RELATIONSHIP BETWEEN ORGANIZATIONAL AGILITY AND OPERATIONAL PRODUCTIVITY AT KENYA PORTS AUTHORITY

BY

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DECLARATION

I declare that this research project is my original work and has not been presented for award of degree in this or other University.

……. ……

Signature Date

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I confirm that this research project is being presented with my approval as the University Supervisor.

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DEDICATION

I dedicate this work to my lovely wife Elizabeth and children Kelvin, Shimron, Faith and Sheila. This thesis serves as inspiration to them.

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ABSTRACT

The competitive business environment has gone through many evolutions. Great consumer demand for customization has led to a short product life cycles thus creating the need for flexibility strategy. The nature of these changes has necessitated firms to have capabilities beyond flexibility described as agility.Agility capabilities are considered as main features of today's forward-looking organizations. Those organizations which possess such characteristics would be able to achieve competitive advantage and gain an edge over competitors. Over the last decade, Kenya Ports Authority faced numerous operational challenges such as port congestion, old and unreliable cargo handling equipment, slow and manual processing of documentations, poor infrastructure, constrained berths and yards and high rate of cargo pilferage. The challenges contributed to low productivity thus there was urgent need for Kenya Ports Authority to enhance efficiency and operational productivity. The study sought to demistify the effect of agility practices on Port productivity. A longitudinal research design was used for the research. Secondary data was used and detailed information on dependent and independent variables were obtained from Kenya Ports Authority. Productivity measures namely ship turnaround time, ship waiting time, berth occupancy, total cargo throughput, cargo dwell time and total number of twenty feet equivalent units handled and agility measures namely reliability, quality and speed were tested for the period under study and analysed using the SPSS software. The study revealed that there was a significant positive relationship between the productivity indicators (that is, ship turn-around time, cargo dwell time, total cargo throughput and the number of twenty feet equivalent units handled except waiting time and berth occupancy). The study further concluded that relationship between agility practices and port productivity existed at high significance level. It recommends that Kenya Ports Authority should adopt full implementation of agile practices to experience improved productivity. By adopting agility practices, KPA can provide transport solutions by developing the capability to effectively control transport chain through extra-flexibility and capacity utilization.The study finally recommends that more research be done not only at KPA but also in other service firm to clearly establish the relationship of the study variables and the benefits.

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ABBREVIATIONS AND ACRONYMS

BERTH A space occupied by a ship at the Port when loading or offloading the cargo

CFS Container Freight Stations

DREDGING The act of increasing the depth or width of the sea channel using so special excavation equipment

HHTs Hand Held Terminals

ISS Integrated Security System

KRA Kenya Revenue Authority

KWATOS Kilindini Waterfront Operating System

LAPSSET Lamu Port-South Sudan-Ethiopia Transit Corridor

RMG Rail Mounted Gantry Crane

RTGs Rubber Tyred Gantry Crane

SAP Systems Application Programmes

TEU Twenty Feet Equivalent Unit

SSGs Sea to Shore Gantry Crane

UNCTAD United Nations Conference on Trade and Development

"**WAJIBIKA PROJECT**" KPA's sensitization programme to employees on responsiveness, positive attitude and cultural change to enhance productivity.

CHAPTER ONE: INTRODUCTION

1.1 Background of the Study

The competitive business environment has gone through many evolutions from the time of mass production popularized by Henry Ford where the competitive strategy emphasized cost efficiencies through economies of scale. This was followed by quality as competitive strategy and later priorities were set on cost leadership and delivery speed. As the competition intensified, world-class firms offered low-cost, quality products with greater reliability or dependability. However great consumer demand for customization led to short product life cycles thus creating the need for flexibility as the next strategy. Flexibility became necessary due to business uncertainties which forced firms to produce products in small volumes (Vokurka & Fliedner, 1998).Technological developments are occurring at an ever-increasing pace, resulting in both product innovations and manufacturing process improvements. The nature of these changes is creating the need for firms to have capabilities beyond flexibility. Fliedner and Vokurka (1997) describe these capabilities as agility. Over the last decades the economy shifted from an industrial based national economy to information or knowledge based economy. In knowledge based national economy, the input of employees is more about theories, concepts, and ideas than manual skills and/or muscle power (Drucker, 2007).

Agility is founded on cumulative model of competitive capabilities theory and resource-based view (RBV) of the firm. Skinner (1985) stated that certain competitive capabilities such as flexibility, speed, cost and quality can be used as the competitive weapons. Agility requires that firms combine all their competencies and capabilities to remain competitive in the business environment. Proponents of the resource - based

view argue that it is not the environment but the resources of the organization, which form the foundation of the firm's strategy (Feurer&Chaharbaghi, 2007). Resources can be classified into financial, physical, human, organizational, technological and intangibles.

The Port of Mombasa is a vital link in the transport network of both Kenya and the wider region. It serves a region of over 120 million people and handles transit cargo to South Sudan, Uganda, Rwanda, Burundi, the Democratic Republic of Congo and Tanzania. Over the last ten years, port productivity has been increasing at an impressive rate (KPA, 2014).The history of Port of Mombasa has largely been associated with growth driven by improving economies of hinterland countries. KPA has committed itself to serve these economies by improving productivity and efficiency by offering world-class services to its customers. The growth has been attributed to massive investments by the Authority on improvement of infrastructure, procurement of new high capacity cargo handling equipment and implementation of other practices such as sensitization programs for employees. At the same time, the port has been facing a lot of challenges as a result of increasing business that has overpassed the ports capacity, increasing competition and delays in cargo due to poor road networks. Marlow and Paixão (2001) suggest that ports ought to introduce agility practices to compete more effectively in this highly competitive environment. Development of agile ports requires efficient application of knowledge since the world where ports carry out their operations is governed by knowledge-based economy (UNCTAD, 1999).

1.1.1 Organizational Agility

Kidd (1995) defines agility as a rapid and proactive adaption of enterprise elements to unexpected and unpredicted changes. Agility is the ability of a firm to market successfully low-cost, high quality products with short lead times and in varying volumes that provide enhanced value to customers through customization (Fliedner&Vokurka, 1997). Hayes and Wheelwright (1979) identify that agility merges the four distinctive competencies of cost, quality, dependability and flexibility. Kidd (1995), Sharifi and Zhang (2001) identify important attribute of organizational agility as effective response to change and uncertainty. Yusuf, Sarhadi and Gunasekaran (1999) proposed that agility is the successful application of bases such as speed, flexibility, innovation, and quality by the means of the integration of reconfigurable resources and best practices of knowledge-rich environment to provide customer-driven products and services in a fast changing environment.

Oosterhout (2010) argues that being able to act quickly to unpredictable changes and uncertainty, requires a new and extended level of flexibility, which could be referred to as agility. Agility can best be demonstrated by a fish which is always alert, flexible and swift. These attributes makes it survive in its environment (water) by competing for food and evading the predators. Sambamurthy, Bharadwaj and Grover (2003) categorize organizational agility into three interrelated capabilities namely customer agility, partnering agility, and operational agility. Customer agility involves co-opting of customers in the innovation process of an organization which include the process of thinking, creating, and producing. This enables the demands of the customers to be aligned with the strategy of the firm. Partnering agility is the ability of an agile firm to leverage the assets, knowledge, and competences of their suppliers, distributors, contract manufacturers, and logistic providers through diverse forms of commitment.

Through a partnership with a supplier or contract manufacturer for instance, a firm could explore opportunities for innovation in the supply chain. Operational agility reflects the ability to accomplish speed, accuracy, and cost efficiency in the daily processes. This form of agility ensures that an organization can rapidly redesign the existing processes in responding to changes in the external environment. Operational agility is a subset of organizational agility. In the context of the Port, It entails responding to customer demands for efficient services, reduced operational costs and superior services. Generally, organizational agility leads to increase in productivity and profitability.

