

**SUPPLY CHAIN PERFORMANCE MEASUREMENT IN THE  
AVIATION INDUSTRY: A CASE STUDY OF KENYA  
AIRWAYS LTD**

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**A Management Research Project Submitted In Partial Fulfilment of the  
Requirements for the Award of the Degree of Masters of Business  
Administration (MBA), School Of Business, University Of Nairobi**

**OCTOBER 2008**

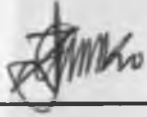
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## DECLARATION

This Research project is my original work and has not been submitted for a degree in this or any other University or Institution of Higher Learning.



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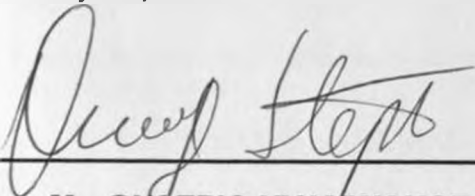
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This Research project has been submitted for examination with my approval as the University Supervisor.



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15/11/2008

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**DATE**

## DEDICATION

This research work has been accomplished through hard work and dedicated study. I would wish to dedicate this piece of writing to my late father, Mr Hezron Gwako, my mum, Rose Osano Gwako and all my brothers and sisters who have always been a motivation in my life.

## ACKNOWLEDGEMENTS

First and foremost, I would wish to thank the Almighty God for the free gift of life and for guiding me, giving me strength wisdom and the ability to successfully complete this study.

Secondly, I would wish to extend my earnest gratitude to my supervisor, Mr. Nyamwange Onserio for his constant encouragement, guidance and patience. His contribution to this study is invaluable, and for that, I say a big thank you.

Special thanks to my mum, Mrs Rose Gwako for her relentless support, sacrifices and encouragement during my studies. Her dedication, understanding and vision was surely key to my reaching this level in my studies.

Lastly, I would like to recognise the role played by all the MBA teaching staff of the University of Nairobi, for their splendid ideas and guidance during this program. The cooperation, support and encouragement accorded by my colleagues in the office (Andedo, Okemba, Noah, Mwandembo, Beatrice, Catherine, Caroline, Susan and Raymond) was immense, and is worth noting. A lot of thanks go to the Kenya Airways staff who took their time to fill in the questionnaires during data collection exercise, without which this study would not have been accomplished.

**To all of you, I say God bless you.**

## **ABSTRACT**

This research work sought to explore the Supply Chain Performance Measurement in the Aviation Industry. The key objectives of the study were, to establish the supply chain performance measures used by the company and to determine the challenges encountered in supply chain performance measurement. The study was conducted at Kenya Airways Ltd. Primary data was collected through the use of a structured questionnaire, and subsequently analysed using descriptive statistics, mainly the mean.

The research findings indicate that the company measures several dimensions of performance within their supply chain. Major dimensions measured include, Quality, Effectiveness of the procurement activities, Stock turnover, Number of Supplies rejections, Cost, Flexibility, among others. These dimensions are measured regularly, and the results obtained communicated to the internal channel members, as well as the company's suppliers.

The research findings reveal a growing application of the concept of supply chain and its management in the company. As competition, globalisation and technological advancements continue to affect how business is done; every effort should be geared towards ways of saving on costs. There is need to explore the benefits of having an integrated supply chain as a form of gaining competitive advantage. In addition, as the concept of supply chain gains prominence, the company needs to improve awareness across the entire company in order to sensitise chain members on the role they play in having an effective and efficient supply chain. Some of the challenges to effective supply chain performance measurement are internal factors that can be effectively addressed through improved communication and consultations. The external challenges to effective supply chain performance measurement should however be addressed through constant consultation with external chain members.

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## **LIST OF ABBREVIATIONS**

<b>ASC</b>	<b>Agile Supply Chains</b>
<b>ERP</b>	<b>Enterprise Resource Planning</b>
<b>ESC</b>	<b>Efficient Supply Chains</b>
<b>IATA</b>	<b>International Air Transport Association</b>
<b>JIT</b>	<b>Just In Time</b>
<b>KQ</b>	<b>IATA Designation code for Kenya Airways Ltd</b>
<b>LSC</b>	<b>Lean Supply Chains</b>
<b>MRP</b>	<b>Manufacturing Requirements Planning</b>
<b>OTD</b>	<b>On Time Delivery</b>
<b>QSC</b>	<b>Quick Supply Chains</b>
<b>RSC</b>	<b>Responsive Supply Chains</b>
<b>SC</b>	<b>Supply Chain</b>
<b>SCM</b>	<b>Supply Chain Management</b>
<b>SCOR</b>	<b>Supply Chain Operation Reference</b>
<b>TQM</b>	<b>Total Quality Management</b>



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# CHAPTER 1: INTRODUCTION

## 1.1: Background

The modern competition is a major upheaval that is affecting every aspect of how networked enterprises (supply chain networks) organize and operate. Moreover, we are in the midst of a fundamental revolution in the nature of business and therefore if an individual enterprise wants to thrive in this new landscape, it has to understand how SC networks work and how you can make them work better. A key feature of present day business is the idea that it is Supply Chains that compete, not companies (Christopher and Towill, 2001), and the success or failure of Supply Chains is ultimately determined in the marketplace by the end-consumer. It has been argued that measuring Supply Chain performance can facilitate a greater understanding of the SC, and improve its overall performance (Chen and Paulraj, 2004). Therefore, there is an emerging requirement to focus on the performance of the SC or network in which company is a partner.

Supply chains comprise all activities associated with the flow and transformation of goods from the raw material stage through to the end user (Handfield and Nichols, 1999). It is a vital business function and the process includes sourcing raw materials and parts, manufacturing and assembling products, storage, order entry and tracking, distribution through the various channels and finally delivery to the customer. Several researchers seem to agree that it mainly comprises three elements; physical material flow, information flow and financial flow. It also consists of several members who are positioned upstream or downstream. However, the view of the supply chain has changed over time from an internal to a more external focus i.e. from an internal supply chain to an integrated synchronized supply chain. Hill (2000) describes the origins and evolution of the supply chains by means of four phases. The first phase starts with the integration of the steps within the internal supply chain. The second phase emphasizes the horizontal nature of the process inherent in the basic task of procurement through to the manufacture of finished goods and forges cooperation between the steps in order to create an integrated whole and the opportunity to reduce costs and delays as well as increase customer responsiveness. The third phase concerns coordinating activities between businesses, for example tier 1 and tier 2 suppliers, and stages in the distribution

channel. The final phase involves synchronizing the planning and execution of activities across the supply chain.

A range of benefits have been attributed to supply chain management, including reduced costs, increased market share and sales, and solid customer relations (Ferguson, 2000). Whether organizations achieve the full benefits accruing from effective supply chain management is still an area that needs further research. An international study of modern manufacturing practices reported moderate uptake and perceived effectiveness of supply chain management (Clegg et al., 2002). These findings highlight a very important aspect of supply chain performance measurement: what metrics do organizations use in measuring the effectiveness of their supply chains? What are the challenges in measuring the efficiency and effectiveness of supply chains?

Supply Chain Management (SCM) is a concept that originated in the manufacturing industries in the early-1980s. It was developed from innovations such as Just in Time and Total Quality Management. SCM can be seen as an example of evolutionary and cumulative innovation, which is often described as emanating from internal programs aimed at improving overall effectiveness (Saad *et al.*, 2006). The focus is not only limited to increasing the internal efficiency of organizations, but also has now been broadened to include methods of reducing waste and adding value across the entire supply chain (Christopher, 1998).

The driving forces of SCM stem from two sources: external pressures and potential benefits from strategic SC alignment. External pressures include such forces as advances in technology and increased customer demand across national borders (Basu, 2001), maintaining lower costs while meeting these diverse needs, intensified competition utilizing relationships among vertically aligned firms (Beamon, 1999). Others include greater competitive intensity, tighter alliance relationships, continued merger activity, and need for better information. These pressures have begun shifting the focus of individual firms vying for market presence and power to supply chains competing against supply chains.

The second main driving force entails the potential benefits from successful SC collaboration. These include; unique products and services, faster research and development cycles, superior product quality, cost competitiveness, shorter order

cycles, flexible customer responses, enhanced delivery performance, better asset management, superior channel relationship.

Several studies highlight the need for the right type of performance measures in the supply chain. These studies highlight the need to measure the efficiency of the integrated supply chain. For instance, Chan and Qi (2003) identified six core processes (supplier, inbound logistics, manufacturing, outbound logistics, marketing and sales, end customers) and present input, output and composite measures for each. Similarly, proponents of the supply chain operations reference (SCOR) model, argue that supply chain performance must be measured at multiple levels and assigned five categories of metrics to level 1 of this model; reliability, responsiveness, flexibility, cost and efficiency indicators. In Kenya, researchers have mainly focused on the benefits companies derive from effective supply chain management. Rwoti (2005) observed that procurement performance measurement systems are key to the success of large manufacturing companies. Ayugi (2007), in his study on the effectiveness and efficiency of the supply chain model in the Wrigley Co. East Africa observed that supply chain activities would increase significantly the organizations' performance in the next 5 years. Gatarwa (2007) also found out that East African Breweries Ltd derives a lot of benefits by having upstream and downstream integration of their supply chain.

