MEASURING EFFICIENCY AND BENCHMARKING CLASSIFIED TWO - FIVE STAR HOTELS IN NAIROBI AND MOMBASA, KENYA

BY

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DECLARATION

This proposal is my original work and has not been presented for a degree in any other university.

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DEDICATION

To my Mum Bilha and Dad Charles; you have always wanted the best, whatever the circumstances;

And to my wife, Phyllis Nyaboke, together with our children, Graham, Bill and Nigel.

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ABBREVIATIONS AND ACRONYMS

A.A	Automobile Association
ADR	Average Daily Rate
ASP	Average Spend Per Person
CCR	Constant Returns to Scale
CMAM	Cost/Margin Menu Analysis model (CMAM)
DEA	Data Envelopment Analysis
DMU	Decision Making Unit
ERS	Economic Recovery Strategy
FDI	Foreign Direct Investment
G.O.K	Government of Kenya
OP	Operating Profit/Operating Income
GDP	Gross Domestic Product
ITH	International Tourist Hotel(s)
MAM	Menu Analysis Model
MEM	Menu-Engineering Model
UNICTAD	United Nations Conference on Trade and Development
VRS	Variable Returns to Scale

ABSTRACT

The Government of Kenya recognizes the role played by hotels and restaurants in terms of wealth creation, contribution to Gross Domestic Product (GDP) and its multiplier effect that acts as a stimulus to the growth of other sectors such as transport, entertainment, agriculture, trade and industry. There are a limited number of detailed studies into performance measurement practices in the hospitality industry in particular. Most of the previous studies in the hotel industry have used traditional financial ratio analysis such as return on equity or return on assets. Few studies have used Data Envelopment Analysis (DEA) for the hotel sector. The purpose of this study was to measure the relative efficiency of the hotels in Nairobi and the Coast region using Data Envelopment Analysis. The objectives of this study were; to measure the efficiency level of 2-5 hotels, to profile the hotels based on their performance, to analyze their efficiency distribution and to identify the determinants of efficiency differences. The study was a longitudinal survey in which data are collected for each variable for two or more distinct periods; 2007, 2008 and 2009 being three such distinct periods. The study was carried out in Nairobi and Mombasa and was limited to two-five star hotels. The study sample consisted of 36 hotels. Data for 2007 to 2009 collected through interviews. The results revealed many hotels were in private/independent ownership particularly in the three star rating. International chains owned most of the five star hotels. The hotels generated most of their revenue from room sales. There was a general decline in revenue from rooms in 2008 attributed to the post election violence. Technical inefficiencies of the hotels were mainly due to the pure technical inefficiencies rather than the scale inefficiencies. These hotels were ineffective in converting inputs to outputs. The results further revealed that four and five star hotels had declining efficiency scores from 2007 to 2009. In 2007 22 % of the hotels were operating under decreasing returns to scale while 8.3% operated under increasing returns to scale. In 2008, 19.4% of the hotels operated under increasing returns to scale while 13.8% operated under the decreasing returns to scale. In 2009 33% of the hotels operated under the increasing returns to scale whereas 19.4% operated under increasing returns to scale. There were no significant differences in the efficiency scores for two and three star hotels as one set and four and five star hotels as a second set. There were equally no significant differences in the efficiency scores for the hotels found in Nairobi and Mombasa and also between chain and independent owned hotels. Generally, there was no significant difference in the efficiency scores between the different hotel sizes. The main determinant of efficiency was the location of the hotels. The study recommends that the hotel managers address their hotel's internal weaknesses in their day to day hotel operations if they are to be more efficient. One of the conclusions of this study is that all the hotels studied had declining efficiency scores from 2007 to 2009. A policy implication for the managers of the inefficient hotels is that they should borrow the best practices of their efficient peers if they have to raise their hotel's performance. Another policy implication for investors is that one can invest confidently in Nairobi since the efficiency of the hotels in this region is likely to be higher compared to those in Mombasa.