1.1.2 Operational Productivity

Case and fair (1999) define operational productivity as the ability of an organization to deliver goods and services in the most effective and efficient way using available resources without compromising profitability. Blocher, Stout and Cokins (2010) define it as output per physical unit of input. The inputs can be identified as natural resources such as land, human resources and man-made aids such as tools and machinery to further production. Outputs can be classified into tangible and intangible products. Examples of tangible products are goods while intangible products are services. Studying organizational productivity is of great importance because resources are scarce and there is a desire to fully utilize them.

To be successful in today's competitive business environment, companies must know what combinations of factors are most important to satisfy all of their shareholders while also helping to fulfil their mission. These factors may include, but are not limited to: price, quality of services or goods, time or special features. There is need for the resources to be used efficiently to maximize operational productivity.

Improving productivity is the number one initiative of nearly every company that manufactures a product or delivers a service. However, how to improve productivity is always a challenge as markets are increasingly becoming more competitive. Companies of all kinds are looking for ways to improve productivity and efficiency, while bringing greater value to their customers (Blocher, Chen & Cokins, 2008).

1.1.3 Organizational Agility and Operational Productivity

According to Sambamurthy, Bharadwaj and Grover (2003), agility means quick response to change and gives the firm the opportunity to engage in other actions to control market risk and uncertainty. When organizations are able to respond quickly, expand into new markets, and increase the innovation rate, they could reduce costs and experience higher profit (Tallon&Pinsonneault, 2011). Meurs (2012) notes that agility does influence aggregated productivity but this relationship is not strengthened by the moderating environmental turbulence. Goldman (1995) claims that an agile organization has the capability to be successful in a competitive environment with continuous and unforeseen fluctuations.

Agility enhances the organization's capability to provide high quality products and services and also is important in increasing employees' knowledge and experiences thus enhancing operational productivity (Hamel & Prahalad, 1990). As agility involves sharing knowledge with customers in the business environment, it leads to improvement in business operations and subsequent increase in productivity (Locke, 1999), thus there exists relationship between organizational agility and operational productivity.

1.1.4 Kenya Ports Authority

Kenya Ports Authority (KPA) is a statutory body under the Ministry of Transport established by an Act of Parliament on 20th January, 1978. The Authority is responsible for the operation and management of the Port of Mombasa, other small Ports, Inland Container Depots (Nairobi and Kisumu) and Liaison Offices in Kampala, Rwanda and Burundi. Kenya Ports Authority's Mission statement is to facilitate and promote global maritime trade through provision of competitive port services. KPA vision is to be a world class seaport of choice (KPA1998).

The Port of Mombasa promotes National and International Trade through handling of imports, exports and transshipments. It is a backbone of Kenya's economy being the main source of revenue and employment. The Port is a gateway to East and Central Africa. Almost 90 % of all cargo is transported through maritime. It is the largest Port in East Africa and it also serves other hinterland Countries such as South Sudan, Uganda, Rwanda, Burundi and Congo.

Over the last decade, the Port of Mombasa faced numerous operational challenges such as port congestion, old and unreliable cargo handling equipment, slow and manual processing of documentations, poor infrastructure, constrained berths and yards and high rate of cargo pilferage. All these challenges contributed to low productivity. However, KPA has experienced sustained business growth since the year 2005. The total cargo throughput has been rising consistently for example in 2013 the cargo throughput was 22.307 million tons and it rose to 24.875 million tons in 2014. An enormous achievement by KPA was realized in December, 2014 when the port handled for the first time in history one million Twenty Feet Equivalent units. It is projected that this figure will double in the next three to four

years. In the same time, ship turnaround time and cargo dwell time at the port has drastically reduced, an indication of enhanced productivity. These achievements have been made possible by management's commitment to provision of quality port services to its customers that facilitate and promote global maritime trade in consistency with its quality policy of improving service delivery and customer satisfaction, enhancing operational efficiency and improving productivity of internal resources (KPA, 2014).

The Authority has embarked on various activities to enhance its operational productivity such as establishment of cereals handling facility to reduce the cost of manual discharge of bulk cereals, implementation of kilindini waterfront operations systems to interface documentation processes with Kenya Revenue Authority, establishment of one stop centre for processing documents, allowing Container Freight Stations to provide storage of cargo while awaiting customs clearance thus reducing cargo congestion at the port, adoption of 24 hour service operations to enhance operational flexibility, initiating "Wajibika Project," and acquisition of new and high capacity cargo handling equipment. Like other Ports, the Port of Mombasa is facing intense competition from other regional ports thus there is need for KPA to become agile so as to be profitable and remain competitive (KPA, 2014).

1.2 Research Problem

Agility capabilities are considered as main features of today's forward-looking organizations. Those organizations which possess such characteristics would be able to achieve competitive advantage and gain an edge over competitors. Many firms in today's business environment are facing business challenges due to increased competition, changing technology and customer demands. Environmental turbulence

can affect the existence of an organization thus threatening the continuity of business. Firms are required to be agile as they will understand not only their current markets, product lines, competencies and customers, but also understand the potential for future customers, markets and the necessity of changing to meet those opportunities. Agility allows a company to react more quickly than in the past. An agile firm proactively anticipates customer requirements and leads the emergence of new markets. Sanchez and Nagi (2001) observe that there is a need for an organization to be agile in its operation to handle the uncertainties associated with operational environment.

Kenya Ports Authority like other port Authorities is facing many operational challenges. The congestion in the port and in road networks linking the port has caused slow and poor uptake of cargo into and out of the port. This is threatening the Authority's business due to potential loss of customers to regional competitors. High cost of infrastructural development and resistance to change by employees are also major challenges faced by the Authority. For instance, in order to enhance efficiency in terminal operations, the Authority procured hand held terminals a couple of years ago to be used to capture container data and transmit the same to management information system. However, due to resistance by employees to change, the gadgets have not been put into use as required. In June 2015, the Authority introduced time management system aimed at managing labour related costs. All employees were required to clock in and out using Biometric clocking system. This was however resisted by some workers who went on strike causing great losses to the Authority and its customers (G.Ndua, personal communication 2015).

There is an urgent need for Kenya Ports Authority to enhance efficiency and operational productivity. By adopting agility practices, KPA can provide transport solutions by developing the capability to effectively control transport chain through extra-flexibility and capacity utilization. According to Marlow and Paixão (2001), agile ports can quickly adapt the service delivery processes associated with service-production and service development, they are capable of exploiting unanticipated customer opportunities.

Several studies have been done in areas of organizational agility. Monie (1987) conducted a study on agility and port performance. Ebrahimpour, Salarifar and Asiaei (2012) carried out a study on the relationship between agility capabilities and organizational performance. Meurs (2012) conducted a study on the influence of trust and empowerment on the agility of an organization and how does agility in turn influence the productivity. In Kenya, Misiko (2014) conducted a study on TQM and operations management tools as agility strategies used by firms in Kenyan Dairy Industry. Murungi (2015) carried out a study on the influence of strategic agility on competitive capability of private universities in Kenya. The researcher is not aware of any studies on the relationship between organizational agility and operational productivity in the context of port industry and specifically Kenya Ports Authority thus this study sought to address this gap. The study seeks to answer the question, what is the relationship between organizational agility and operational productivity at Kenya Ports Authority?

1.3 Research Objective

The objective of the study was to establish relationship between organizational agility and operational productivity at Kenya Ports Authority.