### **1.1.1: Supply Chain Performance Measurement**

“You can't manage it if you don't measure it” is one of the oldest maxims around, yet is one that needs some significant new attention for companies involved with supply chain management programs (Scott 1997). The main idea behind measuring performance is to obtain information about what needs to be improved. Chibba (2007) describes measurement as the process of estimating or determining the ratio of the magnitude of a quantitative property or relation to a unit of the same property or relation. A measurement process involves a comparison of the physical quantities of objects or phenomena, or the comparison of relations between objects (e.g. angles). Any given measurement is the result of such a process and is normally expressed as the multiple of a real number and a unit, where the real number is the ratio obtained from the measurement process. An example of a supply chain

performance measure could be delivery: "was the product delivered on time to the customer?" Metrics is thus the system of parameters or methods for the quantitative assessment of a process to be measured, as well as the procedure involved in carrying out such a measurement. Metrics defines the items to be measured and is usually specifically related to a given subject area, in which case it is only valid within a certain domain and cannot be directly benchmarked or interpreted outside it (Chibba 2007).

Neely et al. (1995) define performance measurement as the process of quantifying the effectiveness and efficiency of action. Effectiveness is the extent to which a customer's requirements are met and efficiency measures how economically a firm's resources are utilised when providing a pre-specified level of customer satisfaction. Performance measurement systems are described as the overall set of metrics used to quantify both the efficiency and effectiveness of action. Neely et al. (1995) identify a number of approaches to performance measurement, including: the balanced scorecard (Kaplan and Norton, 1992); the performance measurement matrix (Keegan et al., 1989); performance measurement questionnaires (Dixon et al., 1990); criteria for measurement system design (Globerson, 1985); and, computer aided manufacturing approaches.

Organizations today try to measure performance in many areas of their operations. Areas where performance is measured include, the overall customer service performance where product quality and delivery time is if a major concern, production and operations performance which provides an evaluation of how best the company is turning over its raw materials to produce customer satisfying products. Other areas of performance measurement include employee performance appraisals which help organizations in determining the productivity of its employees, as well as identify key areas to improve. Organizations also carry out financial performance appraisal through the use of financial statements, in order to evaluate its financial strength as compared to major players within the industry. This helps organizations benchmark in order to identify ways of doing things better.

However, the establishment of a measurement system requires knowledge about the processes within the organization and between customers and suppliers. To generate this knowledge the organization has to decide what performance metric to

measure. As Robson (2004) stated without the knowledge of the exact circumstances under which a measurement system either will or will not improve the performance, it is difficult to genuinely justify the additional cost of implementing a measurement system. Lambert & Pohlen (2001) claim that most of the performance measures known as supply chain metrics are nothing more than logistic measures that have an internal focus and do not actually capture how the firm derives value and profitability from the supply chain. A supply chain performance metrics system consists of a set of parameters that can fully describe the logistics and manufacturing performance of the whole supply system, as perceived by end customers, as well as of each actor in the chain, as perceived by downstream players. However, there are several supply chain performance measures and metrics that can be assessed. Those most commonly used by practitioners as well as the most cited in research are: quality, delivery, cost/price and flexibility.

### **1.1.2: Kenya Airways Ltd**

Kenya Airways Ltd is the Kenyan National carrier operating scheduled flights throughout Africa, Asia and Europe. Its hub is the Jomo Kenyatta International Airport in Nairobi. It was established in the year 1977 after the breakup of East African Community and subsequent disbanding of the jointly owned East African Airways. Its IATA designated code is KQ. The Kenya Airways Group is made up of, Kencargo Airlines International Ltd, African Cargo Handling Ltd (ACHL) and the Kenya Airfreight Handling Ltd (KAHL) (source; Kenya Airways intranet). Kenya Airways Ltd operates within the upstream of the service sector. Its core business entails the air transportation of passengers and cargo across the globe.

The airline has faced a myriad of challenges since its inception, most of which have been intensified by the impact of globalization. Currently the airline is facing stiff competition in both its domestic and the European routes due to the entrance of new players such as Fly 540 in the East African routes and Virgin Atlantic for the Europe routes. Other competitors include, Emirates, British Airways, Qatar Airways, East African Airways, Jetlink etc. Fuel prices continue to go up and may continue to rise to between \$150 and \$ 200 a barrel within two years, mainly due to lack of adequate supply growth (Chairman's statement in 2007/8 Financial statement). Events

following the recent elections (year 2007) have also impacted the airlines performance, and going forward, as the company strives to withstand increasing competition, there is serious need to control its costs. Other challenges include, process inefficiencies, poor schedule integrity, rapid technological changes, flight delays due technical problems which negatively impacts the on-time performance of the airline. While KQ continues to face these challenges, the airline also needs to contend with a more informed customer, whose service expectation continues to rise.

Kenya Airways continues to work on its fleet modernisation programme through the recent acquisition of a new aircraft for its regional routes. The airline is also planned to take delivery of a new aircraft to replace the one lost in the Doula accident in 2007(Year 2007/08 financial Statements). As we continue to experience the effects of open skies, rising fuel prices as well as globalization, Kenya Airways needs to strategise and employ new tools to ensure they remain competitive. The company has however put in place measures that will ensure that it remains in business. Some of these activities include, the KQ brand development enhancement, in-flight entertainment upgrade, in-flight catering improvements as well as investment on the new Enterprise Resource Planning system (ERP) that was recently implemented in the company. One other means of ensuring that the company succeeds in saving on costs will be the implementation of a proper supply chain management system, and to put measures to ensure the same is appraised on a continuous basis.

Kenya Airways Ltd has a designated section called Supply Chain Division within the Finance department charged with the responsibility of maintaining and operating an effective and efficient Supply chain (Finance department organization chart). The supply chain division handles the entire goods requirement for the company. They source for and purchase commercial stores items, including in-flight consumables, Capital assets as well as items required for office use.

Some of the functions of this section include; developing, implementing and reviewing of the purchasing policy, procedures and strategy to ensure all purchases deliver best value, source goods & services that meet KQ quality standards for smooth operation of the business, carry out periodic cost/benefit analysis on purchasing methods to ensure best options are used to achieve quality goods and

services and value for money, ensure stakeholders adhere to laid down purchasing procedures and policy to improve current practices, which will in turn bring down costs. Others include, negotiate best price and terms of contracts with suppliers to achieve savings, maintain Supplier Contracts/Agreements' records to ensure timely renewals/termination and Supplier rationalization, development and performance rating to ensure timely deliveries and quality assurance including authorizing additions / deletion of new/existing suppliers.(source; KQ internal purchasing manual).

Supply Chain management practices employed by the company include, planning, warehousing, purchasing, forecasting, customer database management and materials logistics. In order to achieve effectiveness and efficiency, the supply chain division has embarked on an aggressive performance evaluation for each supply chain activity.

## **1.2: Statement of the Problem**

Supply chain performance measurement faces challenges at different stages and at different levels within the organisation. A major challenge is to identify, evaluate and select the parameters or metrics, which are appropriate to assess performance. The process of deciding which measures of business performance to adopt is a valuable one, not least because it forces management teams to be very explicit about their performance priorities and the relationship between them. Criticisms of measurement systems designed to evaluate the performance of supply chains mirror those in the wider performance management literature (Neely et al., 1995). They include: lack of connection with strategy (Beamon, 1999; Chan and Qi, 2003; Gunasekaran et al., 2004); focus on cost to the detriment of non-cost indicators (Beamon, 1999; De Toni and Tonchia, 2001); lack of a balanced approach (Beamon, 1999; Chan, 2003); insufficient focus on customers and competitors (Beamon, 1999); loss of supply chain context, thus encouraging local optimization (Beamon, 1999); and lack of system thinking (Chan, 2003; Chan and Qi, 2003).

The importance of measuring the correct metric of performance within an organisation is vital, due to the fact that it may affect the decision process. In Kenya, major research work in this area has focused mainly on case studies and efforts



towards exploring the benefits derived from supply chain practice. Ayugi (2007), in his study on the effectiveness and efficiency of the supply chain model in the Wrigley Co. East Africa, observed that supply chain activities would increase significantly the organizations' performance in the next 5 years. He concentrated on providing an understanding of the existing supply chain model within the organization and the challenges that the model is facing. He identified key supply chain management practices at Wrigley Co.EA as, planning, scheduling and deployment. Gatarwa (2007) also found out that East African Breweries Ltd derives a lot of benefits by having upstream and downstream integration of their supply chain. The main risk he identified was that the company relies on fewer suppliers. Orukoh (2007), in his research on supply chain management practices at Numerical Machining Complex Ltd, identified several SCM practices. These include creation and maintenance of communication across supply chain, continuous improvement along the supply chain, environmental considerations as well as maintenance of proper supplier list. His research findings also echoed the observation that companies derive massive benefits from good supply chain management practices. As was observed by Rwtoti (2005), procurement performance measurement systems are key to the success of large manufacturing companies.

