarking while other drawbacks are such as failure to treat benchmarking as a continuous process and not a one-time-project and perceiving benchmarking as too expensive to undertake.

Many organisations confuse the difference between benchmarking and competitive analysis as noted by Zairi and Hutton (1995), hence more often than not organisations doing competitive analysis believe they are benchmarking. Zairi and Hutton argued that, while competitive analysis is a powerful tool for strategy formulation because it quantifies competitive gaps in cost, quality and timeliness, it often does not induce effective turnaround programmes. They observed that, in many companies competitive gaps are apparent, yet underperforming companies cannot achieve near comparable performance because they do not know how to.

2.3 Business Process Reengineering

Business process reengineering falls under the generic name of process reengineering and seeks to improve broader business processes of an organisation in a discontinuous overhauling of the business processes and views the business processes in their entirety for quantum improvement possibilities (Ahire & Waller, 1994).

Hammer and Champy's (1993) definition (as cited in Hesson, 2007) presents BPR as the fundamental rethinking and radical redesign of business processes, in order to achieve dramatic improvements in critical, contemporary measures of performance, such as cost, quality, service and speed. Teng, Grover and Fiedler (1994) on the other hand, defined BPR as critical analysis and radical redesign of existing business processes to achieve breakthrough improvements in performance measures.

One of the reasons given by Attaran and Wood (1999) for the growing number of companies embracing BPR to gain competitive advantage is that the earlier improvement strategies aimed at incremental, small changes on an ongoing basis. In contrast, BPR initiatives are intended to radically redesign and improve work processes within a time frame (Patwardhan & Patwardhan, 2008). The meaning of dramatic change in BPR as analysed by Hesson (2007) is the overhaul of organizational structures, managements systems, employee responsibilities and performance measurements, incentive systems, skills developments, and the use of information technology.

To demonstrate the advantages of applying BPR to business, Hesson (2007) refers to Prosci's, 2002 Best Practices in Business Process Reengineering Report, a study in a series conducted over a five-year period, involving 327 organizations from 53 countries. The goal of the study was to provide real-life lessons from the experiences

of project teams that were at that time involved in reengineering projects. Participants represented a broad sampling of industry groups with product development and manufacturing, finance and banking and consulting consisting the three largest sectors, with over 37% of participants.

The study found that customer service was the most frequently reengineered process while information services came as the second most targeted business process for reengineering. The need to reduce cost or expense was the most frequently cited business driver for reengineering projects with 65% of participants stating that expense reduction was the primary driver. Other three business drivers cited were competitive pressure, poor customer satisfaction and poor quality of products and services.

Drawing lessons from the experiences of five success examples of companies in both manufacturing and service firms in the US, Attaran and Wood (1999) suggested five guidelines for companies to follow to take full leverage of process reengineering. They listed them as: reengineering effort should be driven by a clearly defined strategic mission, focus on important cross-organizational business processes critical to the mission of the firm and that cost reduction should not be the only goal of reengineering. They suggested that reengineering efforts should focus on growing profits in order to benefit all stakeholders and that leadership plays an important role in the success of reengineering efforts.

In assessing readiness for BPR, Abdolvand, Albadvi and Ferdowsi (2008) categorized five critical success factors as positive readiness indicators. These were outlined as visionary leadership from top managers, collaborative working environment, top management commitment with clearly defined strategic mission, supportive

management that assist human resource in the transition period to new working environment and use of ICT. They also pointed out failure factor to be employee resistance to change resulting from fear of uncertain future, job and authority loss, and general anxiety.

The same idea was perceived by Terziovski, Fitzpatrick and O'Neill (2002) who in reviewing several researches identified best predictors of BPR to include strategy, management commitment, information technology, customer focus, continuous improvement, and performance outcomes. They argued that re-engineering projects should be driven by strategy; that lack of management support starves BPR projects from fund, IT and BPR are highly interdependent and that BPR successful redesign efforts must concentrate on areas that add value to customer and reduce costs. They further contended that BPR should form part of continuous improvement culture and overall BPR should result in improved customer service, faster processes, increased quality, sales and revenues.

Several factors that hinder effective implementation of BPR were identified by Irani et al (2000) (as cited in Al-Mashari, Irani & Zairi, 2001) as consisting loss of nerve, focus and stamina, senior management that lack holistic focus, settling for minor improvement gains, human issues dealing with organizational culture, attitudes and skills, resource restriction and fear of IT.

On the other hand, Harrington (1995) saw breakthrough methodologies not a panacea to all improvements needs. On the contrary, he observed that no organisation can ignore its continuous improvement processes if it has to succeed in a competitive global environment today. He went on to conclude that all organisations need both continuous and breakthrough improvement and recommended that organisations need

to combine both continuous improvement and breakthrough improvement in their organisation's improvement plan.

2.3.1 Variants of Business Process Reengineering Approaches

McKay and Radnor (1998) noted that, BPR has been named many things by different authors including as process innovation, business process redesign, business engineering and process engineering. Tennant and Wu (2005) acknowledged that the conception of BPR as championed by Hammer and Champy and the subsequent researchers has led to the emergence of numerous alternative definitions and concepts of BPR making identification of the associated implementation difficult.

Hesson (2007) also noted the confusion in the literature regarding the use of terms like reengineering, process improvement and redesign. However, in his perspective he considered re-engineering as being synonymous to radical change and process improvement equivalent to incremental change. Further, he perceived both re-engineering and process improvement to be included in the definition of redesign.

2.3.2 Process Redesign

Process redesign approach is also referred to as focused improvement or process re-engineering and is associated with remoulding the present processes by removing bureaucracy, duplication and waste, then reorganising and simplifying them to reduce cycle-time and cost before applying automation and information technology (Harrington, 1995).

In presenting process redesign as an approach that concentrates on major business cross-functional boundaries, Povey (1998) claims that this is the technique most

companies mean when they talk of BPR. He argues that this technique is a natural evolution of TQM and goes beyond improving existing processes.

2.3.3 Process Innovation (New Process Design)

New Process Design is another BPR technique that Harrington (1995) observed as being called various names such as big picture analysis, process innovation or process breakthrough analysis. Citing Davenport (1993), Harrington noted that new process design uses IT as the primary way to improve selected processes. He contends that this methodology starts by creating a process vision statement then focuses on understanding and improving the existing process, then the process improvement team designs a new process and defines the required supporting organisation. He observes that this approach allows the process improvement team to operate freely by removing all restrictions to change and improvement where practical things like locations, organisational structure and present practises are not considered.

Harrington (1995) differentiated process redesign and new process design by claiming that new process design can bring about the biggest improvements in the levels of 400% to 1,500% while process redesign improvement ranges between 200% and 1,000%. However, he cautioned that although the use of new process design has great potential improvement, the impact and risk of failure is also much greater, since this approach usually cuts deeply into the fibre of the organisation.

2.3.4 Business Process Reengineering

Povey (1998) looked at this approach as based on the premise that continuous improvement can not deliver the major breakthroughs most companies need to remain competitive in the marketplace. He noted that Davenport, Hammer and Champy as the

key driving forces behind BPR which is the representative among the BPR methodologies.

Hammer and Champy's (1993) view (as cited in Hesson, 2007) presented seven principles of BPR to include organizing around results not tasks, the users of the output of the process perform the process, information to be considered, geographically dispersed resources to be treated as though they were centralized, link parallel activities instead of integrating their results, put decision areas where actual work is performed, build control into the process, and finally capture information once at the source.

2.3.5 Information Technology and Business Process Reengineering

Tinnila (1995) perceived that the original perspective of business process was to use IT as an enabler to improving operative efficiency and ultimately to achieve competitive advantage. He cited Hammer (1993) and Davenport and Short (1990) as the originators of this perspective where the power of IT can be used to radically redesign business processes to achieve dramatic improvement in performance.