CHAPTER ONE

INTRODUCTION

1.0 Background of the Study

Many countries in Africa have acknowledged the importance of the hotel and restaurant sectors in their economies. Government of Kenya (GOK) in its Economic Recovery Strategy for Wealth and Employment Creation (ERS), recognizes the role played by hotels and restaurants in terms of wealth creation, contribution to Gross Domestic Product (GDP) and its multiplier effect that acts as a stimulus to the growth of other sectors such as transport, entertainment, agriculture, trade and industry (Government of Kenya, 2003, UNCTAD, 2007). Hotels and restaurants have been acknowledged to contribute to 'consumption multiplier effects' when their employees use their salaries and wages to buy goods and services from other non tourism-related industries (ibid). This recognition has attracted many investigations and surveys in hotel and restaurant businesses (Claver and Pereira, 2006; Sharma and Upneja, 2005).

In its vision 2030, Kenya aims at quadrupling tourism GDP contribution to over Ksh. 80 billion by 2012 (in the short run) and the average spent per visitor from Ksh. 40,000 to at least Ksh. 70,000. The vision also aims at increasing hotel beds to 65,000,000 with emphasis on quality service.

On a broader scale, revenues from tourism increased from Ksh 28 billion in 2002 to Ksh. 65.4 billion in 2007. By 2010 Kenya recorded the highest number of tourists' arrivals at 1,095,945. This was a growth of 15% when compared to the previous year. The tourist arrivals, though peaking at about 1.1 million fell short of the ERS target of 2 million tourists. A significant contribution to this growth was attributed to strategic international advertising by Kenya Tourist Board (GOK, 2009). GOK however notes that while the number of international visitors and their length of stay in hotels has been increasing, other top competing tourist destinations such as South Africa and Egypt attracted four to five times more tourists than Kenya. Additionally the Average Spending per tourist in Kenya (560 US dollars) is lower than in other destinations because Kenya attracted and still continues to attract low – spending tourists. For example, tourist expenditure per capita is 70 percent more in Egypt than in Kenya.

Wadongo *et al,* (2010) have pointed out that the general growth in the Kenyan economy, coupled with rising tourism earnings has not only led to expansion of current hotels facilities but also investments of new in hotels in Kenya. This study adds that the hotels in Kenya have shifted their strategy with a focus on efficiency in their operations in order to become certified by international quality certifications such as ISO (International Organization for Standardization, 2011), 'Leading Hotels of the World', 'Kenyan yearly awards for 'Top Performing Companies' among others. This has created pressure on the hotels to efficiently manage their operations. Such business pressures coupled with the achievement of the coveted five-star rating and membership to the international hotel associations has created the need for effective key performance indicators especially those that focus on the efficiency of hotels operations.

The National Kenyan Tourism Policy (GOK, 2008) however contends that some of the hotels in Kenya, especially those at the Coast are inefficient and characterized by downward spiralling of revenue, poor quality operations, erratic occupancy levels, poor service standards and poor quality accommodation. GOK(2008) further acknowledges that some of the key challenges that face the hotel industry are inadequate bed capacity, lack of skilled human resource (95.3 percent of whom earn less than Ksh. 30,000); poor infrastructure such as roads, water, electricity and competition for tourists from the region (GOK, 2008; GOK, 2009). Note that these are some of the elements that might lead to inefficiency. The erratic occupancy levels particularly need to be singled out since Kenya has a distinct low tourism season when the occupancy levels plummet especially in Mombasa. During such times supply is higher than demand leading to under-utilized capacity which is an element of inefficiency.

The tourism policy notably paints Kenya as having a 'tired' hotel infrastructure. This policy however acknowledges that if this sector were to be efficiently managed, Kenya has enormous potential for increasing its overall earnings

Bed occupancy is one of the inputs used to generate revenues in the hotel business. Table 1 shows the bed occupancy as a percentage of the total number of beds available from 2003 to 2009.