1.4 Value of the Study

This study would be useful from a theoretical view in that it would provide information on the field of organizational agility. The conclusions and recommendations arrived at would form useful theoretical support in underpinning the relationship between organizational agility and operational productivity.

The study would focus on the topic of the organizational agility and operational productivity. Scholars in this area would use this study as a form of reference. In addition, researchers would be able to gain additional knowledge on the topic as few studies have been done on relationship between agility and operational productivity.

From a practical perspective, the findings of this research would provide vital information to the management of Kenya Ports Authority to appreciate how agility practices of speed, reliability and quality can influence operational productivity level at the port of Mombasa and help the organization gain competitive advantage over other regional ports currently competing with Kenya Ports Authority.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

The chapter reviews various literature and theories related to organizational agility. It also covers literature on the relationship of agility concept with operational productivity in the context of Port industry.

2.2 Theoretical Foundation of the Study

This section looks at the theoretical foundation underpinning the area of study. It identifies and reviews cumulative model of competitive capabilities theory and resource-based view (RBV) of the firm as the foundation of the study.

2.2.1 Cumulative Model of Competitive Capabilities

According to Day and Wensley (1988) competitive capability is usually reflected in superiority in production resources and performance outcomes. These competitive capabilities must also be first identified and evaluated to achieve a firm's strategic goals. Skinner (1985) stated that certain competitive capabilities such as flexibility, speed, cost and quality can be used as the competitive weapons.

Agility requires that firms combine all their competencies and capabilities to remain competitive in the business environment. This is also relevant in the context of port industry where various capabilities are required to enhance agility and productivity. However, Skinner (2003) discusses trade-offs, which occur in competitive priorities. For example, in the design and operation of a production system, Skinner suggests that there are trade-offs in such variables as cost, time, quality, technological constraints and customer satisfaction. The premise of Skinner's "focused factory" (1974) argues that factories attempt to perform too many conflicting production tasks

within one inconsistent set of manufacturing objectives. Part of his findings in working with a number of plants in various industries was a “factory cannot perform well on every yardstick”. There are performance trade-offs, which must be compromised to meet several goals simultaneously.

Hayes and Wheelwright (1979) suggest that firms could gain a competitive advantage from a strategic matching of product and process life cycles. They proposed a product/process matrix where for each major product line there should be a proper match between the stage of the product life cycle and the choice of production process. They postulated that a trade-off occurs between the paired priorities of efficiency/ dependability and quality/flexibility.

2.2.2 Resource Based View

Collins and Tallman (1991) noted that strategy is constrained by, and dependent on the firm’s resource profile. Proponents of the resource - based view argue that it is not the environment but the resources of the organization, which form the foundation of the firm’s strategy (Feurer & Chaharbaghi, 2007). According to Grant (1991) a resource can be classified for example into financial, physical, human, organizational, technological and intangibles. Rumelt (1987), Montgomery and Wernerfelt (1988) observe that heterogeneous firm-specific resources and capabilities are the foundation of the resource- based view of the firm.

Dierickyx and Cool (1989) suggest that the logic for generating and sustaining rents are derived from services of durable resources that are relatively important to customers and are superior, imperfectly imitable, specialized, imperfectly substitutable and are not entirely appropriable by others and cannot be traded in imperfect factor markets. A firm selects its strategy to generate rents based upon its

resource capabilities and a dynamic fit with environmental opportunities such as customers, competitors and technology. Any agile organization must have adequate resources such as financial, physical, human, organizational and technology thus the relevance of resource-based view in this study.

2.3 Organizational Agility Practices

Reliability, quality and speed have been identified as operational agility practices that enhance productivity. Reliability is the consistency of the product's or service's performance over time, or the average time for which it performs within its tolerated band of performance. Speed is the elapsed time between customers requesting products or services and their receipt of them. The main benefit of speedy delivery of goods and services to the operation's eternal customers lies in the way it enhances the operation's offering to the customer (Slack, Chambers & Johnson, 2010). Quality is the consistent conformance to customers' expectations. According to ISO 8402-1986 standard, it is the totality features and characteristics of a product or service that bears its ability to satisfy stated or implied needs. Consumers are becoming more sophisticated in their requirements and are increasingly demanding higher standards of service. To them service means customer satisfaction, customer delight, service delivery and customer relationship. Because of inseparability and intangibility features of services, quality of services in service business is usually more important than in manufacturing companies (Sachdev, & Verma, 2004).

Sharifi and Zhang (1999) named accountability, competence, flexibility and the speed as agility competitive priorities.Overby, Bharadwaj and Sambamurthy (2005) note that agility may be seen as the extension of the concept of strategic flexibility. Agility capabilities were noted as flexibility, quickness, responsiveness and competency

(Ebrahimpour, Salarifar & Asiaei (2012).Volberda and Rutges (1999) define flexibility as the degree to which an organization has potential managerial capabilities and also the speed at which these capabilities can be activated to increase this managerial capacity and controllability to adjust its internal environment to respond to changes in the external environment.

Fliedner and Vokurka (1997) identify numerous practices that promote agility. Examples are reductions in manufacturing cycle times and order response times, partnerships, outsourcing, schedule sharing, supply channel performance improvements, postponement, teamwork and cross-functional management teams, employee education, training and empowerment and business process re-engineering. They observed that organization culture contributes significantly towards successful agile adoption and therefore understanding it is important. Management, executives, and team members should support and embrace this change by investing in agility practices such as the healthy team dynamics of self-organization teams, continuous improvement, frequent delivery, effective communication and adapting to the changing environment. He further highlights that organizations which have accepted culture change can be characterized by team members demonstrating values like trust, respect, courage, openness, confidence, synergy, unity, affiliation, and commitment, creativity, collaboration and transparency.

Couillard and Lampierre (2003)note that organizational agility is the essential enabler of the operational excellence of a high-performance organization in today's hypercompetitive business world to keep growth, profitability, transient competitive advantage and highest customer value. He observes that the ability to be agile is directly related to an organization's human performance and the processes and

technologies that the organization has in place. Operational excellence is the design and the performance of the integrated systems and processes that create ongoing improvements and excellence in a company's strategic, competitive and operational values through speed, flexibility and cross-purpose adaptability, while also focusing on the customer's needs and keeping the employees positive and empowered with strategic purpose.

Couillard and Lampierre(2003) observe that when creating company's long-term marketing and innovation strategy, focus on operational excellence, organizational agility, product/service leadership and customer loyalty through building a strong and effective brand management and winning sales strategy, aligning operation, innovation and competing models towards achieving strategic management and operational excellence with organizational agility. Create regulatory and quality management processes that are strategic and efficient in regards to the company purpose, products and/or services, everyone in the company from top to bottom should know the main objective of the business and take action accordingly, be transparent and improve transparency by creating appropriate culture in the organization.

2.4 Empirical Review

Several studies have been conducted on organizational agility and operational productivity. In a study which sought to establish relationship between agility capabilities and organizational performance for home appliance factories in Iran by Ebrahimpour, Salarifar and Asiaei (2012), they found out that there was a significant positive relationship between agility capabilities and performance of a company in the confidence level of 0.99.The study investigated the key principles and features of the

agile manufacturing companies and agile manufacturing dimensions. It was found out that responsiveness, flexibility, competency and quickness in company provide the preliminaries for increased performance. The researchers further noted that agility enhances the organization's capability to provide high quality products and services and is therefore important in increasing organizational competitiveness by enhancing the employee's knowledge and experiences which enable organization to gain desired results. The researcher concluded that if agility practices are designed and implemented well, the company would achieve improvement in productivity in comparison with competitors. The study recommended that mangers apply these capabilities in their plans.