Kenya Airways Ltd being an international airline is currently facing massive competition in both the local and the international routes. Surging fuel prices continue to eat into the company's profits. The company seriously needs to review the performance of every aspect of the company so as to reap the benefits of efficiency and effectiveness. The supply chain section within the company handles large volumes of goods purchases including purchases from overseas suppliers as well as those local suppliers. Adopting an effective and efficient supply chain is of essence to the company during these hard times. It's therefore important to continuously carry out supply chain performance measurement as well as identify the challenges involved.

Through this study, the researcher sought to answer the following questions.

- a) What metrics and the corresponding indicators does the company apply in supply chain performance measurement?

- b) What benefits do they derive from accurate supply chain performance measurement?
- c) What are some of the challenges they encounter in trying to undertake supply chain performance measurement?

### **1.3: Research Objectives**

Key research objectives in this research paper were:

- i) To find out the major supply chain performance measures employed by Kenya Airways Ltd,
- ii) To determine the challenges faced by Kenya Airways Ltd in the measurement of supply chain performance.

### **1.4: Significance of the study**

The systematic study of supply system performance measurement is a relatively recent phenomenon. Research in this area will definitely benefit several stakeholders. To Kenya Airways Ltd, it will act as an eye opener on the need to carry out an appraisal of the performance of their supply chains. The research findings will help managers in continuously seeking better ways of carrying out supply chain performance measurement practices. This is further strengthened by the fact that the new Enterprise Resource Planning System (ERP) recently implemented by the company shall provide new challenges and opportunities for effective supply chain performance measurement.

To the airline industry at large, this work will definitely be a breakthrough as it addresses a dimension that will definitely result in cost savings given that the industry is already bearing the brunt of surging fuel prices.

The Government in their bid to implement Information Technology and as they work towards the realization of their Vision 2030 will for sure benefit from this research work. By continuously evaluating the performance of their supply chains, the Government will realize massive savings by employing good supply chain management practices.

The student fraternity will also benefit by having a rich reference material at their disposal. Moreover, this research work will definitely propose further researchable areas hence ensuring continuity in the development of the supply chain concepts and forming the basis for further research.

## CHAPTER 2: LITERATURE REVIEW

### 2.1: Supply Chain Management.

Supply Chain Management can be defined as a collaborative effort of multiple channel members to design, implement, and manage seamless value added processes to meet the real needs of the end customer. The developments and integration of people and technological resources as well as the coordinated management of materials, information, and financial flows underlie successful supply chain management. The supply chain of a firm is often described in terms of upstream and downstream flows. Christopher (1998) defined supply chain and its management as the management of upstream and downstream relationships with suppliers and customers to deliver superior customer value at less cost to the supply chain as a whole. Both definitions state that the supply chain includes upstream suppliers, internal functions, and downstream customers. The first definition mentions the information flow which is connected to the physical material flow, while the second introduces the important economic aspects of cost and price in the management of the flows.

Supply chain management deals with how the chain operates in its environment (Cigolini, Cozzi et al. 2004; Hill 2000) and requires meaningful collaboration and mature relationships in order to provide the necessary basis for cooperation and joint development. Each member of the chain is a vital link who affects its efficiency and effectiveness, which requires a structural change e.g. closer collaboration between the members, in order to ensure that the appropriate IT solutions are employed. Abrahamsson and Brege (1997) highlight the need for structural changes in different parts of the supply chain and argue that, without them, the various functions will operate more or less independently and the supply chain concept will be no more than a piece of paper with no major influence on the actual supply chain performance. Holmberg (2000) argues that the implementation of SCM requires an expansion of the organization's view on performance measures to include both "interfunctional" and "partnership" perspectives and avoidance of inward-looking and self focused attitudes in the management approach.

During the last two decades supply chain management literature has evolved rapidly as a result of global competition and the introduction of information technology.

Reducing cost and increasing profitability has always been of interest to organizations that compete on a market. Some researchers claim that it is the supply chain itself that competes on a market and not merely the organizations with their specific strategies and goals (e.g. Christopher, 1997). All members of the supply chain, both upstream and downstream, are actors who influence its output (e.g. quality, delivery, cost). In a framework that reflects manufacturing strategy issues in corporate decisions, Hill (2000) describes how organizations can gain advantage over their competitors. He claims that supply chain strategy is part of the overall manufacturing strategy of an organization, and therefore the manufacturing performance affects the performance of the supply chain. The need to measure the correct metrics of performance within an organization is vital, due to the fact that it may affect the decision process.

SCM represents a state-of-the-art management tool used to enhance overall customer satisfaction that is intended to improve competitiveness and profitability. It addresses such modern business issues as: long-term strategic alliance and supplier-buyer partnership, cross-organizational logistics management, joint planning and control of inventory, and information sharing (Beamon and Ware, 1998). Cooper *et al.* (1997) describe the conceptual framework of SCM, which consists of three major and closely related elements: business processes, management components, and the structure of the supply chain.

In order to survive in the global competition and sustain long-term advantages, more and more enterprises have introduced SCM. According to Christopher (1992), leading-edge companies have realized that the real competition is not company against company, but rather supply chain against supply chain.

There is a framework for benchmarking the supply chain. The Supply Chain Council has presented a model known as SCOR (Supply Chain Operations Reference) which is built around four major processes: plan, source, make and deliver. These processes can be seen as interlinked flows. The aim of the model is to present standard metrics which can be used for benchmarking. However, this framework does not fully take the type of supply chain (e.g. efficient, quick, agile, lean or hybrid) into consideration or where in the supply chain an organization should measure. Therefore, it could be relevant to present a framework that states which performance

measures, sub measures and metrics should be measured, depending on the type of product being manufactured and the type of supply chain the organization operates in. It is also be beneficial for organizations to measure the performance of their own supply chain from supplier to end customer, involving both actors upstream and downstream. Both researchers and practitioners refer to quality, delivery, flexibility and price as supply chain performance measures. These measures are often referred to by purchasing managers when choosing suppliers. The metrics describing these measures could be: time to deliver a product, number of products delivered without defects, cost of a product etc.

### **2.1.1: Barriers to effective Supply Chain Management**

It is important to recognize that SCM is complex and has proved to be difficult to implement. It is described as a multi-factor process, reliant upon close and long-term relationships within and between organizations (Saad et al., 2002). Its success is associated with the challenging and difficult development of a new culture based on shared learning, greater transparency and trust. With a greater reliance on suppliers and the increasing emergence of outsourcing and fierce competition, the main challenge for SCM is to sustain and continuously improve the coordination and integration of all interactions and interfaces in order to enhance the overall performance of the supply chain. The resisting forces to strategic supply management come both from the nature of the organization itself and the people that compose the organization.

These barriers can be classified under one of two headings: "inter-firm rivalry" and "managerial complexity" (Park and Ungson, 2001). Inter-firm rivalry is a misalignment of motives and behaviors among allying partners within the strategic supply chain (Park and Ungson, 2001). Some barriers under this category include internal and external turf protection, poor collaboration among chain partners, and lack of partner trust. In short, inter-firm rivalry is the tendency for allying partners to compete rather than willingly cooperating. Absent a willingness to cooperate, a supply chain will not be able to attain lower costs and higher returns on investment. Further, irregular collaborative meetings among chain partners hinder managers' opportunities to share with one another concerns, weaknesses, and best practices.

Other barriers to SCM fall under managerial complexity or misalignments in allying firms' processes, structures, and culture (Park and Ungson, 2001). Under the umbrella of managerial complexity barriers include information system and technological incompatibility, inadequate measurement systems, and conflicting organizational structures and culture (e.g. Sheridan, 1999; Tyndall *et al.*, 1998; Quinn, 1997a). Because many firms are comfortable using their systems for only their own tasks, it is not surprising to see inconsistent information and technology systems as a barrier. People are change averse and unwilling to share information for fear of exposing their weakness and secrets to others. If SCM is to be implemented across company borders, a revamp in attitude and thinking is necessary. Cooper *et al.* commented: Successful supply chain management requires a change from managing both individual functions to integrating activities into key supply chain processes (Cooper *et al.*, 1997).

### **2.1.2: Bridges to Effective Supply Chain Management.**

Modern business practice requires that management put in place measures and controls to discover challenges that the business is facing, and to instigate procedures to control and counter the challenges. With respect to effective supply chain management, some of the bridges identified include, transparent information systems, cross-functional collaboration, and collaborative planning across the supply chain (Kulp *et al.*, 2004; Mentzer *et al.*, 2000; Monczka *et al.*, 1998). If SC managers are expected to make difficult decisions in dynamic environments, valuable information must be available at the right place, at the right time, and in the right hands of people who approach the problem from different perspectives and with different styles.

The remaining bridges include adopting a strategic SC vision, paying attention to human factors, and supply-base reduction and certification (Barratt, 2004a; Metz, 1998; Tan *et al.*, 1998). This spectrum of proposed solutions suggests a single remedy that cannot solve all effective SCM barriers. Managers must be able to “think outside of the box” using different combinations of approaches with different people to remedy SC problems.