Soliman and Youssef (1998) concured by stating that BPR relies heavily on the use of IT to create radically different working methods and achieve improvements of the magnitude required. Furthermore, they noted that BPR facilitates the change in corporate management's perception to technology. They observed that implementing IT for business applications is traditionally aimed at automating the pre-existing processes in an organisation. They also argued that IT cannot elevate productivity drastically if it is not used to maximise the benefits of the current advances in the IT environment.

Without creative use of IT in BPR, many projects would be very difficult to implement and many may even fail (Soliman & Youssef, 1998). As noted by Harrington (1995) IT plays a central role in the area of automation after the present process are refined using proven tools to arrive at redesigned processes. However, he cautioned that automation should go beyond IT to taking the routine, monotonous jobs left in the business processes and handle them automatically.

A survey of 63 UK-based companies carried by Tennant and Wu (2005) found out that 80% felt IT had a very important role within BPR, particularly in terms of solution implementation. It further found out that common IT tools used by the respondent companies in their BPR projects were SAP, data management, the Internet and process planning.

2.3.6 Business Process Reengineering Implementation Challenges

Business Process Reengineering approaches are contextual. Seethamraju and Marjanovic (2009) saw that each of the BPR methodology has its advantages and disadvantages and no single model is the best one for all business situations. They argued that requirement to consistently follow a particular approach to process improvement prescribed by a particular methodology that had worked well in a different context, may stifle the creativity of people involved in the improvement and even restrict the opportunities for achieving optimum results.

An observation made by Tennant and Wu (2005) is that many companies had undertaken BPR and had suffered major implementation problems that caused them to abandon their initial efforts with little or no positive results. Marjanovic (2000) gave two reasons among many for the possible failure of BPR projects; one being the inability by management to identify the critical problems to be solved by

reengineering and poor management practices that fail to properly address the wide spread fear of change.

Shin and Jemella (2002) noted that the continuing demand for business process improvements has led to proliferation of methodologies, techniques and tools for conducting BPR projects that has left BPR project planners confused about which methods are best suited to their needs. They argue that this lack of consensus on BPR methods has resulted in many failures of BPR projects. They also ascribe high failure rate of BPR to lack of senior management sponsorship or failure to make ongoing commitment to the tough management decisions needed to effect the changes. Further Gitagama (2008) found that continuing operations while implementing BPR introduced problems of migrating from old processes to the new ones.

Tennant and Wu (2005) cited the causal factors of typical BPR failures, as including the difficulties associated with supporting reengineering efforts through concentrating on the technology side and arriving at a redesigned process that becomes obsolete in the extended business process. They argue that technical solutions have tended to include IT systems such as enterprise resource planning (ERP), IT outsourcing, internet, e-business, and electronic data interchange (EDI), yet the high cost of new information systems in most large organisations is reported as a major impediment to achieving immediate benefits.

Tennant and Wu (2005) further showed that many companies seek solutions without understanding future performance goals which is further compounded when companies struggle to create an environment for successful reengineering that adequately addresses the people issues, which leads to fear and confrontation as employees find it difficult to accept completely new processes.

Crowe, Fong, Bauman and Castro (2002) pointed out that BPR efforts have always stressed the importance of introducing radical changes to obtain quantum leap improvements, with the argument that this effort also demands radical changes on employees' behaviour at work and since it is human nature to develop inertia, it is their instinctive reaction to resist changes instituted by BPR efforts. This resistance was also noted to be especially high among employees directly affected by the changes and in fact if no resistance is detected then the BPR effort is probably is not being done right.

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Research Design

This was a case study. Awuoti (2006) stated that a case study involves a careful and complete examination of a social unit, institution, family, cultural group or an entire community and embraces depth rather than breath of a study. This type of research design was chosen because it describes the characteristics of behaviour or condition and was the most appropriate for studying a subject in details to bring up the unique issues such as set in the objectives of this study. The port of Mombasa is a unique entity operating in a unique environment that requires an in-depth study to understand its approaches to improvement and resulting implementation challenges it faces.

3.2 Data Collection Techniques and Procedures

Primary and secondary data was used for this study. Primary data was extracted using interview guide as shown in Appendix IV that was divided in two parts (A and B). Part A sought to draw the respondent's profile and part B was divided into three sections with section I measuring the presence of BPR, section II measuring the presence of benchmarking and section III capturing challenges facing BPR and benchmarking implementation at the port.

Secondary data was obtained from KPA bulletin of statistics on port performance covering a period of fifteen years from 1995 to 2009. Among the range of indicators presented by these statistics measuring various aspects of port performance, four were considered as appropriate for this study. These included port cargo throughput, number of ships worked, ships waiting time and number of container moves against units moved at the container terminal. A data collection form was used as provided in Appendix V. The secondary data provided a means of determining whether the

business process improvement initiatives at KPA had commensurate impact on port performance.

The fifteen-year period was preferred because it was indicated by the interviewed managers that improvement efforts started way back in 2002, hence to capture trend before and after the change this period was considered important. The choice of a fifteen-year period was also ideal to establish if there has been a structural change in performance trend as a result of the introduction of BPR and benchmarking approaches between the two phases of this period. All the items but one in the data collection form (shown in Appendix V) received the needed data.

The respondents of this study for the primary data were managers appointed by divisional administrators who provided information for their divisions. These representatives of the divisions were those thought to possess broader knowledge of business processes in their divisions. KPA management structure comprised 8 divisions answerable to the office of the managing director with a total of 26 departments under them as provided by the company's organisation structure in Appendix II. One respondent was considered for this study in each of the 8 divisions.

3.3 Data Analysis and Presentation

Before analysis, the collected data was checked for accuracy, completeness and consistency. Data collected in part A of the interview guide was analysed using descriptive statistics, showing percentages and presented using tables. Sections I and II in part B of the questionnaire dealing with BPR and benchmarking was analysed using content analysis to determine the presence of BPR and benchmarking. Section III of part B that captured challenges faced in process improvement implementation was analysed using descriptive statistics by ranking the factors using means, standard

errors and standard deviations. This analysis determined the factors that were ranked the highest and those ranked the lowest in hindering improvement efforts.

To present and analyse secondary data collected using the form in Appendix V, tables and charts were used for presentation and structural break was used for analysis. Total yearly port throughput and number of ships worked were presented using tables and charts while ships waiting time in days was tested for structural break to confirm whether indeed a structural change had occurred between 1995 to 2001 and 2002 to 2009. The presence of a structural break between those two sub periods would suggest impact of BPR or benchmarking or both initiatives on port performance. Statistical Package for Social Sciences (SPSS) was used as a tool of analysis and presentation.

CHAPTER FOUR: DATA ANALYSIS, RESULTS AND DISCUSSION

4.1 Introduction

Data was collected from both primary and secondary sources. Primary data was collected through interviews with the individual respondents being managers appointed to answer for their divisions, as deemed fit by the divisional administrators. A total of 8 respondents were targeted for each division out of which five were available for the interviews, giving a response rate of 60%. Secondary data was obtained mainly from KPA's bulletins of statistics covering a fifteen-year period from 1995 to 2009.

4.2 Respondents Profiles

Table 1: Period worked with KPA

Period	Responses	Percentage
Less than 5 years	0	0%
Between 5 and 10 years	1	20%
More than 10 years	4	80%

Source: Primary data

Out of the interviewed managers 80% had worked with KPA for over 10 years while 20% had worked with KPA for between 5 and 10 years. This indicated that most managers had a long experience working with KPA to well understand the business processes of the organisation.

Table 2: Period in the current job position

Period	Responses	Percentage
Less than 5 years	4	80%
Between 5 and 10 years	1	20%
More than 10 years	0	0%

Source: Primary data

Respondents that had worked at their current job positions for less than 5 years constituted 80% while 20% had worked in their current positions for between 5 and 10 years. A high number of 80% managers having worked in less than five years in their job positions indicated high rate of job mobility or reshuffling in the management structure, which may not be good for consistency on short- and mid-term strategies to be maintained, especially if it involved top management levels.