Meurs (2012) conducted a survey of 28 companies in Rotterdam. The objective of the survey was to find out the influence of trust and empowerment on the agility of an organization and how agility in turn influences the productivity. The study found out that agility does influence the productivity level of an organization and that the more agile an organization was, the higher the productivity. The study also noted that agility of an organization helps to improve the performance of an organization. The researcher observed that an agile organization is able to sense, respond, and learn of developments in the external environment. The researcher recommended that organization should focus on changes and trends in the external environment by using the dynamic capabilities and involve customers and partners to remain competitive.

Some studies have been done in Kenya on organizational agility. Misiko (2014) undertook a study on TQM and operations management tools as agility strategies used by firms in Kenyan Dairy Industry. He found out that agile firms are keen in creating new business models; they are innovative and speedy to seize opportunities.

Murungi (2015) carried out a study on the influence of strategic agility on competitive capability of private universities in Kenya. The study found out that various strategic agility variables influenced competitive capabilities of private universities. Organizational capabilities of quality, delivery, flexibility, and/or cost were linked to business performance. The study revealed that competitive capabilities enhance an organization's chances for growth and survival and those organizations that couple high integration intensity with market transactions were hypothesized to reduce transaction costs. The study recommended that private universities should adopt the various strategic agility practices more in their institutions to achieve the desired levels of competitive ability. The study further recommended that organizations should know their weaknesses and strengths to facilitate achievement of competitive ability.

2.5 Summary and Research Gap

From the literature reviewed, it is evident that organizations must adopt agility practices to enhance their performance and productivity. Ebrahimpour, Salarifar and Asiaei (2012) observed that responsiveness, flexibility, competency and quickness in company provide the preliminaries for increased performance. Organization should focus on changes and trends in the external environment by using the dynamic capabilities and involve customers and partners to remain competitive (Meurs, 2012). Agile firms are keen in creating new business models, they are innovative and speedy to seize opportunities (Misiko, 2014). According to Murungi (2015), various strategic agility variables influence competitive capabilities of organizations. Firms therefore should adopt various strategic agility practices to enhance performance.

Many studies on agility have been conducted outside the country and mostly focus on the concept and little on the relationship with operational productivity especially in the context of ports. It is clear therefore that more research was required in this area which this study sought to address.

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Introduction

This chapter gives details of the methodology that was used in the study. The chapter sets out various stages and phases that were followed in completing the study. It involved a blueprint for the collection, measurement and analysis of data. This section is an overall scheme, plan or structure conceived to aid the researcher in answering the raised research question.

3.2 Research Design

A Longitudinal research design was used in this study as the study covered a long period of time. According to Menard (2002), Data for longitudinal research are collected on one or more variables for two or more time periods thus allowing at least measurement of change and possibly explanation of the change. The researcher found this approach to be appropriate for the study.

3.3Data Collection

Secondary data was used for this study. The data on operational productivity variables were obtained from KPA's annual bulletin of statistics which were readily available. Secondary data was collected on port productivity measures namely ship turnaround time, ship waiting time, berth occupancy, total cargo throughput, cargo dwell time and total twenty feet equivalent units handled. Data was also collected on agility practices of KPA namely reliability of equipment, quality of service and speed. The data was collected for twenty years from 1995 to 2014.

3.4 Data Analysis

The secondary data was analysed using tables, frequencies, mean, and regression analysis to interpret the data. Regression analysis was done to analyse the data using the SPSS software.

The following regression model was used:

$Y = a + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5X_6 + \varepsilon$; Where:

Y =Dependent variables namely total cargo throughput, ship waiting time, ship turnaround time, berth occupancy, cargo dwell time and number of TEUs handled.

a = Constant

b_1, b_2, b_3, = Coefficients of agility dimensions.

X_1, X_2, X_3, = Independent variables namely reliability, quality and speed.

ε = Error term.

3.5 Operationalization of Operational Productivity Variables

According to Thomas and Monie (2000), Ports and Terminals must measure their productivity due to the need know efficiency and effectiveness of the services, for benchmarking purposes, to assess achievement of set targets, to compare performance and productivity with those competitors so as to develop business strategy and to gauge customer satisfaction level. Different ports however use different measures of productivity due to complexity in port business. He suggested that the measures can be divided into four categories namely production, productivity, utilization and service. The port of Mombasa uses the following variables as productivity indicators.

3.5.1 Total Cargo Throughput

This variable may be defined as the average quantity of cargo that can pass through a port at a given time from arrival at the port to loading onto a ship or from the discharge from a ship or to the exit (clearance) from the port complex. Cargo throughput is usually measured in tons. Increase in cargo throughputs indicates enhanced productivity at the port. In the context of Kenya Ports Authority, total cargo throughput is the total quantity of cargo in tons which passed through the port in a given year. The measurement is tonnage.

3.5.2 Average Ship Waiting Time

Average ship waiting time is the time it takes any port to allocate appropriate berths to in- coming ships so as to discharge or load the cargo in the port. Less average ship waiting time indicates high operational productivity. Reduction in waiting time indicates enhanced productivity. Waiting time can be expressed in days or hours for highly productive ports.

3.5.3 Ship Turnaround Time

One of the most significant indicators of service to ship operators is ship turnaround time. This is the total time, spent by the vessel in port, during a given call. It is the sum of waiting time, plus berthing time, plus service time, plus sailing delay. Ideally, ship turnaround should be only marginally longer than ship ’ s time at berth and thus waiting time in particular should be as near to zero as possible. Reduction in ship turnaround time indicates enhanced operational efficiency and high productivity.Short ship turnaround time indicates high productivity. Ship turnaround ti me is measured in days or hours in highly productive ports.

3.5.4 Berth Occupancy

The berth occupancy factor (BOF) is the time that a berth is utilized, divided by the total available time. For a port, it is the primary indicator of congestion. The parameter is defined as a percentage of the time when a berth is occupied to the total time available at the berth. As recommended in the Major Ports Development Plan by the Port of Rotterdam, 60-70 per cent would be the optimum BOF while higher berth occupancy would indicate congestion.

3.5.5 Cargo Dwell Time

The dwell time can be defined as the measure of the time elapsed from the time the cargo arrives in the port to the time the goods leave the port premises after all permits and clearances have been obtained. Long cargo dwell times in ports are a critical issue in Sub-Saharan African countries since they result in slow import processes and are bound to dramatically reduce trade. Cargo dwell time for productive ports such as the port of Singapore is 2-3 days only. For highly productive and efficient port, cargo dwell time ought to be shorter.

3.5.6 Number of TEU's Handled

The variable indicates the number of twenty feet equivalent units (containers) handled by a terminal in a given time. The measure indicates productivity in container terminal which is a key business unit for any port. A productive terminal handles many due to increased efficiency units.

3.6 Operationalization of Organizational Agility Variables

Slack, Chambers and Johnson (2010) identified reliability, quality and speed as operational agility practices that enhance productivity. The following subsections discuss each of these agility practices.

3.6.1 Reliability of equipment

Kenya Ports Authority gauge reliability of cargo handling equipment on percentage of availability of defect free equipment for work deployment over the total Authority's cargo handling equipment. To ensure that equipment are reliable, the Authority has developed a policy of replacing old equipment with new ones. The information on reliability of equipment is normally availed on weekly performance reports and annual bulletin of statistics. Reliability of cargo handling equipment is a major factor affects operational productivity at the port of Mombasa.

3.6.2 Quality of Service

Kenya Ports Authority normally measures quality of services in respect of port operations by analysing customer complaints through customer care section dedicated for serving port users specifically importers and exporters. A complaint register has been opened and maintained for use by management in addressing operational complaints. Complaints are registered in quantity daily and analysed at the end of each month. KPA is ISO 2008 certified thus it places issues on quality in high priority. Most of the recent complaints on operational service quality emanates from system problems namely customer blockage of accounts and billing.