### **2.1.3: Challenges faced in Supply Chain Performance Measurement**

Intensifying competition, globalization as well as rising costs of operation has put a lot of pressure on management to seek ways of achieving efficiency and effectiveness in all areas of operation. Many organizations have thus embraced the concept of performance measurement. Organizations are however faced with several challenges in supply chain performance measurement.

Brewer and Speh (2001) postulated a number of concerns in applying performance measurement tools and systems across the SC. These include; overcoming mistrust, lack of understanding, lack of control, incapable information systems, lack of standardized performance measures and difficulty in linking measures to customer value. They further stated that in SCs with multiple vendors, manufacturers, distributors and retailers, whether regionally or globally dispersed, performance measurement is challenging because it is difficult to attribute performance results to one particular entity within the chain. (Hervani *et al.*, 2005). Holmberg (2000) also suggested that a lack of systems thinking has plagued Supply Chain Performance Measurement system (SCPMS) design and development. Beamon (1998) observed that a single performance measure will be inadequate for an entire SC, and that a system of performance measures is required for accurate measurement of SC systems. Beamon (1999) also observed that current SCPMS are inadequate because they use cost as a primary (if not sole) measure, they are not inclusive, they are often inconsistent with the strategic goals of the organization, and do not consider the effects of uncertainty.

### **2.1.4: Types of Supply Chains.**

There are several types of supply chains described in the literature. Fischer (1997) presented a model which links supply chains to products. The model describes two types of supply chains and connects functional and innovative products to them i.e. efficient supply chains (ESC) are matched to functional products while market responsive supply chains (RSC) are linked to innovative products. An efficient supply chain, ESC, brings products to the market that can broadly be considered as commodities and are often sold in high volumes (e.g. grocery, newspapers ...).



Because of the stability of their product flows, such organizations can invest in large and financial-intensive facilities, and improvement initiatives are focused on operations rather than product innovation.

A quick supply chain, QSC (e.g. fashion apparel, white products) can be defined as products whose demand is difficult to forecast. These types of organizations invest in manufacturing systems with a high variable vs. fixed cost ratio due to the fact that manufacturing flexibility is very important. A lean supply chain, LSC, (e.g. automobiles) deals with a functional product, the demand for which can be forecast. LSCs also have intermediate characteristics: firms do not only compete on product price or novelty, but simultaneously on price, novelty, quality and customer service. An LSC employs continuous improvement processes in order to eliminate waste or non-value stops across the chain (Christopher and Towill, 2000). The LSC employs both lean production and time compression to ensure economical, flexible and responsive operation. Naylor (1997) presented a definition of leanness: to develop a value stream to eliminate all waste, including time and to enable a level schedule. Innovative products focus on capturing new markets and are designed to be acceptable to changing customer demands. Huang, Uppal et al. (2002) argue that this type of product usually has uncertain demand and its design may be unstable; such products are in the introduction or growth stages of the product life-cycle. Huang, Uppal et al. (2002) claim that this justifies the use of an agile supply chain (ASG), the paradigm of which was presented by Christopher and Towill, 2000.

According to Naylor et al. (1999), agility means using market knowledge and a virtual corporation to exploit profitable opportunities in a volatile marketplace. Huang, Uppal et al. (2002) presented a hybrid supply chain i.e. a combination of an LSC and ASC, which they claim might be the best choice for car manufacturers. In the example provided, they demonstrate that some automobile components may contain innovative features. As a result, these components may be produced using either lean or agile techniques. A hybrid supply chain may therefore be appropriate, as it consists of a mix of both lean and agile techniques. Naylor et al. (1999) also presented a supply chain which is a combination of LSC and ASC i.e. Leagile supply chain. This type of supply chain is described by Christopher and Towill (2000) as both lean and agile i.e. agile enough to respond to what is actually selling (market driven) with availability as the market winner. Christopher and Towill (2000) also presented a

"customized leagile supply chain" which has a more customer driven approach where the market winner is lead-time, and an example of a product could be a personal computer. Dell supplies products that accord exactly with individual customer specifications.

## **2.2: History of Performance Measurement**

There are at least five identifiable phases of performance measurement evolution. These start with the basic measurement of financial transactions, an element that is still in evidence today and which is focused on the traditional "buy cheap – sell dear – make profit" perspective (Morgan 2007). While this mode of measurement is as old as trading itself, it became formalized with the invention of the double entry book keeping systems in Venice during the fifteenth century, the principles of which are still embedded in modern accounting practice.

The next phase of performance measurement resulted from the industrial revolution and the development of the manufacturing environment. Although financial measures still dominated management thinking, efficient resource utilization became important as competition and new products and services developed. This was also the age that resulted in "Scientific Management" and the development of high-volume production and the production line. This era of managerial determinism used the work-time measure to define, predict and standardize work systems performance and to regulate the activities of manufacturing organizations (Taylor, 1911; Gilbreth and Gilbreth, 1921). This focus was described by Ford (1926) as: Standardization in its true sense is the union of the best points of commodities with all the best points of production, to the end that the best commodity may be produced in sufficient quantity and at the least cost to the consumer.

It can be reasonably argued that these internally focused perspectives pervaded the thinking of management for a long time, perhaps until the end of the World War II, and the subsequent steady rise of the "quality revolution". Although starting at a very low-level in the 1950s, by the 1970s and 1980s the quality revolution was in full swing. The initial work of Shewart (1931), subsequently expanded and applied in industry by Deming (1939) and Juran (1988) and their successors, did a great deal

to encourage managers to add two new foci to the performance portfolio – the customer and the process. Although, it could hardly be described as an “overnight success” the quality revolution did much to change managers’ perspectives to include a critical, and subsequently important, external focus. It also introduced managers to the concept of the “process” as a deliverer of customer satisfaction. At the heart of the process philosophy were four important quality issues that had to be addressed and measured; the extent to which the process delivers what the customer (internal or external) requires, the need to design quality into the product or service, the capability of the process to achieve the standard required; and the principle and achievement of continuous improvement.

In parallel, with these innovations, and in response to increasing complexity of businesses, management accounting also developed. But, as Johnson and Kaplan (1987) explained, by 1925 virtually all management accounting practices used today had been developed; cost accounts for labour, material and overhead; budgets for cash, income and capital; flexible budgets, sales forecasts, standard costs, variance analysis, transfer prices and divisional performance measures.

However, as they forcibly argue, the business environment changes subsequent to 1925 increasingly left the accounting fraternity behind. Manufacturing, in addition to the changes wrought by quality developments, was moving into radical new paradigms in order to remain competitive in international markets. Hughes *et al.* (1998) describe the 1970s as being a time when the explosion in computing drove a lot of change, especially in the use of Manufacturing Requirements Planning (MRP II) to improve management control; the 1980s as the decade of just-in-time manufacturing; the 1990s as the “Lean” decade when cost reductions were achieved through comprehensive information systems enabling the refinement and integration of resource and cost management; and, the 2000s as (speculatively) the decade of the “Agile” system in which flexibility and the integrated supply network are the key enablers of development.

Against this background of change the fourth phase of performance measurement emerged in which the financial measures began to be regarded as part of an integrated performance measurement system. The Balanced Scorecard, probably the most widely evaluated and discussed performance measurement system of all

time, was introduced to the world by Kaplan and Norton (1996). Their argument, rooted in Johnson and Kaplan's previously cited work, was founded on the core basic ideas that; the performance measurement system should be balanced and not be dominated by one single measurement perspective, the performance measurement system should be designed in such a way that there is alignment of all measures with the organization's strategy, there are four basic business perspectives that should be measured – the financial perspective, the customer perspective, the internal business process perspective, the learning and growth perspective; and the performance measurement system should be a dynamic and ever changing system that reflects the strategic responses of the organization to its market. What should, and should not, be included in the four business perspectives has been the subject of intense debate

The final and current phase is one in which the importance of the supply network emerges. From a philosophical point of view this represents a significant shift away from the unitary to the pluralist perspective. It recognizes that customer satisfaction can only come from the supply system functioning effectively in totality (both processes and process interfaces). This closely follows the logic of Goldratt and Cox's (1984) "Theory of Constraints" model as focused on intra-organizational activities, and its subsequent extrapolation to a wider inter-organizational perspective (Srikanth and Cavallaro, 1987). However, as Christopher (1998) suggests, success in meeting customers' needs requires an increasing international perspective from the supply network and this introduces a new vector of pan-culturalism into the performance measurement perspective.

### **2.2.1: Supply Chain Performance Measurement.**

Studies on supply chain have highlighted the need to measure the efficiency of the integrated supply chain. Neely et al. (1995) defined performance measurement as the process of quantifying the effectiveness and efficiency of action. The efficiency can best be described by customers. Petroni and Panciroli (2002) argue that customers usually retain suppliers who achieve the highest aggregate score on price, quality, flexibility of production and delivery times. De Toni, Nassimbeni et al. (1994) claim that an efficient high quality supply chain is dependent on the

achievement of a high-level performance in terms of cost, quality and time-to-market. Hayes and Wheelwright (1984) were the first to present methods for addressing operational strategy by means of four generic competitive priorities; quality, cost, flexibility and delivery, which are the dimensions on which a company chooses to compete within a target market. Their original formulation was applicable to all functions.