Table 3: Number of employees per division

Employees	Responses	Percentage
Less than 50	1	20%
Between 50 and less than 100	0	0%
Between 100 and 500	1	20%
Above 500	3	60%

Source: Primary data

Divisions that had less than 50 employees working in them were 20% and 20% of the divisions had between 50 and less than 100 employees while 60% divisions had a workforce of 500 and above. This indicated that most divisions of KPA had a large workforce of over 500 employees. Such a large workforce in a division may pose a management challenge when crucial decisions affecting the workforce had to be taken, in particular those dealing with restructuring work processes.

4.3 Business Process Re-engineering Approach

Key performance measures cited were those that dealt with the ship, cargo, equipment and timely reports. Number of ships that called at the port per period of time, ship time at port and ship turn-round time was indicated as crucial measures on port operations. Other measures were cargo throughput and cargo dwell time, equipment downtime and uptime, equipment availability and working and quantities handled per

time were shown to be good measures of equipment productivity. Timely submission of reports on human resource status, finance and performance were also indicated as important measures of performance.

Major business processes at the port were documentation processes and physical handling processes of both import and export of cargo, contracting, remuneration, staff appraisal and training processes. On the other hand, automation and training were used and considered major techniques appropriate for great performance improvement. For example, automation was singled out as one that initiated a major change in the way work was done at the port by integrating IT with an enterprise resource planning software called SAP and Kilindini Waterfront Terminal Operating System (KWATOS). This major shift which was said to have affected all the KPA business processes, started in 2002 with the introduction of SAP and a complete rollout of KWATOS in 2008 and was indicated to be still ongoing, with a yet to be effected single window system.

Several drivers that led to the initiation of the major shift were pointed out; key being complaints from stakeholders and customers, general inefficiencies and changing world trends. The main goals for undertaking the change were to satisfy port users, improve performance and achieve a paperless environment.

It was clear from the interviews that the approach to change was predominantly IT based, with over 70% being cited as the estimated level of IT usage in most divisions. However, this great extent usage of IT to change did not introduce new processes in the divisions but rather shortened existing ones and automated them. Further, this change did not affect the number of employees, though it is noted that most employees initially resisted the change but later embraced it. Attributing to the

benefits of change, interviewed managers claimed that morale of the workforce had gone up, with some citing of their jobs to have become less stressful, more understandable and clearer than before and performance estimated to be over 80%.

4.4 Benchmarking Approach

Some selected business processes at KPA were claimed to be compared against other best standards in performance, however, some divisions did not compare at all. Not all the standards were considered as ultimate benchmarks because marine industry was claimed to be dynamic. Fact finding missions to other ports, the government and UNCTAD (United Nations Conference on Trade and Development) were indicated as sources of getting the benchmarks. On the other hand, competition and poor performance were cited to be the main drivers for benchmarking.

Most interviewed managers concurred that world ranking of ports used the same measures of performance as those published in the KPA's annual review and bulletin of statistics including cargo throughput and ship-turn round time. However, no one had an idea of what position KPA was in the world ports ranking. Further, no specific annual performance targets were placed on departments to meet the ambitious KPA's vision 2010 (that was already being phased out) to be rated among the top 20 ports in the world in terms of performance and reputation. Measuring reputation was cited to be difficult, though most alluded that incidences that attracted negative media reports such as corruption, theft cases and complaints from customers indicated deterioration of reputation.

New equipment, the 24/7 work schedule and automation were associated with the performance improvement at the port, while gradual improvement of services was associated with benchmarking.

4.5 Challenges Facing Implementation of Business Process Improvement

A Likert scale rating was used to determine the factors that were thought to contribute in hindering effective implementation of improvement efforts in the divisions. Factors that hampered to a great extent were given a score of 5 points and those that did not contribute at all a score of 1. The analysed result is shown in table 4.

Table 4: Factors hindering improvement efforts

	Mean	Std. Error	Std. Deviation
Political interference	4.00	.447	1.000
Wrong attitude to change	3.40	.510	1.140
Frequent changes in top management	3.40	.600	1.342
Fear of job loss	3.40	.678	1.517
Fear of uncertain future	3.20	.374	.837
Resistance to change	3.20	.374	.837
Too much bureaucracy	3.20	.490	1.095
Lack of innovation	3.00	.316	.707
Lack of focus	3.00	.548	1.225
Restriction of resources	3.00	.548	1.225
Implementation of generic best-practice process that do not fit company needs	3.00	.548	1.225
Poor communication	3.00	.632	1.414
Org culture of idleness	2.80	.374	.837
Management interference	2.80	.490	1.095
Poor project management	2.80	.490	1.095
Lack of incentive system	2.80	.583	1.304
Internal management friction	2.80	.583	1.304
Lack of dedicated teams	2.80	.583	1.304

	Mean	Std. Error	Std. Deviation
Lack of skills	2.80	.663	1.483
Lack of a suitable benchmarking partner	2.80	.917	2.049
Cross-functional barriers	2.60	.400	.894
General anxiety	2.60	.510	1.140
Too much concentration on technology than adding value to process	2.60	.510	1.140
Rapid change in technology	2.60	.600	1.342
Lack of endurance	2.40	.400	.894
Lack of top management support	2.40	.400	.894
Fear of losing authority	2.20	.374	.837
Fear of IT	2.20	.490	1.095
Cost of change seeming too large	2.20	.490	1.095

Source: Primary research data

From the above rankings, political interference was perceived to be the highest factor that hindered effective implementation of improvement efforts in the divisions at KPA with a mean score of 4.00. Coming second in ranking were wrong attitude to change, frequent changes in top management and fear of job loss all with a mean score of 3.40 while fear of uncertain future, resistance to change and too much bureaucracy, came third with 3.20 mean score.

Factors that hindered improvement efforts the least, were cost of change seeming too large, fear of IT and fear of losing authority with a mean score of 2.20, while lack of top management support and lack of endurance ranked second last with a mean score of 2.40

4.6 Port Performance Data and Analysis

Data obtained from KPA performance records from 1995 to 2009 was used to analyse various aspects of port performance improvement.

4.6.1 Port Throughput

Port throughput is a measure of output and indicates how much cargo a port can handle per given period (usually given per year). KPA port throughput from 1995 to 2009 is given in table 5 and illustrated in figure 1.

Table 5: Port throughput

Year		1995	1996	1997	1998	1999	2000	2001
Total ('000' DWT)		7,973	8,694	8,442	8,561	8,188	9,126	10,601
Year	2002	2003	2004	2005	2006	2007	2008	2009
Total ('000' DWT)	10,564	11,931	12,921	13,281	14,419	15,962	16,415	19,062