3.6.3 Speed

Over the years, Kenya Ports Authority has tried to increase operational service speed by acquiring high capacity cargo handling equipment and improving information systems. This is evident by increased capital expenditure over the last ten years as indicated in the annual bulletin of statistics. The Authority has invested heavily on modern cargo handling equipment such as SSG, RTG and Harbour cranes to ensure increased speed and reliability of cargo handling services.

CHAPTER FOUR

DATA ANALYSIS AND INTERPRETATION

4.1 Introduction

This chapter presents the data findings to determine the relationship between organizational agility and operational productivity at Kenya Ports Authority. Multiple linear regression was employed to determine the relationship between organizational agility and operational productivity at Kenya ports authority. The study covered a period of 20 years from years 1995 to 2014.

4.1.1 Background Information

This study mainly sought to find out the relationship between organizational agility and operational productivity at Kenya ports authority.

4.1.2 Descriptive Statistics of Study Variables

4.1.2 Summary of the descriptive analysis for the variables

Table 4.1 Descriptive statistics

	Minimum	Maximum	Mean	Std. Deviation	Variance
Average ship Turn around time (Days)	3.50	5.50	4.5050	.62952	.396
Average ship waiting time (Days)	1.30	3.70	2.5950	.78571	.617
Berth occupancy (%)	.71	.94	.8360	.06159	.004
Average cargo dwelling time (Days)	3.90	8.90	6.1650	1.57656	2.486
Total cargo throughput (Millions)	3.90	4.40	4.1228	.16503	.027

Number of TEUS handled (No. of Containers handled expressed as log transformation of the original data)	5.30	6.01	5.6330	.23174	.054
Reliability of equipment (% of total equipment inventory)	.70	.91	.7960	.07816	.006
Quality of service(average monthly customer complaint)	.37	.85	.6265	.13196	.017
Speed of service (hours)	3.94	8.02	5.0662	1.62802	2.650

Source: Author (2015)

From the table 4.1, it is clear that the mean turnaround time is approximately 4.505 days. This is an implication that the central point of the turnaround time is 4.505 days. From the minimum and the maximum statistics for the ship turnaround time, it is clear that Kenya ports authority registered a minimum turnaround time of 3.5 days and a maximum value of 5.5 days for the period of 20 years under consideration. The variance of 0.396 is relatively small, an implication that the average turnaround time over the years cluster about the mean.

The mean waiting time is approximately 2.6 days. From the minimum and the maximum statistics for the ship waiting time, it is clear that Kenya ports authority registered a minimum waiting time of 1.3 days and a maximum value of 3.7 days for the period of 20 years under consideration. The variance of 0.617 is relatively small, an implication that the average waiting time over the years cluster about the true mean.The statistics for the rest of the variables are shown in table 4.1.

4.1.3 Multicollinearity Test

Multicollinearity is the undesirable situation where the correlations among the independent variables are very strong. For multiple regression to be suitable, the correlations among the independent variables should not be very strong. Statistics used to measure multicollinearity include tolerance and Variance Inflation Factor. Tolerance of a respective independent variable is calculated from 1 - R^2. A tolerance with a value close to 1 means there is little multicollinearity; whereas a value close to 0 suggests that multicollinearity may be present .The reciprocal of the tolerance is known as Variance Inflation Factor (VIF). A VIF of around or greater than 10 implies that there is multicollinearity problem associated with that variable Chatterjee, Hadi and Price (2000). Table 4.2 shows the collinearity statistics, of the independent variables.

The table indicates the test results for multicollinearity, using both the VIF and tolerance. With Tolerance values being close to 1 and VIF values being less than 10, it was thus concluded that there was no good evidence for presence of multicollinearity problem in this study.

Table 4.2 Table of Multicollinearity Statistics

	Collinearity Statistics	
	Tolerance	VIF
Reliability of equipment	.245	4.077
Quality of service(customer complaint)	.159	6.308
Speed	.285	3.513

Source: Author (2015)

4.1.4 Normality Test

This is a key assumption that should be met in regression analysis. It however, depends on many factors, for example the nature or distribution of data. For instance, in cases whereby the data is a proportion, the normality test may fail or the data may not be normal. In such a case for example, a different method, other than the expected ANOVA statistics may be used. Such may include the Kruskal Wallis test and so on. In this case, since the sample size was less than 50, the Shapiro-Wilks test was used as it was proposed by Samuel Sanford Shapiro and Martin Wilk (1965). If the p-value is greater than the level of significance (0.05), the data is assumed normal. However, if data is found to be not normal, this is not assurance for the absence of normality as this all depends on the nature of data as earlier mentioned. The Shapiro-Wilks test was as shown in the table 4.3.

Table 4.3: Normality Test

	Shapiro-Wilk	
	Statistic	Sig.
Average ship Turnaround time	.946	.313
Average ship waiting time	.942	.258
Berth occupancy	.974	.830
Average cargo dwelling time	.918	.092
Total cargo throughput	.925	.122
Number of TEUS handled	.929	.146
Reliability of equipment	.827	.002
Quality of service(customer complaints)	.965	.655
Speed	.638	.000

From the above table, all the data on the variables were found to be normal since their p-values were greater than 0.05 except reliability of the equipment and the speed. Reliability data possibly failed to be normal since it was a proportion while speed failed to be normal because of the big improvement towards the end of the 20 years period. Thus the assumption for normality was held true in this study.

4.2 Relationship between Agility Practices and Operational Productivity

In this study, a multiple regression analysis was conducted to test the influence among predictor variables. The research used Statistical Package for Social Sciences (SPSS V16) to code, enter and compute the measurements of the multiple regressions. A regression was done for the different productivity indicators (that is, ship turn-around time, waiting time, berth occupancy, cargo dwell time, total cargo throughput and the number of TEUs handled), on the independent list which included the reliability, quality of service and the speed.

4.2.1 Agility Practices and Average Ship Turn-around Time

Table 4.4: Model Summary for Agility Practices and Average Ship Turnaround Time

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.856[a]	.732	.682	.35504

Source, Author (2015)

Adjusted R squared is coefficient of determination which tells us the variation in the dependent variable due to changes in the independent variables. From the findings in

the table 4.4, the value of adjusted R squared was 0.682, an indication that there was variation of 68.2% on the average ship turnaround time due to changes in reliability, quality of service and speed. 31.8% could be accounted for by other factors not included in this model. R is the correlation coefficient which shows the relationship between the study variables. The findings show that there was a strong positive relationship between the study variables as shown by 0.856.

Table 4.5: ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	5.513	3	1.838	14.578	.000[b]
	Residual	2.017	16	.126		
	Total	7.530	19			

Source, Author (2015)

From the ANOVA statistics in table 4.5, the processed data, which is the population parameters had a significance level (p-value) of 0.000which shows that the data is extremely ideal for making a conclusion on the population's parameter as the value of significance (p-value) is less than 0.05. This is also an indication that the three agility indicators, reliability, quality of service and speed significantly influence average ship turn around at the Kenya ports authority. The significance value was less than 0.05, an indication that the model was statistically significant.