Table 1.1: Hotel Rooms and Beds Available and Occupied

	2003	2004	2005	2006	2007	2008	2009
Rooms available (000)	4,336	5,568	6,063	7,202	8,281	8,148	10,335
Room occupancy percentage	42	47	49	51	52	32	39
Beds Available (000)	7,765.7	10,030.7	10,845.6	13,003.5	14,711.6	14,223	17,125.4
Bed Occupancy percentage	33.6	37.8	41.3	45.5	47.2	26	36.5

Source G.O.K: (2010)

The total rooms and beds available are shown in Table 1.1. The total beds available have been rising steadily from 7,765,000 in 2003 to the 17,125,000 in 2009. The total rooms available have equally been rising from 4,336,000 in 2003 to 10,335,000 in 2009. In 2008 the total beds available slightly declined to 14,233,000 and the occupancy rate declined even further to 26 percent respectively, attributed to the effects of post election violence. Therefore except in 2008, the bed occupancy has generally been rising. It is however important to note that according to Vision 2030 the targeted number of beds that should have been available for sale in 2007/2008 was 15,000,000 against the actual number that was 14,223,000. Kenya was off this target by 777,000 beds. Secondly, Kenya targets to have at least 65,000,000 beds by 2012. By 2010 however, the total available beds for sale were 17,168,000. As a country therefore, Kenya did not achieve this target by 2008, and it appears highly unlikely that it will achieve the 2012 target that would require the generation of additional 47,832,000 beds in a span of two years.

Selected key economic indicators that could have had a bearing on hotel performance are shown in table 1.2

Table 1.2: Selected key economic indicators

Indicator	Unit	2004	2005	2006	2007	2008
Growth of GDP	Percent	5.1	5.9	6.3	7.1	1.7
Tourism earnings	Ksh (million)	38,457	48,874	56,200	65,450	52,710
Inflation rate	Percent	11.6	10.3	14.5	9.8	26.2
Interest rates for loans and advances	percent	12.25	13.16	13.74	13.32	14.87
Hotels and restaurants Growth rates of GDP	(Percent)	38.8	13.3	14.9	16.3	-36.1

Source G.O.K: (2010)

Form table 1.2 it is noted that the value added for Hotels and restaurants has been contracting significantly from 38.8 percent in 2004 to minus 36.61 in 2008. This is tied by the fact that in 2008 only a few sectors registered improved growths. This decline in growth for hotels and restaurants, culminating to a massive -36.1 percent was occasioned by the post election skirmishes and the global financial crisis in 2008.

The Kenyan GDP was conversely on a continuous growth; from 5.1 percent in 2004 to 7.1 percent in 2007 before the sharp drop to 1.7 percent in 2008. This growth in GDP was important because there is generally a positive correlation between the national GDP growth and the tourism growth rates as evidenced with the growth rates in the tourism earnings that reached 65.4 billion Ksh by 2007.

Another key macro economic indicator that may have had a bearing on hotel performance was inflation. In the vision 2030 GOK agrees that maintaining a low and stable inflation is critical for long-term economic stability. Central Bank of Kenya was therefore tasked with pursuing a monetary policy aimed at maintaining inflation at a low rate of 5 percent. In the year 2004 however, the annual inflation was 11.6 percent. By 2006, inflation stood at 14.5 percent before it declined in 2007 to 9.8 percent before rising to an all time high of 26 percent in 2008. This therefore shows that as a country we have not achieved this threshold. Secondly, since hotels buy from a market characterized with high food and fuel prices, the profitability of these enterprises would definitely have been affected by the rising inflation.

The commercial banks lending rates for loans and advances also marginally rose from 12 percent in 2004 to about 15 percent in 2008. Any hotels that took this facility especially in 2008 when the rates were high must have passed this on to the consumer and this may have had a connection with the occupancy rates.

As noted earlier, revenues from tourism increased from Ksh 28 billion in 2002 to Ksh. 65.4 billion in 2007 before contracting to 52.7 billion in 2008. However despite this evident growth in revenues, room occupancy rates; and despite the fact that hotels rarely have 100 percent room occupancy; the Kenyan hotels are yet to attain the international break-even room occupancy rate of 53-65 percent (PricewaterhouseCoopers, 2010; Worldwide Lodging Industry, 1996). This break-even is a critical intermediate point which must be reached before profits are realized and therefore, until a business passes through a break-even threshold, profits will not be forthcoming. The room occupancy of the Kenyan hotels was and still is way below the internationally accepted threshold and this could be a pointer to inefficiency of their operations. This notwithstanding, the growth in bed and room occupancy is an indication that there is potential to be realized from the hotel sector.