Source: KPA Annual Review and Bulleting of Statistics 1995 - 2009

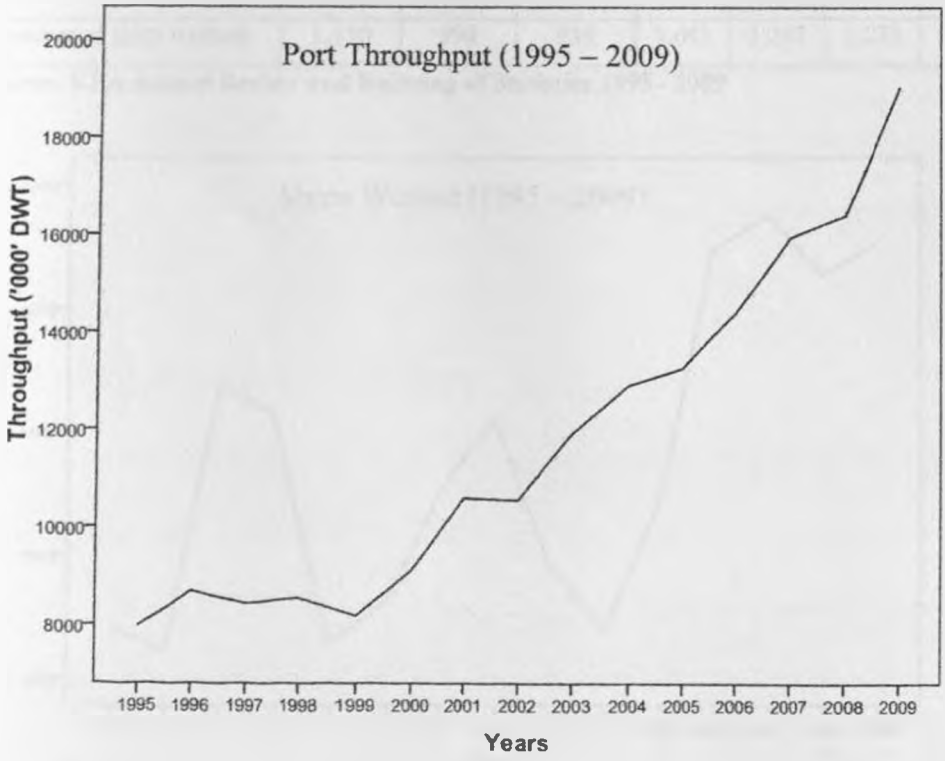

Figure 1: Port Throughput

Source: KPA Annual Review and Bulleting of Statistics 1995 - 2009

From table 5 and figure 1, port throughput increased consistently from 8.18 million DWT (Deadweight Tonne) in 1999 to 19.06 million DWT in 2009 with a slight dip in 2002 to 10.56 million DWT.

4.6.2 Number of Ships Worked

Number of ships worked in a given period of time is an indicator of service that also affects ships turn round time. If handling services at the port are more efficient, more ships would be worked in shorter periods which in turn shorten their stay at the port. Number of ships worked from 1995 to 2009 is shown in table 6 and illustrated in figure 2.

Table 6: Number of ships worked

Year		1995	1996	1997	1998	1999	2000	2001
Number of ships worked		941	923	1,137	1,114	928	962	1,052
Year	2002	2003	2004	2005	2006	2007	2008	2009
Number of ships worked	1,110	994	939	1,043	1,247	1,275	1,227	1,254

Source: KPA Annual Review and Bulleting of Statistics 1995 - 2009

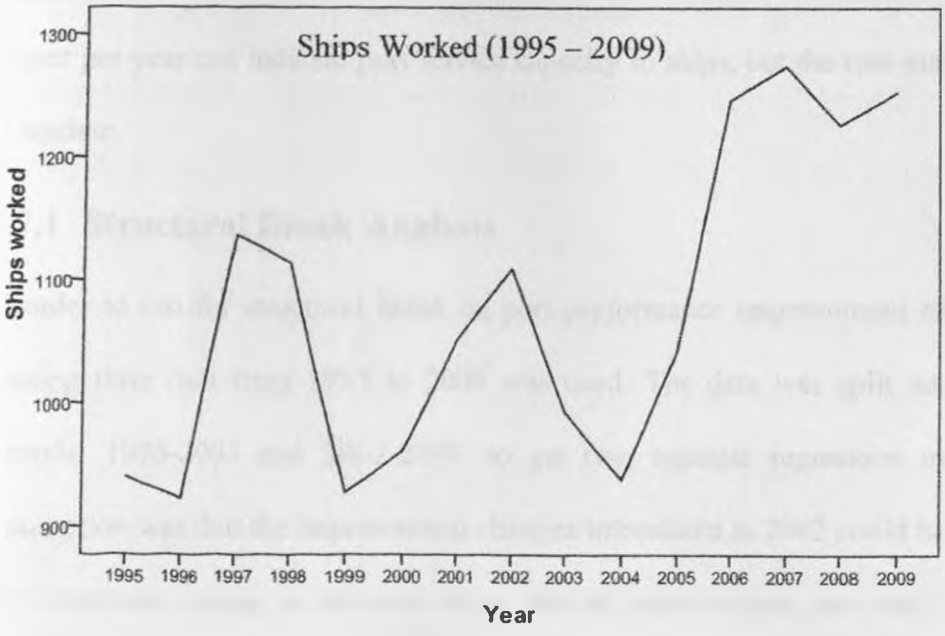

Figure 2: Ships worked

Source: KPA Annual Review and Bulleting of Statistics 1995 - 2009

Figure 2 shows the number of ships worked took wide swings from 1995 to 2004 then rose significantly from 939 ships worked in 2004 to 1,275 ships worked in 2007 before it dipped slightly in 2008, and showed signs of rising in 2009.

Comparing port throughput with number of ships worked, showed two trend lines that seem to have no correlation as illustrated in figure 1 and 2. Reason being that port throughput in deadweight tons include various types of cargo that are handled using different technologies. For example, containers are handled as units while conventional cargo, dry bulk and liquid bulk may use gangs or continuous transfer equipment such as conveyor belts or pumps. One large vessel carrying bulk cargo such as grain or liquid may deliver thousands of tons of cargo in a shorter time than several container ships because of the kind of equipment being used in discharging and loading cargo.

Total port throughput in itself therefore, is a poor indicator of cargo handling efficiency at berths. Nonetheless, port throughput is important indicator in volumes of cargo a port can handle per time whereas total number of ships worked to produce the output per year can indicate port service capacity to ships, but the two may not move in tandem.

4.7.1 Structural Break Analysis

In order to test for structural break on port performance improvement efforts, ships waiting time data from 1995 to 2009 was used. The data was split into two sub-periods: 1995-2001 and 2002-2009, to get two separate regression models. The assumption was that the improvement changes introduced in 2002 could have resulted into structural change in the time series data of ships waiting time and it might be

misleading to represent the pre- and post-change periods using a single regression model.

4.7.2 Ships Waiting Time

Ships waiting time measures the total time a ship spends at port, waiting for a berth to be free so that it could be worked. If the berth booked for is not free, the ship may have to anchor midstream and wait for the clearance of the berth before unloading or loading of cargo could start. While still waiting, the ship continues to incur charges for being in the port. The KPA ships waiting time for the period 1995 to 2009 is shown in table 7.

Table 7: Ships waiting time

Year		1995	1996	1997	1998	1999	2000	2001
Number of ships		269	239	489	325	197	191	230
Days		677	558	1478	1266	644	691	673
Year	2002	2003	2004	2005	2006	2007	2008	2009
Number of ships	208	296	237	225	210	310	262	127
Days	543	472	316	343	314	541	673	292

Source: KPA Annual Review and Bulleting of Statistics 1995 - 2009

Chow test for structural change analysis was used under the null hypothesis that there was no structural change in the period of 1995 to 2009 and thus it was justifiable to use a single regression model to fit all the data. Residual sum of squares for all observations was defined as RSS_c with degree of freedom, $df = (n_1+n_2-k)$, the restricted residual sum of squares as RSS_R and the unrestricted residual sum of squares as RSS_{UR}. Then equated as: $RSS_R = RSS_c$ and $RSS_{UR} = RSS_1 + RSS_2$ with $df = (n_1+n_2-2k)$.

If indeed there was no structural break, and that the regression models of pre- and post-2002 were essentially the same, then RSS_R and RSS_{UR} should not be statistically different. All the working was as illustrated below.

Period between 1995 and 2009:

Equation 1: Estimate of waiting days between 1995-2009

$$\hat{Y}_t = -183.002 + 3.205X_t$$

$$t = (-0.984) \qquad (4.590)$$

$$R^2 = 0.618 \qquad RSS_c = 600612.282 \qquad df = 13$$

Figure 3 below shows the scatter gram for the above regression model.