Hill (2000) also addresses competitive priorities such as price, cost reduction, delivery reliability, delivery speed, quality conformance, flexibility i.e. increased demand, product range and design, which he terms order-winners or qualifiers. Since the beginning of the manufacturing era, performance measures have been important for organizations as a way of obtaining knowledge about what is happening around them. Lambert & Pohlen (2001) argue that a well crafted system of supply chain metrics can lead to competitive advantage through differentiated services and lower costs. They also hold that implementing a supply chain strategy requires metrics that align performance with the objectives of the other supply chain members. The performance of a supply chain can be viewed as a system of measures such as quality, delivery, flexibility and cost/price. Traditional performance measures such as profitability are less relevant for measuring supply chain performance.

A well known framework for benchmarking performance in the supply chain is that of the Supply Chain Council, which is a cross-industry association. Their model, known as SCOR (Supply Chain Operations Reference), is built around four major processes, namely: plan, source, make and deliver. These processes cover the key supply chain activities from the point of identifying customer demand to delivering the product. The main aim of this reference model is to provide a standard way of measuring supply chain performance and to use fixed metrics for benchmarking against other organizations (Christopher 1998). The framework describes metric type, the expected outcomes and the diagnostics that can be predicted. However, the Supply Chain Council's integrated supply chain metric framework does not fully take an organization's type of product, type of supply chain or measurement situation into account.

The main idea behind measuring performance is to obtain information about what needs to be improved. Organizations today try to measure their overall customer service performance, and while the criteria considered vary, they usually include quality (of the product) and delivery time. Some businesses need a measurement system in order to keep abreast of customer requirements e.g. ISO certification. However, the establishment of a measurement system requires knowledge about the processes within the organization and between customers and suppliers. To generate this knowledge the organization has to decide what performance metric to measure. As Robson (2004) stated "without the knowledge of the exact circumstances under which a measurement system either will or will not improve the performance, it is difficult to genuinely justify the additional cost of implementing a measurement system". Pagell & Krause (2002) presented a table of performance items for assessing organizational strategy, the main idea being to describe "priority" e.g. quality (reliability, durability, conformance), delivery (speed, reliability), flexibility (volume, mix), cost (price, total cost) and innovation (process, product) as well as the focus of the manufacturing and purchasing items. For example, quality (reliability) in manufacturing is defined as "the ability to maximize the time to product failure or malfunction" while in purchasing the "supplier selection and retention decisions are based on the ability of a supplier to provide reliable inputs". Lambert & Pohlen (2001) claim that most of the performance measures known as supply chain metrics are nothing more than logistic measures that have an internal focus and do not actually capture how the firm derives value and profitability from the supply chain. A supply chain performance metrics system consists of a set of parameters that can fully describe the logistics and manufacturing performance of the whole supply system, as perceived by end customers, as well as of each actor in the chain, as perceived by downstream players. However, there are several supply chain performance measures and metrics that can be assessed. Those most commonly used by practitioners as well as the most cited in research are: quality, delivery, cost/price and flexibility.

## **a) Quality**

According to the freedictionary.com, product quality has been defined as the collection of features and characteristics of a product that contribute to its ability to meet given requirements. There are three views for describing the overall quality of a product (freedictionary.com). First is the view of the manufacturer, who is primarily concerned with the design, engineering, and manufacturing processes involved in fabricating the product. Quality is measured by the degree of conformance to predetermined specifications and standards, and deviations from these standards can lead to poor quality and low reliability. Second is the view of the consumer or user. To consumers, a high-quality product is one that well satisfies their preferences and expectations. This consideration can include a number of characteristics, some of which contribute little or nothing to the functionality of the product but are significant in providing customer satisfaction. A third view relating to quality is to consider the product itself as a system and to incorporate those characteristics that pertain directly to the operation and functionality of the product. This approach should include overlap of the manufacturer and customer views.

Hill (2000) holds that the definition of the term quality has been broadened to encompass many dimensions, resulting in a lack of understanding and subsequent lack of direction. One reason why companies do not compete in the quality domain is due to failure to clarify which dimension(s) of quality will provide the best result in given markets. One oft cited researcher who presented eight dimensions of quality is Garwin (1988) as per table below.

**Table 2.1. Dimensions of quality and the function(s) typically responsible for their provision**

<b>Dimension of quality</b>		<b>Function(s) typically responsible for their provision</b>
Performance	A product's primary operating characteristics	Design
Features	Secondary characteristics the "bells and whistles"	Design
Reliability	The probability of a product malfunctioning within a given period	Design
Conformance	The degree to which a product is manufactured to the agreed specification	Manufacturing
Durability	A measure of a product's life in terms of both its technical and economic dimensions	Design
Serviceability	The ease of servicing (planned or breakdown) including the speed and provision of after-sales services	Design and After-sales
Aesthetics	The appearance of the final product	Design
Perceived quality	How a customer views the product.	Marketing and Design

Source: Garwin, 1988; Hill 1993 cited in Chibba 2007, pg 16

The above dimensions of quality are generic dimensions that can apply to all types of products and services in all types of markets. These quality dimensions are well known and much cited. However, the term product quality, which is not mentioned above, can be classified according to perceived quality i.e. how a customer views the product. Product quality is focused on the user of the product (or service, service quality). The user can be an organization or an individual, not necessarily the end customer but a customer within the supply chain i.e. an internal customer. The



supply chain performance measure “quality” has several sub measures e.g. conformance quality, quality reliability and end product quality. In the literature, quality and delivery are described as important measures for monitoring the supply chain (Christopher and Towill, 2001; Aitken, Childerhouse et al., 2003; Hill, 1993).

## **b) Delivery**

There are several performance sub-measures connected to delivery e.g. on time delivery, delivery reliability, faster delivery times, delivery service, delivery frequencies, delivery synchronization, delivery speed etc. Delivery reliability concerns supplying the ordered products on the agreed date. On-time delivery (OTD) is therefore a major concern of the manufacturing as well as the distribution function. Hill (2000) argues that in many businesses this criterion constitutes a qualifier. A study of the Indian automobile industry (Saad and Patel 2006) showed that the key supplier selection factors identified by most of the respondents were supply delivery lead time, historical rejection rate, geographical proximity and reliability. If organizations frequently miss the OTD date, they usually end up with a problem and have to improve quickly before customers change to a different supplier. OTD is a competitive factor and customers tend to measure this performance metric.

Hill (2000) argues that a company wins orders through its ability to deliver more quickly than competitors or to meet the required delivery date when few or none of the competition can do so. He holds that there are two perspectives on the issue of delivery speed. One is when the process lead time, although shorter than the delivery time required by customers, is difficult to meet as a result of the current forward order load, i.e. the order backlog on the manufacturing capacity, which means that the process lead time to complete the order is greater than the delivery time required. The second perspective is when the process lead time is greater than the customer delivery requirement. Delivery has several sub metrics, and organizations decide which sub measures are most appropriate to measure, e.g. delivery from suppliers, delivery within their own organization or delivery to customers.

### **c) Cost**

Cost reduction both externally and internally in the supply chain is vital for improving productivity. Hill (2000) claims that many organizations do not concentrate their efforts in the area of greatest cost. Instead, they concentrate on reducing the cost of direct labour. Gadde and Håkansson (2001) provided examples of what is usually known as indirect purchasing costs. These costs can be defined as: purchasing costs, goods handling costs, storage costs, financial costs, supplier handling costs, administration costs and development costs. Cost is strongly connected to the performance measure price. Hill (2000) states that price is an increasingly important order-winning criterion, especially in the growth, maturity and saturation phases of the product life cycle. The task of manufacturing is to achieve the low costs necessary for price sensitivity in the market-place. This measure is strongly connected to suppliers i.e. purchased items, as well as the manufacturing organization's own workforce.

### **d) Flexibility**

Flexibility can be defined as "the extent to which a company intends to respond to market changes e.g. significant increases in demand" (Beamon, 1999; Hill, 2000). Or as Harrison (2001) states: "flexibility is the management of reacting to changes in demand by preserving the resources of time, money, materials, people, plants and suppliers until they are specifically required". Both definitions characterise flexibility as the capability to respond to individual customer requirements. This is a broad performance measure that includes: demand increases (volume), product range (mix), order handling (time), order size etc. Hill (2000) argues that, in some markets, a company's ability to respond to increases in demand is an important factor in winning orders. Japanese car manufacturers provide a good example of flexibility; they have established and continue to develop a production system capable of responding to individual customer requirements (Hill, 2000). Slack (1991) identified four types of system flexibility where each type can be measured in terms of range and response: volume flexibility (the ability to change the output level of products produced), delivery flexibility (the ability to change planned delivery dates), mix flexibility (the ability to change the variety of products produced) and new product flexibility (the ability to introduce and produce new products).