Table 4.6: Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.244	2.573		.095	.926
	Reliability of equipment	.547	2.104	.068	.260	.798
	Quality of service(customer complaint)	5.321	1.550	1.115	3.432	.003
	Speed	.097	.094	.251	1.035	.316

Source, Author (2015)

From the data in the table 4.6 the regression equation will be

$Y = 0.244 + 0.547\ X_1 + 5.321\ X_2 + 0.097\ X_3$

From the above regression equation it was revealed that holding reliability, quality of service and speed to a constant zero , the average turnaround time would stand at 0.244 days, a unit increase in reliability would lead to increase in average turnaround time by a factor of 0.547, a unit increase in quality of service would lead to increase in average turnaround time by a factor of 5.321and a unit increase in speed would lead to increase in average turnaround time of by a factor of 0.097. The variables, reliability and speed are insignificant since their p-values are more than the 0.05 level of significance while the quality of service is considered significant since it has p-value of 0.003 is less than 0.05.

4.2.2 Agility Practices and Average Ship Waiting Time

Table 4.7: Model Summary for Agility Practices and Average Ship Waiting Time

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.580[a]	.337	.213	.69719

Source, Author (2015)

The findings in the table 4.7, indicates that the value of adjusted coefficient of determination R squared was 0.231, an implication that there was variation of 21.3% on the average ship waiting time due to changes in reliability, quality of service and speed. This shows that 21.3% changes in ship waiting time could be accounted for by the variation in reliability, quality of service and speed. R is the correlation coefficient which shows the relationship between the study variables. The findings show that there was little relationship between the study variables as shown by 0.580.

Table 4.8: ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	3.952	3	1.317	2.710	.080[b]
	Residual	7.777	16	.486		
	Total	11.730	19			

Source, Author (2015)

The results in table 4.8 show that a model on the relationship between agility practices and average ship waiting time is insignificant. This is because the p-value of 0.080 is greater than 0.05.

Table 4.9: Coefficients of correlation for Agility Practices and Average Ship Waiting Time.

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	6.421	5.052		1.271	.222
	Reliability of equipment	-7.212	4.132	-.717	-1.746	.100
	Quality of service(customer complaint)	1.103	3.044	.185	.362	.722
	Speed	.242	.184	.501	1.312	.208

Source, Author (2015)

From the data in the table 4.9 the established regression equation is:

$Y = 6.421 - 7.212 X_1 + 1.103 X_2 + 0.242 X_3$

The regression equation above reveals that keeping reliability, quality of service and speed to a constant zero , the average waiting time would stand at 6.421 days a unit increase in reliability would lead to a decrease in average waiting time by a factor of 7.212 holding other variables constant, a unit increase in quality of service would lead to increase in average waiting time by a factor of 1.103 holding other variables constant and a unit increase in speed would lead to increase in average waiting time by a factor of 0.242 holding other variables constant. It is evidence that all the parameters in this case do not significantly influence the average waiting time as their corresponding p-values are greater than the 0.05 level of significance.

4.2.3 Agility Practices and Berth Occupancy

Table 4.10: Model Summary for Agility Practices and Berth Occupancy

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.328[a]	.108	.059	.06340

Source, Author (2015)

The results in table 4.10 above, shows an adjusted R squared value of 0.059, an indication that there was variation of 5.9% on the berth occupancy due to changes in reliability, quality of service and speed. This means that 5.9% changes in berth occupancy is accounted for by changes in reliability, quality of service and speed. R is the correlation coefficient which shows the relationship between the study variables. The findings show that there was insignificant positive relationship between the study variables as shown by 0.328.

Table 4.11: ANOVA Test for Berth Occupancy

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.008	3	.003	.645	.597[b]
	Residual	.064	16	.004		
	Total	.072	19			

Source, Author (2015)

From the ANOVA statistics in table 4.11, the processed data, which is the population parameters had a p-value of 0.597which shows that the data is not very ideal for

making a conclusion on the population's parameter as the p-value of is greater than than the level of significance of 0.05. This is also an indication that reliability, quality of service and speed do not significantly influence berth occupancy at the Kenya ports authority. The p-value value is more than 0.05 an indication that the model was not statistically significant.

Table 4.12: Coefficients for Berth Occupancy

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.903	.459		1.966	.067
	Reliability of equipment	-.236	.376	-.299	-.628	.539
	Quality of service(customer complaint)	.033	.277	.071	.119	.907
	Speed	.020	.017	.522	1.179	.256

Source, Author (2015)

From the data in the above table the established regression equation was

$Y = 0.903 - 0.236 X_1 + 0.033 X_2 + 0.020 X_3$

From the above regression equation it was revealed that holding reliability, quality of service and speed to a constant zero , the berth occupancy would stand at 0.903 (90.3%), a unit increase in reliability would lead to a decrease in berth occupancy by a factor of 0.236, a unit increase in quality of service would lead to increase in berth occupancy by a factor of 0.033and a unit increase in speed would lead to increase in berth occupancy by a factor of 0.020. However, all the parameters are not significant in this test since their p-values (that is, 0.067, 0.539, 0.907, 0.256), are all greater than 0.05.

4.2.4 Agility Practices and Average Cargo Dwell Time

Table 4.13: Model Summary for Average Cargo Dwell Time

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.943[a]	.890	.869	.56963

Source, Author (2015)

From the table above, the adjusted R squared value was 0.869, which means that 86.9% of the variation in cargo dwell time is explained by the variation in the agility practices of reliability, quality of service and speed. Only 13.1% is explained by other variables not explained in the model. The findings also show that there was a high positive correlation between cargo dwell time and the agility practices as shown by 0.943.

Table 4.14: ANOVA Statistics

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	42.034	3	14.011	43.182	.000[b]
	Residual	5.192	16	.324		
	Total	47.226	19			

Source, Author (2015)

From the statistics in table 4.14, the population parameters had a p-value of 0.000 which shows that the data is extremely ideal for making a conclusion on the population's parameter as the p-value is less than 0.05. This is also an indication that the agility practices of reliability, quality of service and speed significantly influence

the cargo dwell time at the Kenya ports authority. The p-value value was less than 0.05 an indication that the model was statistically significant.

Table 4.15: Coefficients for Average Cargo Dwell Time

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	12.906	4.128		3.127	.007
	Reliability of equipment	-13.623	3.376	-.675	-4.036	.001
	Quality of service(customer complaint)	5.214	2.487	.436	2.096	.052
	Speed	.165	.150	.170	1.096	.289

Source, Author (2015)

From the data in the above table the established regression equation was

$Y = 12.906 - 13.623\ X_1 + 5.214\ X_2 + 0.165X_3$

The regression equation above gives the information that keeping reliability, quality of service and speed to a constant zero , the cargo dwell time would stand at 12.906 days, a unit increase in reliability would lead to a decrease in the cargo dwell time by a factor of 13.623, a unit increase in quality of service would lead to increase in cargo dwell time by a factor of 5.214and a unit increase in speed would lead to increase in cargo dwelling time by a factor of 0.165. The p-value for the constant (β_0) was 0.007 and that for the reliability of equipment was 0.001, an indication that the constant and reliability are highly significant in the above regression model. Quality of service and speed are rendered insignificant as their p-values are greater than the assumed level of significance, 0.05.

4.2.5 Agility Practices and Total Cargo Throughput

Table 4.16: Model Summary of Agility Practices and Total Cargo Throughput

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.964[a]	.929	.916	.04797

Source, Author (2015)

From the results of the table above, value of adjusted R squared was 0.916 which means that there was variation of 91.6% on the total cargo throughput explained by the changes in reliability, quality of service and speed at 0.05 level of significance. This shows that 91.6% changes in cargo throughput could be explained by reliability, quality of service and speed. The findings show an R value of 0.964 which implies a high positive relationship between the study variables. This relationship is highly significant as proved by the p-value of 0.000<0.05 in table 4.17 below.