A study by Bichage, (2006) established that hotels in Nairobi, particularly in the three to five star categories generally recorded high volume of sales. For instance, as of the year 2006, four to five star hotels recorded annual revenues from food sales in excess of Ksh, 180,000,000 per annum. These huge revenues notwithstanding, the net profit from food sales generally ranges from 25% -30 %. However, it is also a fact that with such profit margins, any food operation cannot allow room for inefficiency because this may force it operations to close (Levy, 2007).

In order to realize the potential from the hotels and for improved hotel performance, it is imperative to understand how the hotels perform using a modern and acceptable tool of analysis such as Data Envelopment Analysis (DEA). This will permit hotel self evaluation, benchmarking and peer review.

Data Envelopment uses linear programming techniques Analysis. In DEA, a hotel 's performance is evaluated in terms of the ability of the hotel to expand its output vector subject to the constraints imposed by the best observed practice.

A fundamental assumption in DEA is that if a given hotel A is capable of producing Y units of output with X inputs, then the other hotels should do the same if they were to operate efficiently. Similarly if hotel B is capable of producing X units of output with Y inputs, then other hotels are capable of the same. Hotels A and B can then be combined to form a composite (fused) producer with composite inputs and composite outputs. However because such a composite (fused) producer does not exist, it is called a virtual producer. In DEA one computes the ratio of input to output and describes the hotel with the largest ratio as the most efficient one.

Relative to other performance measurement techniques, DEA's relative advantages are summarized by (Sengupta, 1988; Banker and Thrall, 1992; Cooper, Seiford and Tone, 2000 in Sigala *et al*, 2005 pp.67) as follows:

It provides a comprehensive productivity evaluation as it generates a single aggregate score by comparing simultaneously inputs and outputs of comparable units/hotels by using a benchmark of 100 percent efficiency; it is independent of the units of measurement allowing flexibility in specifying inputs/outputs to be studied; it objectively assesses the 'importance' of the various performance attributes; it evaluates each entity in the best possible light- all alternative priorities will reduce performance; it calculates efficiency based on the best observed practice- not against 'average' or 'ideal' model;

best practices are identified; no functional relationships between inputs and outputs need to be pre-specified; inefficient DMU's/hotels are identified as well as sources and amounts of their inefficiency- (Thus DEA answers questions: *how well is a unit/hotel doing? Which dimension and how the unit/hotel could improve*?); DEA can identify economies of scale and take them into account.

This study therefore used the Data Envelopment Analysis approach to measure performance and efficiency of the selected hotels under the study.

1.1 Problem Statement and Justification

Government of Kenya (GOK, 2008) acknowledges that hotels in Kenya, mainly those Mombasa are inefficient. These hotels are characterized by lack of skilled workforce, downward spiralling of revenue, poor quality operations, erratic occupancy levels, poor service standards, poor quality accommodation and under-utilized capacity. As noted earlier a national tourism policy depicts Kenya as having a wanting hotel infrastructure. This policy however acknowledges that if this sector were to be efficiently managed, Kenya has enormous potential for increasing its overall earnings.

It is also recognized that, there is a limited number of comprehensive studies into performance measurement in the hospitality industry (Haknatir and Harris, 2005). In addition, most of the studies on hotels and restaurants performance (for example, Sharma and Upneja, 2005; Jeffrey *et al*, 2002), have based their approaches on financial ratio analysis. Valid arguments have been raised based on the fact that the arithmetic mean of a ratio is not an appropriate benchmark because it neither adequately singles out best practices in a company nor reflect its multiple dimensions that contribute to its performance (Neves, 2008). There are large variations in the industry that contribute to performance. These come from several sources such as the influence of privileged locations, ownership, size and age (Pine and Philips, 2005; Ngui *et al* 2007; Chyan, 2009). Most of these are non financial.