## 2.2.2: Appropriate Supply Chain Performance Measures

Chibba in his 2007 research paper observes that a primary efficient supply chain measure is cost e.g. total cost from suppliers through the internal supply chain to customer, or all types of cost that have a bearing on the cost of manufacture. The primary supply chain metric can be expressed as e.g. cost/purchased item. A quick, agile or market responsive supply chain (which has similar characteristics) has shorter lead times i.e. delivery as a primary measure, while flexibility (mix) of production and product quality are also primary measures. A shorter lead time from order to delivery is another important Lean supply chain measure, ~~but not~~ but not to the same degree as cost i.e. cost is more important than delivery. A hybrid (lean & quick/agile/market responsive) supply chain focuses on shortening the lead times at component level but without incurring cost, while in order to accommodate customer requirements, it follows the agile (quick/market responsive) supply chain performance measures at product level i.e. delivery, flexibility and quality.

## 2.2.3: Benefits of Supply Chain Performance Measurement

In modern business management, performance measurement goes well beyond just quantification and accounting. It is supposed to contribute much more to business management and performance improvement in the various industries. Sink and Tuttle (1989) claim that you cannot manage what you cannot measure. From the management perspective, performance measurement provides necessary information of management feedback for decision makers and managers. It plays the important roles of monitoring performance, enhancing motivation, improving communications, and diagnosing problems (Rolstandas, 1995; Waggoner *et al.*, 1999). Furthermore, performance measurement provides an approach to identifying the success and potential of management strategies, and facilitating understanding of progress and position. Hence, it assists in directing management attention, revising business goals, and re-engineering business process (Beamon and Ware, 2000; Kuwaiti and Kay, 2000; Van Hoek, 1998).

## CHAPTER 3: RESEARCH METHODOLOGY

### 3.1. Research Design

This research work mainly focused on KQ, hence regarded as case study. The main focus was to explore the main supply chain performance measures employed by the company as well as the challenges faced by the company in supply chain performance measurement. This design was selected due to the nature of the research objective which required an in-depth understanding of the various supply chain performance metrics in performance measurement as well as the challenges faced in supply chain performance measurement. Kothari (1990) states that, a case study involves a complete observation of a social unit; a person, institution, a family, cultural group or the entire community and emphasises depth rather than breadth of a study..

### 3.2: Population

This research paper mainly focused on the supply chains function within Kenya Airways Ltd. Given that the research focused only on a section within the company, the population consisted of all the section managers and their immediate subordinates. These are the people involved in the day to day supply chain activities of the company.

### 3.3. Data Collection

Primary data was the main source of data for this research work. Data was collected by use of a semi-structured questionnaire having closed ended and open ended questions, as well as the use of face to face interviews. The questionnaire was structured in three parts. Part A was used to capture the background information of the company, for instance, information on key objectives and strategies pursued by the company. Part B focused on the performance measurement metrics used by the company in measuring supply chain performance. Part C on the other hand captured data on the challenges as well as the benefits that accrue from effective supply chain performance measurement.

The questionnaires were dropped by the researcher personally, and the respondents given a period of three days to fill the questionnaires, after which the same was collected personally by the respondent.

### **3.4: Data Analysis**

Quantitative data collected through the questionnaires was reviewed, thoroughly checked for accuracy and completeness. Data was then coded to enable statistical analysis to be carried out. The analysis involved the use of descriptive statistics, mainly the mean in order to provide a summary of the main supply chain performance measures and the factors that hinder effective supply chain performance measurement. The results of the analysis were then presented by use of graphs, tabular descriptions as well as through written explanation.

## CHAPTER 4: DATA ANALYSIS AND FINDINGS

### 4.1: Overview

A structured questionnaire was sent to 15 members of staff within the supply chains division of the company. Out of the 15, a total of 13 respondents actually filled in the questionnaires. This gives a response rate of 87% which is representative enough to allow analysis to continue.

The questionnaire was structured in three parts with the aim of collecting data on, the background information of the company, data on the supply chain performance measures employed by the company, as well as the key benefits and challenges derived from effective supply chain performance measurement.

### 4.2: Background Information

The respondents were asked several questions regarding their views on various aspects of the company and the airline industry as a whole.

#### 4.2.1: Role of Section to the company's operations

Information was sought regarding the respondents view of the strategic role played by their section in the airlines operation. The results obtained are presented in table 4.1 below.

**Table 4.1: Strategic Role of Section to the company's Operations.**

Role	No. Of Responses.	Percentage
a) Core to the airlines operations	7	54%
b) Supportive	6	46%
Total	13	100%

Source: Research Data

From the table above, most respondents view their section as having a strategic and critical role to the company's operation. This can be attributed to the nature of the purchases and support provided by the section. The supply chains section carries

out the entire company's goods requirement, ranging from sourcing and procurement of the companywide capital expenditure, aircraft spare parts, in flight consumable goods as well as stationary items.

#### 4.2.2: Importance of KQ objectives

Kenya Airways Ltd has several objectives that it pursues. The respondents were asked to rate on a scale of 1 to 5, 1 being "not applicable", 2 "not important", 3 "Slightly Important", 4 "Important" and 5 "very important", how important they considered the objectives pursued by the company. From their responses presented in table 4.2.2 below, it is evident that the most important company objectives among the respondents are achieving world class standards in service delivery and providing the highest level of customer satisfaction. The other objectives presented in their order of importance are as follows: to develop a business model that will deliver consistent level of profitability, to maintain sound principles of corporate governance, to be a socially responsible company and. maximising employee satisfaction

**Table 4.2: Importance of KQ objectives.**

No.	Description	Mean of Responses.		
		3	4	5
a)	To achieve world class standards in service delivery	0.00	0.08	0.92
b)	Providing the highest level of customer satisfaction	0.00	0.08	0.92
c)	To develop a business model that will deliver consistent level of profitability	0.15	0.15	0.69
d)	To maintain sound principles of corporate governance	0.08	0.38	0.54
e)	To be a socially responsible company	0.15	0.46	0.38
f)	Maximising employee satisfaction.	0.31	0.38	0.31

Source: Research Data

### **4.2.3: Response to Technological Changes**

When asked to rate how first the company responds to technological changes, all the respondents were in agreement that the company aggressively adopts new technological advancements available in the market. This view can be supported by the recent adoption of the Enterprise Resource Planning tool (ERP) that was recently implemented by the company starting April year 2008.

### **4.2.4: Competitive Strength of an Airline**

The respondents were asked to rate the competitive strengths that they believe an airline should possess in the market in order to effectively compete. The results presented in order of importance include, Reliability, in terms of On-time Performance, Delay minimisation, Schedule integrity and passenger security. Customer Service, which entails how the passengers are handled both during the flight and on ground at the counters, resolution of problems, for example locating lost items etc, .Frequency of Flights, which refers to the Number of times the airline flies into and out of a given market on a daily /weekly basis, Partnerships for example, the Interline agreements that airlines are continuously getting into, such as Special Prorate Agreements (SPA), code shares as well as mergers, Average fares of the company compared to other airlines within the industry, Distribution Strength in terms of how spread the airline is through travel agents, and own regional offices. This translates into how easy is it for customers to get the company's offices or agents across the globe. Lastly, Market share, given by the company's total sales compared to total airlines sales within the industry.

### **4.2.5: Business Strategy**

When asked about the business strategy that the company employs, most respondents were not comfortable commenting on the issue citing that this was equivalent to disclosing to the competition how the company was conducting its business. A few others were of the view that this question could probably have been better answered by the people in the strategy section within the company. Nevertheless, they still responded and a large percentage was of the view that the company employs a focus strategy. This was their personal view, and they argued



that this was the case considering the company was now working on having a strong hold on the African routes.

#### 4.2.6: Barriers to Entry of other Airlines in the Market

The respondents were asked to rate the barriers to entry of airlines into the market as either “very high”, “high”, “moderate”, “low” or “very low”. As presented in table 4.3 below, Start up costs received the highest grading posting an average of 0.77 for “very high”. Cut throat competition and safety followed with a rating by 0.62 “for very high”. Air Service Agreements and security came fourth with a rating averaging 0.54 for “very high”. Economic regulation was however rated at an average of 0.23. The least considered barrier to entry however was average fares.

**Table 4.3: Barriers to Entry of other Airlines in the Market**

Factor	Mean of Responses			
	Very High	High	Moderate	Low
a) Start up Costs	0.77	0.00	0.23	0.00
b) Cut Throat Competition	0.62	0.38	0.00	0.00
c) Safety	0.62	0.15	0.15	0.08
d) Security	0.54	0.31	0.00	0.15
e) Air Service Agreement	0.54	0.23	0.23	0.00
f) Economic Regulations	0.23	0.46	0.23	0.08
g) Average Fares.	0.08	0.54	0.31	0.08

Source: Research Data

This implies that the high start up costs associated with the operation of an airline makes it difficult for other airlines to enter a particular market.

The respondents were then asked generally whether in their view it was easy for an airline to join their market. It was found out that a majority believe it is relatively easy to enter the existing market. When asked why it was generally believed that entry into the market was easy despite the high start up costs, the respondents gave examples of the new entrants such as Fly540 airline and Virgin Atlantic airlines as testimony to their beliefs.