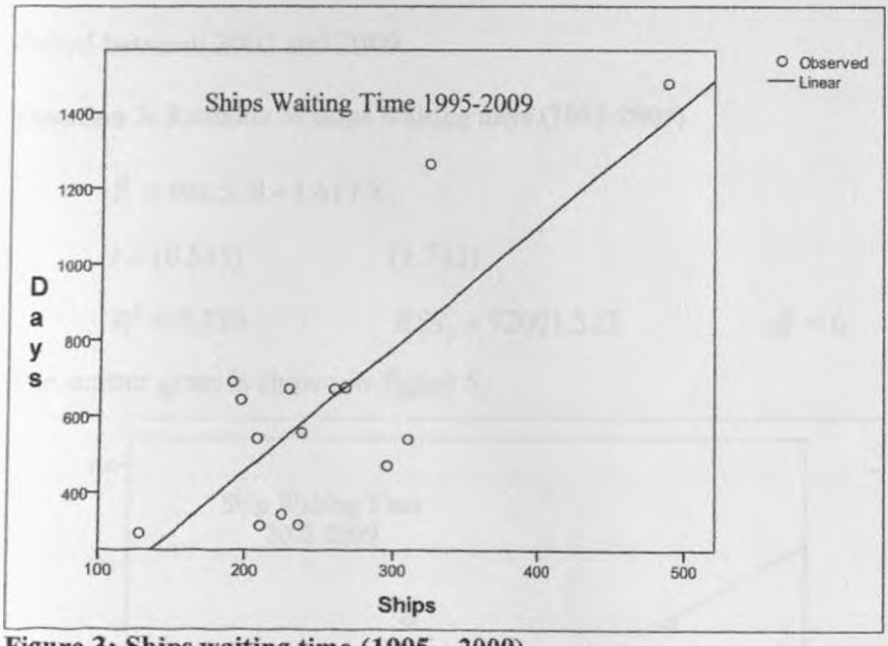

Figure 3: Ships waiting time (1995 – 2009)

Source: KPA Annual Review and Bulleting of Statistics 1995 - 2009

Period between 1995 and 2001:

Equation 2: Estimate of ship waiting days (1995-2001)

$$\hat{Y}_t = -17.950 + 3.151X_t$$

$$t = (-0.094) \qquad (4.817)$$

$$R^2 = 0.823 \qquad RSS_1 = 138547.187 \qquad df = 5$$

The regression curve was shown in figure 4.

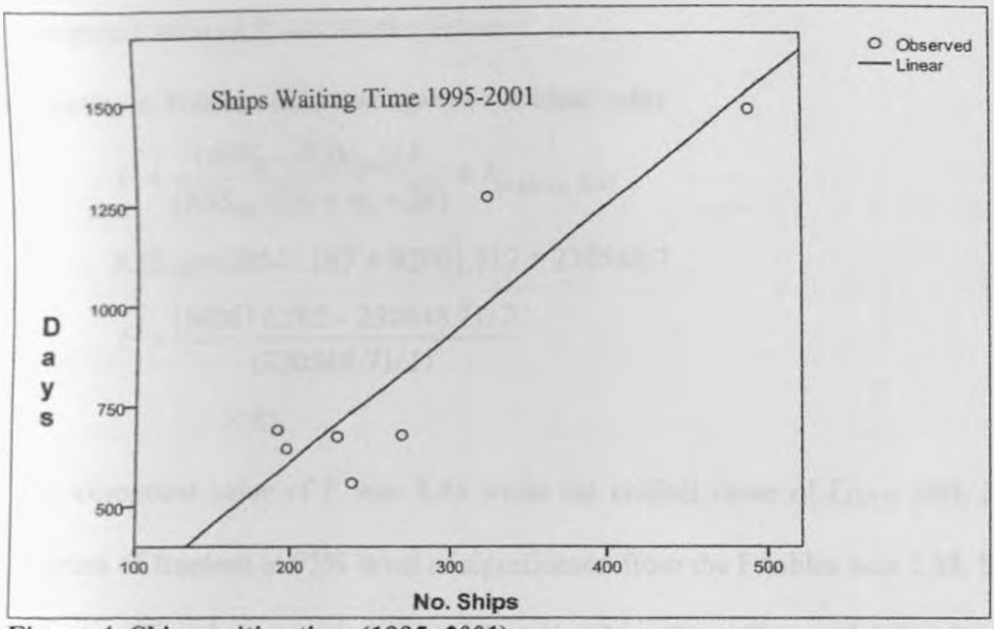

Figure 4: Ships waiting time (1995 -2001)

Source: KPA Annual Review and Bulleting of Statistics 1995 - 2009

Period between 2002 and 2009:

Equation 3: Estimate of ships waiting days (2002-2009)

$$\hat{Y}_t = 104.529 + 1.417X_t$$

$$t = (0.535) \qquad (1.743)$$

$$R^2 = 0.336 \qquad RSS_2 = 92001.512 \qquad df = 6$$

The scatter gram is shown in figure 5.

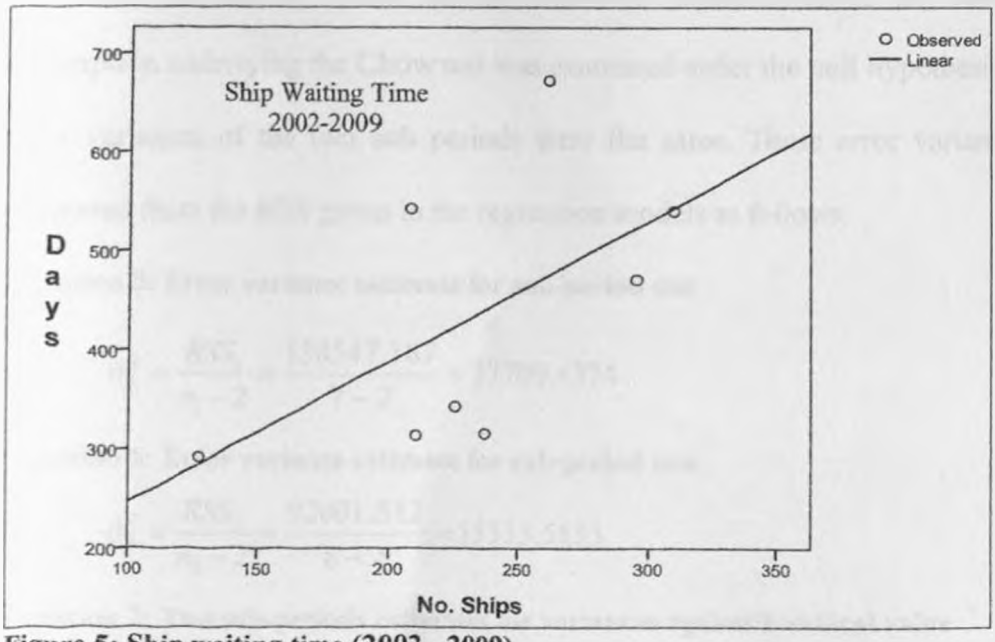

Figure 5: Ship waiting time (2002 - 2009)

Source: KPA Annual Review and Bulleting of Statistics 1995 - 2009

Computed value of F was shown below.

Equation 4: F-computed value against F-critical value

$$F = \frac{(RSS_R - RSS_{UR})/k}{(RSS_{UR})/(n_1 + n_2 - 2k)} \approx F_{[k,(n_1+n_2-2k)]}$$

RSS_{UR}=138547.187 + 92001.512 = 230548.7

$$F = \frac{(600612.282 - 230548.7)/2}{(230548.7)/11}$$

$$= 8.83$$

The computed value of F was 8.83 while the critical value of $F_{(2/11)}$ with 2 and 11 degrees of freedom at 95% level of significance from the F-tables was 3.98. Since the computed F value exceeded the critical F value, the null hypothesis of parameter stability was rejected and a conclusion was arrived at, that the regression models of sub-periods 1995 to 2001 and that of 2002 to 2009 were different. Hence the researcher concluded that a structural change in regard to ships waiting time had indeed occurred and this change was positive as indicated in the regression models of equation 2 and equation 3.