Wadongo *et al* (2010) concluded in a study that hospitality managers in Kenya almost exclusively monitor competitiveness and financial dimensions of performance with little or no attention being paid to non-financial or determinant measures. They point out that the key performance indicators in Kenya are dominated by result indicators and that managers are usually engrossed at the results of past actions rather than towards determinants of future success. This preoccupation with the past financial results suggests that performance measurement within the hotels in Kenya is inadequate.

From the current literature, it is evident that many studies have assessed hotel efficiency in the West, Asia and some parts of Africa using Data Envelopment Analysis. It appears that no documented studies have measured the efficiency of hotels in Kenya using this methodology. Therefore, the actual efficiency level of the hotels in Kenya is not known. This therefore calls for a study that allows for alternative measurement of efficiency and permits one to identify the obstacles to hotel functioning and suggest possible ways to enhance the hotels' performance. The uniqueness of this study is that Data Envelopment Analysis provides a different approach and enriches the area of study for future research (Gachanja, 2008).

1.2 Purpose of the Study

The purpose of this study was to measure the efficiency of the hotels in Nairobi and the Coast region from 2007 to 2009 and benchmark them based on their performance profiles using Data Envelopment Analysis.

1.3 Study Objectives

This research was guided by the following objectives.

1.3.1 General objective

The general objective of this study was to measure the efficiency of the hotels in Nairobi and the Coast region from 2007 to 2009 and benchmark them based on their performance profiles.

Specifically this study was guided by the following objectives:

1. To measure the efficiency levels of 2 – 5 star hotels from 2007 to 2009,
2. To profile the 2 – 5 star hotels based on their performance,
3. To analyze the efficiency distribution of the two – five star hotels and
4. To identify the determinants of efficiency differences of 2 – 5 star hotels.

1.4 Research Hypotheses

1. **H_0.** There is no difference in the efficiency levels of the hotels among the years under study.
2. **H_1**There is a difference in the efficiency distribution among the different categories of the hotels.
3. **H_0** The determinants of efficiency are not significantly different amongst the different categories of hotels.

1.5 Significance of the Study and the Anticipated Output

The results of this study can provide Kenyan hotels with insights into resource allocation and competitive advantage regarding operational styles. This will in return provide the foundation for identifying good performance practices, in generating targets of performance by identifying the role models that inefficient hotels can emulate and the extent to which improvements can be made over a period of time (Verma and Garvineni, 2006). Researchers have noted that many of such businesses are locally owned and may truly and positively influence economic development (Sharma and Upneja 2005).

The results of this study will be used to provide the Kenyan hotel managers with sufficient information to apply reasonably sophisticated DEA (Data Envelopment Analysis) without having to reach for other publications to learn the principal steps in the analysis. The results will also provide an intellectual advantage to managers and consultants who may be involved in relative efficiency analysis. It is also hoped that those researchers, who have not used DEA before, will adopt this valuable managerial decision-making tool in the hotels sector in Kenya.

The results will be a maiden contribution to literature and knowledge in the measurement of hotels relative efficiency.

1.6 Limitations

The study findings were based on the analysis of two tourist areas of Kenya which are Nairobi and Mombasa. Generalization beyond this scope should therefore be done with caution.

Secondly, though DEA is a very useful technique in evaluating efficiency, this approach is not free from drawbacks. The results of DEA are sample specific and hence cannot be generalized for the entire population. Further, the scores obtained using DEA are relative measures of efficiency and not absolute measures.

1.7 Theoretical Framework

This section reviews theoretical arguments that have been proposed and developed to measure efficiency, and the efficiency estimation methods.

1.7.1 The Production Function

Coelli (1998) defines a production function as a technical relationship between inputs and outputs of a production process. The production function therefore defines the maximum output(s) attainable from a given number of inputs.