#### **4.2.7: Level of Competitor Rivalry in the Market**

Kenya Airways is facing competition in its market. The respondents were asked to evaluate the level of competitor rivalry in the market. Of those who responded, 31% of the respondents believe that competitor rivalry is very high, while 54% think it high compared to 15% who rate the level of competition as moderate. From these results, it is evident that competitor rivalry is high in the airline industry.

#### **4.3: Performance Measurement Dimensions**

This section captures data on the various measurement dimensions that the company uses to measure the performance of the supply chains.

##### **4.3.1: Supply Chain Performance Dimensions**

The respondents were asked to rate the various performance measurement dimensions that the company uses in assessing the performance of their supply chain. The various supply chain performance measurement dimensions employed by the company as per the responses obtained from the respondents is presented below arranged according to their level of importance. They include, Quality of Purchases, Effectiveness of the procurement activities eg, Logistics, sourcing, negotiations, Stock turnover, Number of Supplies rejections, Cost of materials/items, Flexibility of Suppliers to changing demands pattern, Supplier Lead Times, Response time to user demands and Days taken to clear imported non stocked items

The above mentioned dimensions are measured frequently with half the number of respondents saying they are measured on a weekly basis, others saying on a monthly basis. This implies that the company is continuously seeking to improve performance of their supply chains.

### 4.3.2: Performance Indicators

The respondents were asked to indicate for each measurement dimension the performance indicators that are used. The results obtained were as presented in table 4.3.2 below.

**Table 4.4: Performance Dimensions & corresponding Indicators**

No.	Dimension	Indicators
a)	Cost of materials/items	i)Average cost of purchases, ii)Percentage savings on budget, iii)Price index
b)	Supplier Lead Times	i)On time full delivery, ii) Supplier time lapse, iii)Stock outs
c)	Effectiveness of the procurement activities eg, Logistics, sourcing, negotiations.	i)Procurement Savings, ii)Level of stock outs, iii)Working capital management, iv)Deferred check maintenance, v)Ordering time lapses, vi)Timeliness in meeting internal customers requests
d)	Quality of Purchases	i)Level of obsolete and excessive materials, ii)Stock valuation and audits, iii) Conformance to user specification, iv) Durability of product
e)	Response time to user demands	i)Feedback from internal customers, ii) Time taken to convert a purchase demand indent to a purchase order, iii) Aircraft on Ground
f)	Flexibility of Suppliers to changing demands pattern	i) On time deliveries, ii)Level of supplier complains
g)	Days taken to clear imported non stocked items	i) To achieve clearance within 3 days for local purchases and 8 days for overseas purchases
h)	Stock turnover	i)Average departmental usage, ii)Level of stock outs
i)	Number of Supplies rejections	i) Achieve minimum stock rejections attributable to quality.

Source: Research Data

From the above table, it's clear that each performance measurement dimension has a corresponding indicator. This helps to assess how well the targets have been met. For example to assess how cost of materials is measured, consideration is given to the average cost of purchases.

#### **4.4: Supply Chain Performance Measurement Challenges and Benefits**

This section addresses major challenges and benefits encountered in supply chain performance measurement.

##### **4.4.1: Challenges facing SC performance Measurement**

The respondents were asked to rate the challenges facing supply chain performance measurement as either "common" or not "common" to the organization. The challenges facing supply chain performance measurement in Kenya Airways Ltd as per the respondents are presented below from the most common to the least common. They include, Difficulty in linking measures to customer value, Overcoming mistrust between supply chain participants, Difficulty to attribute performance results to one particular entity within the chain, Inflexible organizational systems and processes, Cross-functional conflicts and turf wars, Incapable information systems, Use of cost as a primary (if not sole) measure, Use of a single performance measure, Lack of control, Resistance to change, Lack of standardized performance measures, Lack of training for new mindsets and skills, Non-aligned strategic and operating philosophies and lastly, Lack of top management support

##### **4.4.2: Benefits Derived from Effective SC Performance Measurement**

The respondents were asked to rate the benefits derived from effective supply chain performance measurement within Kenya Airways. The following benefits presented below in order of importance were noted from the responses. Effective SC performance measurement helps in, Achieving Superior product quality, Helps management in revising business goals, and re-engineering business processes for competitive advantage, Cost competitiveness, Enhanced delivery performance. Performance measurement also helps management in diagnosing problems associated with supply chain ineffectiveness, Shorter order cycles, and Attaining Superior channel relationships among others.

## **CHAPTER 5: SUMMARY, CONCLUSIONS AND RECOMMENDATION**

### **5.1: Summary**

Supply chain performance measurement is fast gaining prominence in the business world. There are constant pressures to reduce costs as competition, globalisation as well as increasing fuel prices set into play. This study was aimed at exploring the supply chain performance measures employed by the company and to identify the challenges encountered in measuring supply chain performance. The response rate was impressive permitting valuable observations to be derived there from.

Before presenting the key supply chain performance measures employed by the company, it's important to document the other important lessons learnt from this study. Analysis of data obtained from the respondents revealed that the company has in place several objectives that it pursues as it works towards achieving its mission. The most important according to the respondents is achieving world class standards in service delivery and providing the highest level of customer satisfaction. Other objectives include; to develop a business model that delivers consistent level of profitability and to maintain sound principles of corporate governance among others.

Also highlighted in the study are some of the competitive strengths that an airline should have in order to effectively and efficiently compete in the market. These include, Reliability, in terms of On-time Performance, Delay minimisation, Schedule integrity and passenger security, Customer Service. This entails how the passengers are handled both during the flight and on ground at the counters, resolution of problems, for example locating lost items etc, .Frequency of Flights. This refers to the Number of times the airline flies into and out of the market on a daily /weekly basis, Partnerships. This is with respect to the Interline agreements that airlines are continuously getting into, such as Special Prorate Agreements (SPA), code shares as well as mergers, Average fares. How the companies average fares compare to other airlines within the industry, Distribution Strength. How spread the airline is through travel agents, and own regional offices. This translates into how easy is it for customers to get the company's offices or agents across the globe.

Some of the barriers to entry of other airlines into the market are, cut throat competition, High Start up costs safety, Air Service Agreements and security. Economic regulation and average fares are other factors, though they are not very critical.

The company measures supply chain performance using the following dimensions; Quality of Purchases, Effectiveness of the procurement activities eg, Logistics, sourcing, negotiations, Stock turnover, Number of Supplies rejections, Cost of materials/items, Flexibility of Suppliers to changing demands pattern, Supplier Lead Times, Response time to user demands, Days taken to clear imported non stocked items. The corresponding indicators for these dimensions are, Level of obsolete and excessive materials, Procurement Savings and Level of stock outs, Average departmental usage, on time deliveries, Level of obsolete and excessive materials among others.

The task of supply chain performance measurement brings about several challenges. These include, difficulty in linking measures to customer value, overcoming mistrust between supply chain participants, difficulty to attribute performance results to one particular entity within the chain, Inflexible organizational systems and processes, cross-functional conflicts and turf wars, Incapable information systems and Use of cost as a primary (if not sole) measure. However, despite these challenges, the company derives a lot of benefits from effective supply chain performance measurement. These benefits include, achieving superior product quality, helps management in revising business goals, and re-engineering business processes for competitive advantage, cost competitiveness, enhanced delivery performance. Performance measurement also helps management in diagnosing problems associated with supply chain ineffectiveness; achieve better asset management, shorter order cycles, improving communication between chain members and identifying the success and potential of management strategies, and facilitating understanding of progress and position.

## **5.2: Conclusion and Recommendations**

This research work explored the various supply chain performance measures employed by the company. These measures can be broadly categorised as cost measures, quality measures, flexibility measures, and delivery measures. No single

measure can effectively cover all the various functions within a supply chain. The managers are therefore advised to continuously seek to find metrics that measure different dimensions. It is also evident from the research findings that there are many challenges that the company is facing while measuring supply chain performance measurement. A careful look at these challenges shows that they can be categorised into two, those that are internal to the company, hence the company has significant control, and those that are external to the company. The company should work at reducing the internal barriers through methods such as, creating companywide awareness to inform the chain participants of the importance of having an efficient supply chain. Interdepartmental transfers are also encouraged where possible for people to appreciate the roles in other departments. Another important factor to consider is to enhance communication across the entire company. Other avenues include, continuous training for supply chain staff in order to embrace the latest developments in supply chain practices.

External challenges can be best addressed through a collaborative effort between the company and its suppliers. The supply chain partners need to continuously consult in order to understand that an efficient supply chain is aimed at achieving low cost of the total chain. This will ensure that the benefits are realised by all the supply chain players. Moreover, the company needs to communicate to its suppliers their expected level of service in order to avoid supply of substandard products.

### **5.3: Limitations of the study**

This research work was mainly focused on the supply chain section of Kenya Airways Ltd. The company has several departments, hence the responses obtained from only the supply chain section may not be representative of the entire company. Moreover, the number of respondents who are mainly those involved in the day to day supply chain activities may vary from one airline to another as a result, the research findings can only be used as a guide and can also provide a basis for future research.