To justify the use of Chow test for structural break analysis, the fundamental assumption underlying the Chow test was examined under the null hypothesis that the error variances of the two sub periods were the same. These error variances were estimated from the RSS given in the regression models as follows:

Equation 5: Error variance estimate for sub-period one

$$\hat{\sigma}_1^2 = \frac{RSS_1}{n_1 - 2} = \frac{138547.187}{7 - 2} = 27709.4374$$

Equation 6: Error variance estimate for sub-period two

$$\hat{\sigma}_2^2 = \frac{RSS_2}{n_2 - 2} = \frac{92001.512}{8 - 2} = 15333.5853$$

Equation 7: Two sub-periods estimates for variances against F-critical value

$$\frac{(\hat{\sigma}_1^2 / \sigma_1^2)}{\hat{\sigma}_2^2 / \sigma_2^2} \approx F_{(n_1-k),(n_2-k)}$$

Equation 8: F-computed value for variances

$$F = \frac{\sigma_1^2}{\sigma_2^2} = \frac{27709.4374}{15333.5853} = 1.8072$$

The computed F value was 1.81 and the critical F value with 5 and 6 degrees of freedom in the numerator and denominator respectively was 4.39. Since the computed F value was smaller than the critical value, the researcher failed to reject the null hypothesis and concluded that the two sub periods variances were statistically the same; hence it was appropriate to use the Chow test in examining structural change for ships waiting time data.

CHAPTER FIVE: SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Summary of Findings

The main business processes at the port were those that dealt with documentation and handling of cargo, contracting, remuneration, staff appraisal and training processes. The number of most business processes remained the same over the changing period but shortened with efficiency having improved significantly. Automation using IT based systems was the main approach known to have been used to effect change at the port. None of the respondents mentioned BPR as an approach used to effect the change. Benchmarking was alluded to be used in most divisions, however, no coherent method was indicated on how the benchmarking information was obtained and how it was used in the divisions.

Performance data showed a consistent increase of port throughput from 8.19 million DWT in 1999 to 19.06 million DWT in 2009, while ships worked showed wide fluctuations between 1995 and 2004 before it arose again consistently from 939 ships worked in 2004 to new heights of 1, 275 ships worked in 2007, thereafter, the number slightly dipped to 1,227 ships worked in 2008.

Structural break analysis was performed on ships waiting time using Chow test for parameter stability. The analysis showed that indeed a structural break on ships waiting time had occurred between the pre-2002 and post-2002 sub periods. From the two sub periods regression models it showed that this structural change was positive. As with the limitation of Chow test, the exact year where the actual break might have occurred could not be arrived at, though data provided in Appendix VI might indicate 2004 where net average waiting time per ship was the lowest.

The main goals for undertaking the change initiative were to improve performance, satisfy customers and attain the status of an e-port. However, challenges such as political interference, wrong attitude to change, frequent changes in top management and fear of job loss were among the highest ranked factors impeding implementation of business process improvement at KPA. Factors that were considered having least effect in hampering improvement efforts were cost of change seeming too large, fear of IT and fear of losing authority as the first set, followed by lack of top management support and lack of endurance as the second set of least factors.

This research sought to establish the status of BPR and benchmarking implementation at KPA, assess their impact and determine factors hindering implementation of the improvement initiatives.

5.2 Conclusions

The research found out that IT had been used extensively as the principal agent of change at the port. Harrington (1995) noted that process innovation also known as new process design (a variant of BPR) uses IT as the primary way to improve selected processes, which was the case at KPA. Given that IT and BPR are highly interdependent (Terziovski et al, 2002), it was concluded that the change that took place at KPA could be attributed to some extent to BPR implementation as implied in the KPA publications.

Nevertheless, the correctness of how BPR was implemented was unconvincing. Firstly, Harrington (1995) contended that new process design (process innovation) requires that a process improvement team design new processes, after understanding and improving the existing processes and that the team be unrestricted in all aspect of change and improvement and that things like locations, organisational structure and

present practises be disregarded. There was little evidence suggesting that this took place since the existence of concurrent paper and paperless systems created duplication of work and waste. This is partly explained by the fact that automation was done on the existing processes without introducing new ones. Having two parallel working systems does not make sense for an organisation that opts for the BPR route to achieve breakthrough improvement.

Secondly, the fact that none of the interviewed managers expressed knowledge of BPR existence as one of the methodologies employed to drive change at KPA, even when it was indicated in the organisation's publications, implied that BPR was not implemented with the right tag. Further, the time span the said change took place (from 2002 to the time of research, 2010) was unrealistic for a full-fledged BPR project to be sustained. This fact was argued by Patwardhan and Patwardhan (2008) that BPR method is a time sensitive process and if not completed as planned success may be jeopardised.

Benchmarking at the port was not carried out methodically. Apart from the mentioned fact finding missions to other ports, there was no division that indicated that they were using information from benchmarking partners to achieve comparable standards. This conclusion was supported by the fact that there were no timeframe targets placed on divisions or departments to achieve the organisation's specific vision 2010. In fact none of the interviewed managers had an idea what targets their divisions or departments had to achieve, in order to be rated among the top twenty ports in the world in reputation and performance by 2010. This proved to be inconsistent with the benchmarking process as suggested by Camp (1989) in Magd and Curry (2003) which involve what to benchmark and whom to benchmark against, ascertaining

performance gaps and relating them to organisational goals, then incorporating the best practices into the everyday business processes.

Structural analysis of ships waiting time data showed structural break had occurred between the pre- and post-2002 periods. Since the structural change was positive, it signified improvement of services to ships that resulted to reduction in ships waiting time. However, it was noted from figures on net average waiting days per ship provided in KPA's bulletins of statistics shown table 8 and figure 7 of appendix VI, that the net average waiting days per ship decreased from 3.65 days per ship in 2000 to 1.34 days per ship in 2004- a strong indication of significant service improvement at berths. Nevertheless, from 2004 onwards there had been slow increase of net average waiting days per ship to a high of 2.56 days per ship in 2008.

The subsequent gradual increase of net average waiting days per ship could be interpreted to mean that the momentum of service capacity that significantly brought down net average waiting days per ship in 2004 was not sustained, hence the gains began to slip. The explanation for such a scenario where significant gains made were let to slip away might indicate a change or abandonment of the approach that brought about the gains or some difficult in maintaining the momentum of the approach. Most likely, implementation challenges as identified earlier and concluded here under might have come into play.

Clearly the consistent improvement in overall port throughput of 8,188 thousand DWT in 1999 to 19,062 thousand DWT in 2009 could be termed as incremental and not breakthrough. Breakthrough improvements means dramatic shift in productivity at all aspects of the organisations (Hesson, 2007; Tennant & Wu, 2005), which should have been captured in the port throughput. This led to the conclusion that the dramatic

improvements advocated by the BPR approach did not make full impact on overall port throughput. On the other hand, since benchmarking was not accompanied with specific set targets to be achieved in the divisions, its impact on overall port throughput could not be measured.

Political interference was the most singled out factor that hindered improvement efforts at the port to a significant extent. This coupled with frequent changes in top management and wrong attitude to change might have contributed significantly to the watered down BPR implementation and haphazard benchmarking approach at KPA.

5.3 Recommendations

The study, therefore, recommended that for successful BPR implementation, such projects should constitute un-restrained improvement team that understands the existing business process, in order to redesign as-should-be new business processes before using the tool of IT to automate them. Since BPR projects use the new slate concept where old processes are assumed non-existent as new ones are adopted, the BPR undertaking need to take shorter time, with much awareness within the organisation, as the magnitude of change to work processes, human resource and organisation culture is huge.

Benefits of BPR are possible in the Kenyan environment as shown in the case study on the relationship between BPR and organisational performance at EABL by Gitagama (2008). The study found out that the sacrifices made through BPR were compensated by the growth in profitability to over 20 million Kenya shillings, greater efficiency, customer satisfaction, less stock outs and increased plant utilization. These benefits at EABL were realised after the company undertook drastic measures such as staff reduction especially the young and promising, overcoming resistance from old

and experienced staff and the complexity of migrating from old processes to new ones while continuing with operations.