Table 4.17: ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.481	3	.160	69.629	.000[b]
	Residual	.037	16	.002		
	Total	.517	19			

Source, Author (2015)

From table 4.17, the ANOVA statistics shows that the population parameters had a p-value of 0.000 which shows that the data is extremely ideal for making a conclusion on the population's parameter as the p-value is less than 0.05. This is also an

implication that reliability, quality of service and speed significantly influence the cargo throughput at the Kenya ports authority.

Table 4.18: Coefficients for Total Cargo Throughput

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	3.271	.348		9.408	.000
	Reliability of equipment	1.269	.284	.601	4.464	.000
	Quality of service(customer complaint)	-.355	.209	-.284	-1.697	.109
	Speed	.013	.013	.126	1.012	.327

Source, Author (2015)

The regression equation resulting from the above table was

$Y = 3.271 + 1.269\ X_1 - 0.355\ X_2 + 0.013X_3$

According to the above regression equation it was evident that holding reliability, quality of service and speed to a constant zero , the cargo throughput would stand at 3.271 millions, a unit increase in reliability would lead to an increase in the cargo throughput by a factor of 1.269, a unit increase in quality of service would lead to a decrease in cargo throughput by a factor of 0.355and a unit increase in speed would lead to increase in cargo throughput by a factor of 0.013, whereby the constant and the reliability are highly significant and the quality of service and speed are not significant as per their respective p-values.

4.2.6 Agility Practices and Number of TEUS Handled

Table 4.19: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.959[a]	.919	.904	.07185

Source, Author (2015)

The adjusted R squared statistics of 0.904 is an indication that there was variation of 90.4% on the number of TEUS handled due to changes in reliability, quality of service and speed at 95% confidence interval. This shows that 90.4% changes in number of TEUS handled could be accounted for by reliability, quality of service and speed. R is the correlation coefficient which shows the relationship between the study variables. The findings show that there was a high positive relationship between the study variables as shown by 0.959. This relationship was highly significant since the p-value (0.000), in table 4.20 is less than 0.05.

Table 4.20: ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.938	3	.313	60.556	.000[b]
	Residual	.083	16	.005		
	Total	1.020	19			

Source, Author (2015)

From the ANOVA table above, the P-value of 0.000 which is less than 0.05 shows that the data is extremely ideal for making a conclusion on the population's

parameter. This is also evidence that reliability, quality of service and speed were significantly influencing the number of TEUS handled at the Kenya ports authority. The model is also rendered statistically significant since the p-value of 0.000 <0.05.

Table 4.21: Coefficients for Number of TEU's Handled

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	4.651	.521		8.932	.000
	Reliability of equipment	1.613	.426	.544	3.788	.002
	Quality of service(customer complaint)	-.612	.314	-.349	-1.952	.069
	Speed	.016	.019	.114	.852	.407

Source, Author (2015)

According to the analysis in the table above, the established regression equation was

$Y = 4.651 + 1.613 X_1 – 0.612 X_2 + 0.016X_3$

The above regression equation implies that keeping reliability, quality of service and speed to a constant zero , the number of TEUS handled would stand at 4.651 units, a unit increase in reliability would lead to an increase in the number of TEUS handled by a factor of 1.613, a unit increase in quality of service would lead to a decrease in number of TEUS handled by a factor of 0.612 and a unit increase in speed would lead to increase in number of TEUS handled by a factor of 0.016. The p values

for the constant and the reliability of equipment are 0.000 and 0.002 respectively, which are p values less than the assumed level of significance, 0.05, and therefore the two parameters significantly influence the number of TEUS handled. Quality of service and speed do not have a significant effect on the number of TEUS handled as their p-values are greater than 0.05.

4.3 Summary and Interpretation of major Findings

Adjusted R squared is coefficient of determination which tells us the variation in the dependent variable due to changes in the independent variable. From the findings on the adjusted R squared the study revealed that major variation on the productivity indicators under consideration could be accounted to changes in reliability, quality of service and speed. The study revealed that there was a significant positive relationship between the productivity indicators (that is, ship turn-around time, cargo dwell time, total cargo throughput and the number of TEUS handled except waiting time and berth occupancy) and reliability, quality of service and speed as there was a considerable value of correlation coefficient.

From the findings on the ANOVA, the study revealed that reliability, quality of service and speed were in most cases significantly influencing the productivity indicators in Kenya ports authority. The significance value less than 0.05 was an implication that the model was statistically significant.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter presents a summary discussion on the effect of adoption of agility practices on port productivity at KPA. A conclusion discussing the general findings of the research is highlighted followed by recommendation based on the findings of the study. The limitations of the study and suggestions on areas of further research are discussed at the end of the chapter.

5.2 Summary of the Findings

The study relied on secondary data acquired from the Kenya ports authority Archives. This data proved very helpful in providing insight on the qualitative and quantitative aspect of the study on port operations.

Regarding the relationship between agility practices and port productivity, the study established that reliability, quality of service and speed were positively related to the productivity indicators namely ship turnaround time, cargo dwell time, total cargo throughput and the number of twenty feet equivalent units handled except ship waiting time and berth occupancy.

On the analysis of the relationship between the individual independent variables, there was 68.2% on the average ship turnaround time due to changes in reliability, quality of service and speed at 95% confidence interval. The findings show that there was strong positive relationship between the study variables as shown in table 4.4.The ANOVA test also showed that reliability, quality of service and speed were significantly influencing average ship turnaround time at Kenya Ports Authority as

significance value was less than 0.05, an indication that the model was statistically significant.

The analysis of the relationship between average ship waiting time and the reliability, quality of service and speed it shows that 21.3% changes in average ship waiting time could be accounted for reliability, quality of service and speed. The findings show that there was weak relationship between the variables as shown in table 4.6. The ANOVA test showed the significance value of more than 0.05, an indication that reliability, quality of service and speed were not to some extent significantly influencing average ship waiting time at Kenya Ports Authority.

The berth occupancy regression analysis showed that 5.9% changes in in berth occupancy could be accounted by reliability, quality of service and speed. The findings show that there was small positive relationship between the study variables as shown in table 4.9. The ANOVA test showed the significance value of more than 0.05, an indication that reliability, quality of service and speed were not significantly influencing berth occupancy at Kenya Ports Authority.

Moreover, berth occupancy of more than 70% is an indication of berth congestion as the literature and data provided. This means that the Authority has consistently encountered berth congestion in the period under study.

The regression analysis on the average cargo dwell time showed that 86.9% changes in average cargo dwell time could be accounted for by reliability, quality of service and speed. The findings show that there was a high positive relationship between the study variables as shown in table 5.2. The ANOVA test confirms this with a value of less than 0.05, an indication that the model was also statistically significant.

The regression analysis on the cargo throughput showed that 91.6% changes in cargo throughput could be accounted for by reliability, quality of service and speed. The findings show that there was a high positive relationship between the study variables as shown in table 5.5. The ANOVA test confirms this with a value of less than 0.05, an indication that the model was also statistically significant.

The regression analysis on the number of TEUs handled showed that 90.4% changes on the number of TEUs handled could be accounted for by reliability, quality of service and speed. The findings show that there was a high positive relationship between the study variables as shown in table 5.7. The ANOVA test confirms this with a value of less than 0.05, an indication that the model was also statistically significant.

5.3 Conclusions of the Study

The findings of this research are consistent with the research done by Ebrahimpour, Salarifar and Asiaei (2012) in which they found out that there was a significant positive relationship between agility capabilities and performance of a company. Murungi (2015) in her study on the influence of strategic agility on competitive capability of private universities in Kenya also found that organizational capabilities of quality, delivery, flexibility, and/or cost were linked to business performance.The objective of the study was to establish relationship between organizational agility and operational productivity of Kenya Ports Authority.