This research work was accomplished with a lot of time constraints. Achieving the correct balance between work and study was challenging. It's also important to mention the challenge experienced from the respondents. There are instances when they were reluctant commenting on certain issues for fear of victimisation.

#### 5.4: Suggestions for Further Research

Supply chain performance measurement is a new concept that is fast gaining recognition in the business world. The research design in this scenario was a case study. However, for a wider application, it is recommended that a survey be carried out to establish the general supply chain management practices and performance measures in the aviation industry. Moreover, the airline industry by its very nature has a lot of environmental impact. It is thus important to establish whether the various airlines consider green supply chain performance measurement practices within their operations.



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## **APPENDIX 1: RESPONDENTS LETTER**

To: Respondent

From: Zedekia O. Gwako

Dear Sir/ Madam,

**SUBJECT: RESEARCH PROJECT.**

I am pursuing a Degree of Master of Business Administration (MBA) from the University of Nairobi specializing in Operations Management.

As a partial fulfilment of the requirements for the award of the degree, I am currently conducting a research study on the **SUPPLY CHAIN PERFORMANCE MEASUREMENT IN THE AVIATION INDUSTRY.**

Your firm has been selected for this exploratory study. I therefore kindly request that you assist in completing the attached questionnaire.

The information you provide in this study will be treated with utmost confidentiality and will not be used for any other purpose apart from its intended academic use. I hereby undertake not to make direct reference to your name in any presentation or report thereto the study.

I would appreciate any additional information, in the form of suggestions and comments, which you deem necessary to make my research findings more conclusive, relevant and reflective of the study area. A copy of the research report will be availed to the respondents upon request.

Thank you in advance.

Yours faithfully,

**Zedekia O. Gwako**

**APPENDIX 2: QUESTIONNAIRE.**

This research work is intended to explore the application of the supply chain management practices within KQ in order to establish the challenges the company faces in measuring supply chain performance.

Please provide answers to the following questions by ticking against the most suitable alternative or giving narrative responses in the spaces provided.

*(All your responses will be treated with utmost confidence.)*

**PART 1: BACKGROUND INFORMATION**

1. Respondents Title.....
2. E-mail address (optional).....
3. In general terms, what is the strategic role of your department/section in the airlines operations? (Tick where appropriate).
  - a) Core to the airlines operations
  - b) Supportive
  - c) Advisory
  - d) Other(specify).....  
 .....
4. Based on the scale provided, how does KQ rate the importance of the following objectives?
  - 1 – Not applicable, 2 – Not important, 3 - Slightly Important, 4 – Important,
  - 5 – Very important.

No.	Description	Rating				
		1	2	3	4	5
a)	To be a socially responsible company					
b)	To achieve world class standards in service delivery					

c)	To develop a business model that will deliver consistent level of profitability					
d)	To maintain sound principles of corporate governance					
e)	Providing the highest level of customer satisfaction					
f)	Maximising employee satisfaction.					

5. How would you rate the company's response to technological changes? (Please tick as appropriate).

- a) Aggressively adopts new technological advancements
- b) Adopts new technology but at lower pace
- c) Is not concerned of the new technological advancement in the market

6. For each of the factors below, please assign a weight by clicking on the appropriate box to indicate how important it is when evaluating the competitive strength of an airline in a market.

**Weights**

5- Extremely important, 4- Important, 3- Slightly important, 2- Not important, 1- Not applicable

<b>Competitive strength/ Business Strength</b>							
No	Factor	Description	Weight				
			5	4	3	2	1
1	Customer Service	Passenger handling, resolution of problems, in-flight, crew					
2	Reliability	On – time Performance, Delay minimisation, Schedule integrity.					
3	Market share	Company sales compared to total airlines					



4	Partnerships	Interline agreements i.e. Special Prorate Agreements(SPA), code shares					
5	Distribution Strength	How spread the airline is through travel agents, and own regional offices					
6	Frequency of Flights	Number of times the airline flies into the market on a daily /weekly basis					
7	Average fares	How does the companies average fares compare to other airlines					

7. Which of the following represents the business strategy (ies) followed by your company (tick as appropriate).

- a) Cost Leadership strategy
- b) Focus strategy
- c) Differentiation Strategy
- d) Cost Focus Strategy
- e) Any other (specify).....

8. Please rate the factors listed below on the extent to which they act as barriers to the entry of other airlines in your market.

	Very High	High	Moderate	Low	Very Low
a) Air Service Agreement .....	.....	.....	.....	.....	.....
b) Cut Throat Competition .....	.....	.....	.....	.....	.....
c) Start up Costs .....	.....	.....	.....	.....	.....
d) Economic Regulations .....	.....	.....	.....	.....	.....
e) Security .....	.....	.....	.....	.....	.....

f) Safety ..... ..

g) Average Fares. .... ..

9. On a scale of 1 to 5 (5 being "strongly agree" and 1 being "strongly disagree") do you think it is easy for an airline to enter your market?

Response.....

10. From your assessment, what's the level of competitor rivalry/wars in your market?(tick as appropriate)

- a) Very high
- b) High
- c) Moderate
- d) Low
- e) Very Low

**PART B: PERFORMANCE MEASUREMENT DIMENSIONS.**

11. Based on the scale provided, what relative importance does KQ place on the following dimensions?

1 – Not applicable, 2 – Not important, 3 - Slightly Important, 4 – Important, 5 – Very important.

No.	Dimension	1	2	3	4	5
a)	Cost of materials/items					
b)	Supplier Lead Times					
c)	Effectiveness of the procurement activities eg, Logistics, sourcing, negotiations.					

d)	Quality of Purchases					
e)	Response time to user demands					
f)	Flexibility of Suppliers to changing demands pattern					
g)	Days taken to clear imported non stocked items					
h)	Stock turnover					
i)	Number of Supplies rejections					

12. Does KQ normally measure the extent to which the above dimensions are achieved?

- a) Yes  b) No

13. If your answer to question 12 above is Yes, how frequent do you measure the dimensions identified (tick as appropriate).

- a) Daily.....
- b) Weekly.....
- c) Monthly.....
- d) Quarterly.....
- e) Bi annually.....
- f) Annually.....
- g) Other (specify).....

14. Other than the dimensions outlined in question 11 above, list any other supply chain performance metrics normally measured in KQ.

.....

.....

.....

.....

15. If your answer to question 11 is "Not applicable", please list the major reasons why, in the space provided below.

.....

.....

.....

.....

16. For each of the areas you have highlighted as very important in question 11, list three (3) vital performance indicators that you measure as provided in the table below.

No.	Dimension	Indicators
a)	Cost of materials/items	i) ii) iii)
b)	Supplier Lead Times	i) ii) iii)
c)	Effectiveness of the procurement activities eg, Logistics, sourcing, negotiations.	i) ii) iii)
d)	Quality of Purchases	i) ii)

		iii)
e)	Response time to user demands	i) ii) iii)
f)	Flexibility of Suppliers to changing demands pattern	i) ii) iii)
g)	Days taken to clear imported non stocked items	i) ii) iii)
h)	Stock turnover	i) ii) iii)
i)	Number of Supplies rejections	i) ii) iii)

**PART C: PERFORMANCE MEASUREMENT CHALLENGES AND BENEFITS**

17. In your view what do you believe are some of the challenges that KQ is currently facing while carrying out supply chain performance measurement? (Tick from the listing below where appropriate). Please rate the challenges on a scale of 1 to 5, ( 1 "Not common" and 5 "Very common")

- a) Overcoming mistrust between supply chain participants.....
- b) Lack of top management support.....
- c) Lack of control.....
- d) Incapable information systems.....
- e) Lack of standardized performance measures.....
- f) Difficulty in linking measures to customer value.....
- g) Difficulty to attribute performance results to one particular entity within the chain.....
- h) Use of a single performance measure.....
- i) Use cost as a primary (if not sole) measure.....
- j) Non-aligned strategic and operating philosophies.....
- k) Cross-functional conflicts and turf wars.....
- l) Lack of training for new mindsets and skills.....
- m) Resistance to change.....
- n) Inflexible organizational systems and processes.....
- o) Other (specify).....

18. In your view what do you believe are some of the benefits that the company derives from effective supply chain performance measurement? (Tick from the listing below where appropriate). Please rate the benefits on a scale of 1 to 5, ( 1 "Not common" and 5 "Very common")

- a) Helps management in revising business goals, and re-engineering business processes.....
- b) Superior product quality.....

- c) Shorter order cycles.....
- d) Enhanced delivery performance.....
- e) Better asset management.....
- f) Cost competitiveness.....
- g) Superior channel relationships.....
- h) Enhancing motivation.....
- i) Improving communication between chain members.....
- j) Performance measurement helps management in diagnosing problems.....
- k) Measurement provides an approach to identifying the success and potential of management strategies, and facilitating understanding of progress and position.....
- l) Increased market share and sales.....
- m) Solid customer relations.....
- n) Other (specify).....