For benchmarking to have effect at KPA, the researcher recommended that divisional teams work closely with benchmarking partners and incorporate measurable standards that need to be achieved by each department and unit targeted for the improvement. This should include specific time frames appropriate for evaluation as the benchmarking exercise progresses. Namu (2006) noted that critical to successful benchmarking is in sharing of information across functions or sub-units which is supported by Rowland (2004) cited in Namu (2006) that better information exchange rather than information hardware is required for successful benchmarking.

The researcher recommends that serious implementation of business process improvement approaches at KPA needs to be divorced from external political interference that influence frequent top management changes and distract management focus, otherwise improvement results would not match those advocated by the improvement philosophies.

5.4 Limitations of the Study

The port operations are intertwined with various agencies and logistics companies such as Kenya Revenue Authority, Rift Valley Railway and road hauling companies, Kenya Bureau of Standards, Grain Bulk Handlers Limited and other private-owned oil depots whose operations affect how fast cargo moves at the port. This research studied business process improvement approaches at KPA in isolation without regard to how the other firms responded to the change initiatives at KPA.

This study used KPA data and KPA management perspective to arrive at the conclusion that there had been some improvement in performance at the port. This may not necessarily imply that all port stakeholders were satisfied with KPA services, since the study did not seek their assessment.

The interview guide was quite long and detailed that required an engagement with the respondents for over an hour to be exhaustive. Such a long period of engagement with senior managers who were busy was not wise as the researcher had to be patient and allow interruptions from colleagues and clients before returning to the subject matter. This at times made the researcher not to press on for details in some issues whenever there was a sign of exhaustion on the respondent.

The researcher failed to get part of the data on container moves from the annual bulletin of statistics published in year 1995 to 1999, as those publications were not reporting on this measure. Container moves measures how fast containers are handled at the container terminal. This performance indicator is directly influenced by operators' competence, availability and efficiency of equipment, available space and efficient yard planning. If obtained, this portion of data could have been combined with the rest of the available data to form the 15-year period and then tested for structural break. The analysis could have enabled determination whether the container terminal also experienced structural change in container moves, providing a broader perspective. Efforts to get this portion of data from the relevant department were not successful.

5.5 Suggestions for Future Research

From the limitations encountered in this study, some more research were suggested in order to cover the gaps discovered.

Future research to study how the other agencies and firms operating at the port, especially those dealing with cargo logistics improved their business processes in tandem with KPA's improvement efforts was ideal, as one sided process improvement might really not bring the kind of effect targeted.

Another area where research was considered important was in relation to capturing an external assessment of KPA services and performance from the port stakeholders' perspective. Since KPA deals with various stakeholders, from shippers, clearing agents, transporters to governmental agencies whose interests vary, it might not be enough to judge KPA's improvement of performance mainly from port throughput as often emphasized in KPA publications.

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APPENDICES

Appendix I: Introductory Letter

UNIVERSITY OF NAIROBI

MOMBASA CAMPUS

Telephone 020-2059161
Telegrams "Varsity" Nairobi
Telex 22095 Varsity

P.O. Box [redacted]
Mombasa Kenya

DATE: 4th November, 2010

TO WHOM IT MAY CONCERN

The bearer of this letter, **DISII FRANCIS KAHINDI** of Registration number **D61/P/7978/2004** is a Master of Business Administration (MBA) student of the University of Nairobi, Mombasa Campus.

He is required to submit as part of his coursework assessment a research project report on a management problem. We would like the student to do his project on real problems affecting firms in Kenya. We would, therefore, appreciate if you assist him by allowing him to collect data within your organization for the research.

The results of the report will be used solely for academic purposes and a copy of the same will be availed to the interviewed organizations on request.

Thank you.

CYRUS IRAYA
CO-ORDINATOR, MOMBASA CAMPUS

Appendix II: Kenya Ports Authority Organisational Chart

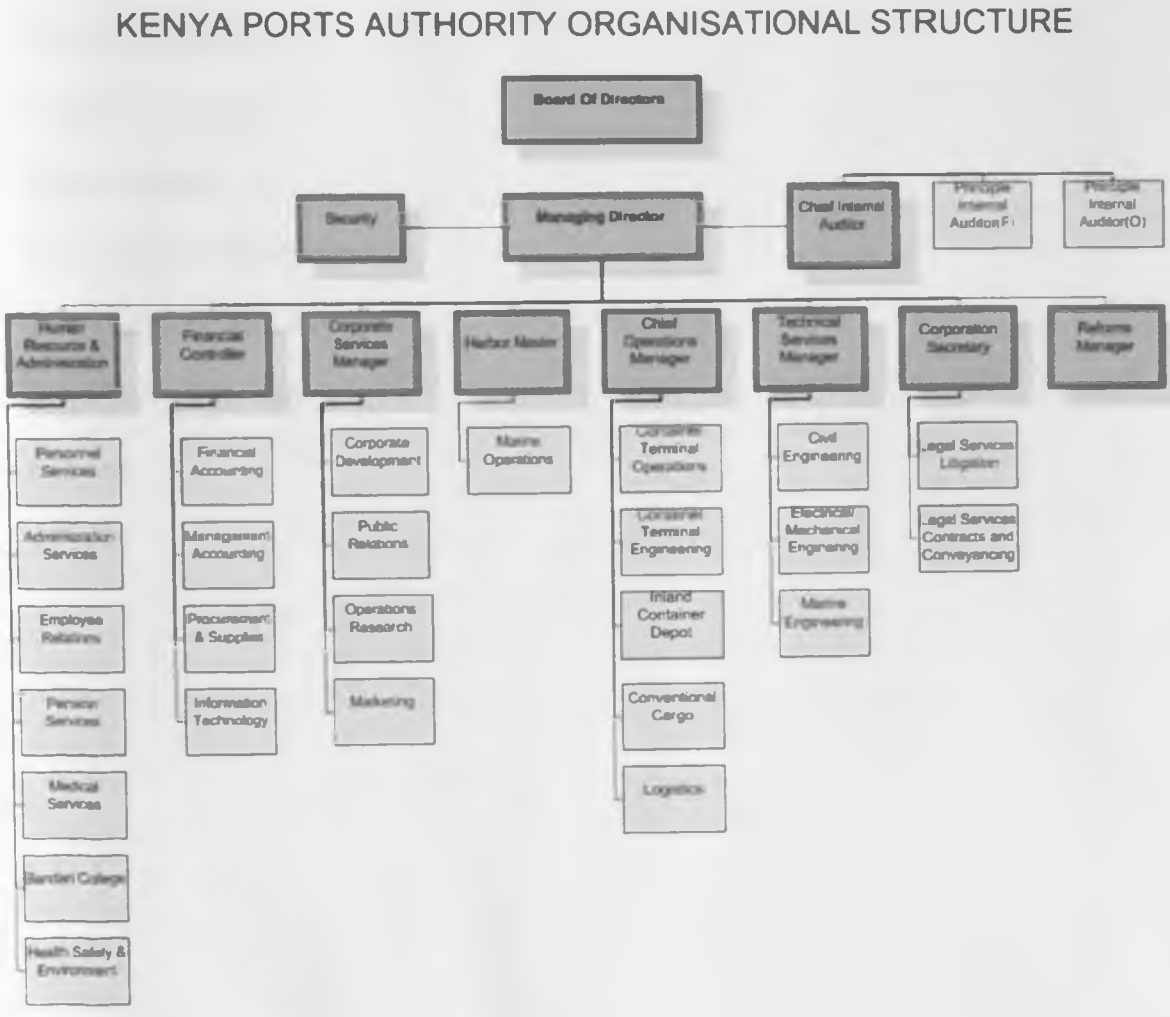

Figure 6: KPA organisation chart

Source: http://www.kpa.co.ke/About%20Us/Pages/OrganisationStructure.aspx

Appendix III: List of Kenya Ports Authority Division

1. Human Resource & Administration
2. Financial Controller
3. Corporate Services
4. Harbour Master
5. Chief Operations Manager
6. Technical Services Manager
7. Corporation Secretary
8. Reforms