The study concluded that there indeed existed a relationship between agility practices and port productivity at high significance level. According to Misiko (2014), many organizations have realized the need to adopt agile practices based on this relationship in order to manage the stiff competition in the market.

The study further concluded that the adoption of agile operations practices at KPA had significant impact on the productivity of the port. This relationship if properly harnessed could be used to ensure efficient and timely service delivery at the port.

5.4 Limitations of the Study

The concept of agility and its adoption is really wide. The study did not cover all the practices considered to constitute agility such as Total Quality Management, Inventory management, Leadership among many others. Interesting findings would have been revealed had all the practices been considered here. Furthermore, the study was limited to one going concern, the KPA. The study was largely constrained by the short time available.

The concept of agile operation was also not well understood and this posed challenges in obtaining and gathering relevant information and data. The dynamic nature of the service delivery management may change after a period of time and the views provided are limited to a given time period. These findings may not be applicable across time.

5.5 Recommendations

Based on the findings of the study it is recommended that Kenya Ports Authority adopt full implementation of agile practices to experience improved productivity. The management of the Port will have to set up clear policies on the adoption and implementation of agility practices and communicate to the all the stakeholders on what it entail, what is expected, the potential benefits and challenges. This is to embrace acceptance of the philosophy as best practice aimed at ensuring improved service delivery for this region. Agile practices that will greatly benefit KPA if properly adopted and implemented include Reliable equipment, Quality of services,

continuous investment in technology among many others that constitute the agile philosophy.

Implementation and adoption of agile practices will result in improved ship turnaround time, ship waiting time, berth occupancy, average cargo dwell time and total cargo throughput which are the key indicators of port productivity used at KPA. This is because of the benefits that can be realized if fully implemented. KPA in adopting these practices ought to do it in a holistic manner rather than in an isolated way to enjoy the great benefits of full implementation. They should build a culture of agility within cross functional teams.

The implementation of agility practices should be driven in a manner that it is strictly adhered to enjoy the true benefits of implementation. KPA management should drive the agility culture by setting up firm policies and communicating the intended benefits to the staff.

5.6 Suggestions for Further Research

The study recommends that more research be done not only at KPA but also in other service firm areas to clearly establish the relationship of the study variables and benefits. Since this study lumped together the agile operations practices, the study hereby recommends that future studies be done to analyse the relationship between each of the practices on the overall productivity of the KPA. This study can also be replicated after five or more years to ascertain whether the situation would have changed.

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APPENDICES

APPENDIX I: SUMMARY DATA FOR PRODUCTIVITY INDICATORS

ear	Average ship turnaround time	Average ship waiting time	Berth occupancy	Average cargo dwell time	Total cargo throughput	No. Of TEUS handled
	(DAYS)			NO. OF DAYS		
2014	3.5	2.8	0.93	3.9	4.40	6.01
2013	3.5	2.2	0.83	4.9	4.35	5.95
2012	4	2.7	0.76	4.5	4.34	5.96
2011	4.4	2.1	0.94	4.4	4.30	5.89
2010	4	2.3	0.87	4.7	4.28	5.84
2009	4.5	2.3	0.71	4.7	4.28	5.79
2008	4.9	2.5	0.89	5.1	4.22	5.79
2007	3.7	1.7	0.85	5.1	4.20	5.77
2006	4.3	1.5	0.81	5.2	4.16	5.68
2005	4.3	1.6	0.74	5.4	4.12	5.64
2004	4	1.3	0.79	6	4.11	5.64
2003	4	1.8	0.78	6.5	4.08	5.58
2002	4.8	2.8	0.79	7	4.02	5.48
2001	4.9	3.1	0.85	7.2	4.03	5.46
2000	4.9	3.7	0.87	7.5	3.96	5.37
1999	5	3.5	0.89	7.5	3.94	5.41
1998	5.2	3.7	0.89	7.8	3.93	5.40
1997	5.2	3.7	0.81	8.5	3.92	5.36
1996	5.5	3.4	0.85	8.5	3.93	5.34
1995	5.5	3.2	0.87	8.9	3.90	5.30

APPENDIX II: SUMMARY DATA FOR ORGANIZATIONAL AGILITY PRACTICES

Year	Reliability of equipment	Quality of service (average monthly customer complaints)	Speed
2014	0.91	0.37	8.02
2013	0.89	0.44	7.86
2012	0.88	0.47	7.79
2011	0.88	0.52	7.66
2010	0.87	0.44	7.66
2009	0.87	0.58	4.66
2008	0.86	0.61	4.30
2007	0.86	0.52	4.31
2006	0.85	0.64	4.33
2005	0.83	0.67	4.32
2004	0.73	0.71	4.18
2003	0.73	0.63	4.13
2002	0.71	0.69	4.08
2001	0.74	0.74	4.08
2000	0.75	0.64	4.03
1999	0.72	0.73	3.97
1998	0.7	0.72	4.06
1997	0.71	0.74	3.94
1996	0.72	0.85	3.99
1995	0.71	0.82	3.96

APPENDIX III: PORT PRODUCTIVITY INDICATORS

AVERAGE SHIP TURNAROUND TIME			**BERTH OCUPANCY**	**AVERAGE CARGO DWELL TIME**	**TOTAL CARGO THROUGHPUT**	**NO. OF TEUs HANDLED**
	(DAYS)	**(DAYS)**	**%**	**NO. OF DAYS**	**(MILLIONS)**	**UNITS**
2014	3.5	2.8	93	3.9	24,875	1,012,002
2013	3.5	2.2	83	4.9	22,307	894,000
2012	4	2.7	76	4.5	21,920	903463
2011	4.4	2.1	94	4.4	19,953	770,804
2010	4	2.3	87	4.7	18,934	695,600
2009	4.5	2.3	71	4.7	19,062	618,818
2008	4.9	2.5	89	5.1	16,415	615,733
2007	3.7	1.7	85	5.1	15,962	585,367
2006	4.3	1.5	81	5.2	14,419	479,355
2005	4.3	1.6	74	5.4	13,281	436,671
2004	4	1.3	79	6	12,921	438,597
2003	4	1.8	78	6.5	11,931	380,353
2002	4.8	2.8	79	7	10,564	305,427
2001	4.9	3.1	85	7.2	10,601	290,500
2000	4.9	3.7	87	7.5	9,127	236,928
1999	5	3.5	89	7.5	8710	256,470
1998	5.2	3.7	89	7.8	8455	248,451
1997	5.2	3.7	81	8.5	8259	230,069
1996	5.5	3.4	85	8.5	8576	217,028
1995	5.5	3.2	87	8.9	7919	200537

APPENDIX IV: AGILILITY PRACTICES

YEAR	RELIABILITY OF EQUIPMENT %	QUALITY OF SERVICE (AVERAGE MONTHLY CUSTOMER COMPLAINTS)	(COST OF INVESTING IN HIGH CAPACITY CARGO HANDLING EQUIPMENT IN'000' TO ENHANCE SERVICE DELIVERY SPEED
2014	91	37	105,352,133
2013	89	44	72,080,322
2012	88	47	62,044,378
2011	88	52	45,432,576
2010	87	44	45,266,919
2009	87	58	45,700
2008	86	61	19,977
2007	86	52	20,505
2006	85	64	21,313
2005	83	67	20,745
2004	73	71	15,140
2003	73	63	13,361
2002	71	69	12,144
2001	74	74	11,938
2000	75	64	10,720
1999	72	73	9,321
1998	70	72	11,431
1997	71	74	8742
1996	72	85	9812
1995	71	82	9143

SOURCE: KENYA PORTS AUTHORITY ANNUAL BULLETIN OF STATISTICS AND CUSTOMER CARE COMPLAINTS REGISTER