Appendix IV: Interview Guide

PART A:

RESPONDENT PROFILE

1. How long have you worked with KPA?

   ❑ Less than 5 years ❑ Between 5 and 10 years ❑ More than 10 years

2. How many years have you been in the current job position?

   ❑ Less than 5 years ❑ Between 5 and 10 years ❑ More than 10 years

3. How many employees work in your division?

   ❑ Less than 50 ❑ Between 100 and 500

   ❑ Between 50 and less than 100 ❑ Above 500

PART B:

(I) BUSINESS PROCESS REENGINEERING (BPR) APPROACH

1. What are the key performance measures in your division?
2. What are the key business processes in your division?
3. What techniques (methodologies) do you use to improve performance in your division?
4. Is there a particular technique you consider to be appropriate for great performance improvements than others?
5. Has there been a major shift in the way work is done in the division and when was it initiated?
6. How was the shift done?
7. What business processes were affected?
8. What were the major drivers that led to the initiation of this shift?
9. What were the goals for initiating the major change?
10. How long did you take in effecting the change?
11. How were the business processes affected in terms of:
    a. Length of the work processes?
    b. Number of the work processes in the division?
    c. Efficiency of the work processes?
    d. Introduction of new processes?
12. How did procedures, rules and regulations affected by the change?
13. In figures what was the divisional performance like before the change?

14. What is the current performance level in the division?
15. To what level has IT been used in this division?
16. Was IT used to create new business processes or was it used to automate the existing business processes?
17. Has IT replaced paperwork completely or you still use both systems?
18. How has changes in the division affected employees in terms of:
    a. Their number?
    b. Their response to new changes?
    c. Their morale?
19. Apart from improvement in performance what other benefits have you experienced in effecting this change?

(II) BENCHMARKING APPROACH

1. Do you have world best standard measures against which you compare yourself in terms of performance?
2. Who provides those standards?
3. Do you consider those standards to be the ultimate benchmark if one aspires to be the best in the world?
4. What business processes do you compare against?
5. Are your comparison based on:
    a. Other best similar function on another port or best work processes of company not in port industry?
    b. Another best internal division or another division of a competing port?
6. Apart from ports, do you compare yourself with other organisations not in port industry?
7. What were the major drivers that led you to benchmark?
8. Are you shown how to reach comparable standards with your benchmark?
9. What measures are used to rank ports in the world?
10. What is the current position of KPA in the world ranking of best ports?
11. What performance targets did you set to achieve to be rated among the top 20 ports in the world as articulated in KPA's vision?
12. How far are you in nearing those benchmarks (standards)?
13. How do you measure reputation?
14. What reasons account for the recent performance improvement?

15. What benefits have you enjoyed from benchmarking?

(III) CHALLENGES HINDERING IMPLEMENTATION OF BUSINESS PROCESS IMPROVEMENT

To what extent has the following factors hindered effective implementation of the improvement efforts in the division?

	1 No at all	2 Minor extent	3 Moderate extent	4 Significant extent	5 Great extent
(1) Fear of uncertain future					
(2) Fear of job loss					
(3) Fear of losing authority					
(4) Fear of IT					
(5) General anxiety					
(6) Lack of endurance					
(7) Lack of focus					
(8) Lack of skills					
(9) Restriction of resources					
(10) Organisation culture of idleness					
(11) Wrong attitude to change					
(12) Resistance to change within organisation					
(13) Lack of incentive system					
(14) Political interference					
(15) Management interference					
(16) Lack of innovation					
(17) Internal management friction					
(18) To much bureaucracy					
(19) Frequent changes in top executives					
(20) Too much concentration on					

	1 No at all	2 Minor extent	3 Moderate extent	4 Significant extent	5 Great extent
technology than adding value to processes					
(21) Lack of a suitable benchmarking partner					
(22) Rapid change in technology					
(23) Lack of top management support					
(24) Cost of change seeming too large					
(25) Cross-functional barriers					
(26) Lack of dedicated teams					
(27) Poor communication					
(28) Poor project management					
(29) Implementation of generic best-practice process that do not fit company needs					
(30) Others (specify)					

Appendix V: Secondary Data Collection Form

1. Port throughput (in Deadweight tons)

Year		1995	1996	1997	1998	1999	2000	2001
Total ('000' DWT)								
Year	2002	2003	2004	2005	2006	2007	2008	2009
Total ('000' DWT)								

2. Number of ships worked

Year		1995	1996	1997	1998	1999	2000	2001
Number of ships worked								
Year	2002	2003	2004	2005	2006	2007	2008	2009
Number of ships worked								

3. Ships waiting time (days)

Year		1995	1996	1997	1998	1999	2000	2001
Number of ships								
Days								
Year	2002	2003	2004	2005	2006	2007	2008	2009
Number of ships								
Days								

4. Container moves

Year		1995	1996	1997	1998	1999	2000	2001
Number of moves								
Number of TEUs								
Year	2002	2003	2004	2005	2006	2007	2008	2009
Number of moves								
Number of TEUs								

Appendix VI: Net Average Waiting Days per Ship

Table 8: Net average waiting days per ship

Year						1999	2000	2001
Average (Net) waiting days per ship						3.38	3.65	2.99
Year	2002	2003	2004	2005	2006	2007	2008	2009
Average (Net) waiting days per ship	2.75	1.77	1.34	1.61	1.49	1.74	2.56	2.30

Source: KPA Annual Review and Bulletins of Statistics 1999 - 2009

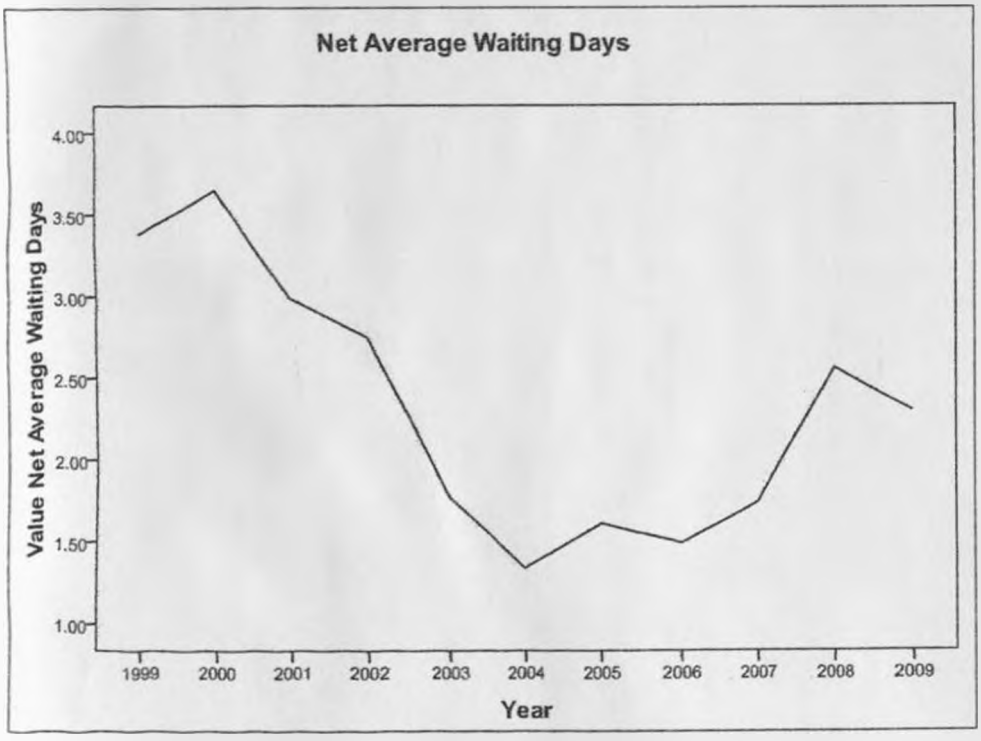

Figure 7: Net average waiting days per ship