Production functions are usually represented by a mathematical function or by a graph. For instance one can specify a two-input single output production function as:

$y = f(x_1/x_2)$ .... (1.1)Where y is the output; x_1 is a variable input (which is called labour) and x_2 is a fixed input (which is called capital) and *f(.)* is a suitable function. If one assumes that x_2 is fixed in the short-run (such that x_2=x_{20}), then the short run production function can be represented by:

$y = f(x_1/x_2 = x_{20})$ .... (1.2)

1.7.1.1 Efficiency Measures

Farrell (1957) proposed a measure of efficiency of a firm that consists of two components: technical efficiency, which reflects the ability of a firm to obtain maximal output from a given set of inputs, and allocative efficiency, which reflects the ability of a firm to use the inputs in optimal proportions, given their respective prices. These two measures of efficiency are then combined to measure total economic efficiency (Coelli, *et al,* 1998).

1.7.1.2 Input-Orientated Measures

The input oriented measures indicate by how much input quantities of a hotel can be proportionally reduced without changing the output quantities produced. (See figure 1.1)

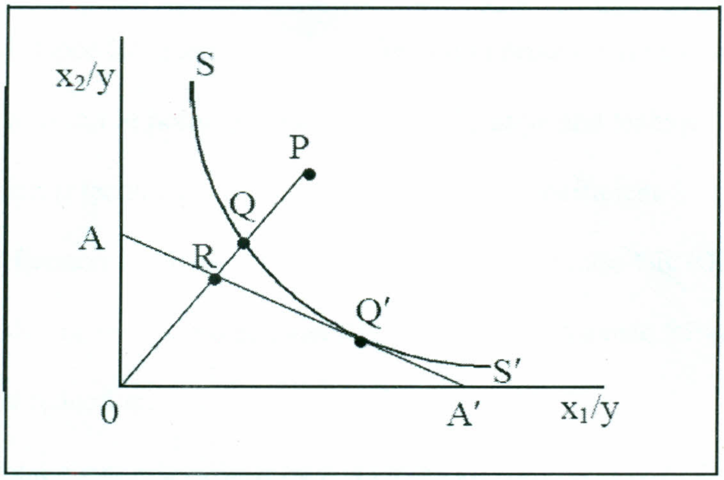

Figure 1.1; Input Oriented Technical & Allocative

Source: Coelli, *et al*, (1998).

This is a simple example of hotels using two inputs (x_1 and x_2) to produce a single output (y) under the assumption of constant returns to scale.

If a given hotel uses quantities of inputs defined by Point P to produce a unit of output, the technical inefficiency of that hotel is represented by the distance QP; that is the amount by which all inputs could be proportionately reduced without a reduction in output.

Technical inefficiency (TE) is usually expressed in percentage terms by the ratio QP /OP. Conversely, technical efficiency is measured by the ratio TE_i (Technical efficiency if the $_{ith}$ hotel) = OQ/OP which is equal to one minus QP /OP (1 – QP/OP). It takes the value between zero and one ($0 \leq TE_i \leq 1$) and therefore provides an indicator of the degree of technical inefficiency of the hotel. Point Q in figure 1 is technically efficient because it lies on the efficient isoquant (which is the production possibilities frontier).

If the price ratio (slope of isocost line, AA′) is also known, allocative efficiency can be calculated. Allocative efficiency (AE) of the firm operating at point P is defined by the ratio: AE_i (Allocative efficiency if the $_{ith}$ hotel) = OR /OQ. It takes the value between zero and one ($0 \leq AE_i \leq 1$).

The distance RQ represents the reduction in production costs that would occur if production were to occur at point Q′ which is both allocative and technically efficient, instead of at point Q which is technically efficient but allocatively inefficient.

Total Economic Efficiency (EE) is defined by the ratio OR /OP (EE_i =OR /OP). It also takes the value between zero and one ($0 \leq EE_i \leq 1$). The distance RP can also be interpreted in terms of cost reduction.

The total economic efficiency is a product of technical and allocative efficiencies ($TE_i \times AE_i$ = (OQ /OP) × (OR /OQ) = (OR /OP) = EE_i). It should be noted here that all the values are bounded by zero and one.

1.7.1.3 Output-Orientated Measures

These measures address the question, 'by how much can output quantities be proportionally expanded without altering the input quantities used?' This can be illustrated in figure 1.2 by a firm where production involves two outputs (y_1 and y_2) and a single input (x_1). The input quantities are constant or fixed at a particular level and the technology is represented by a production possibility curve as shown in figure 1.2.

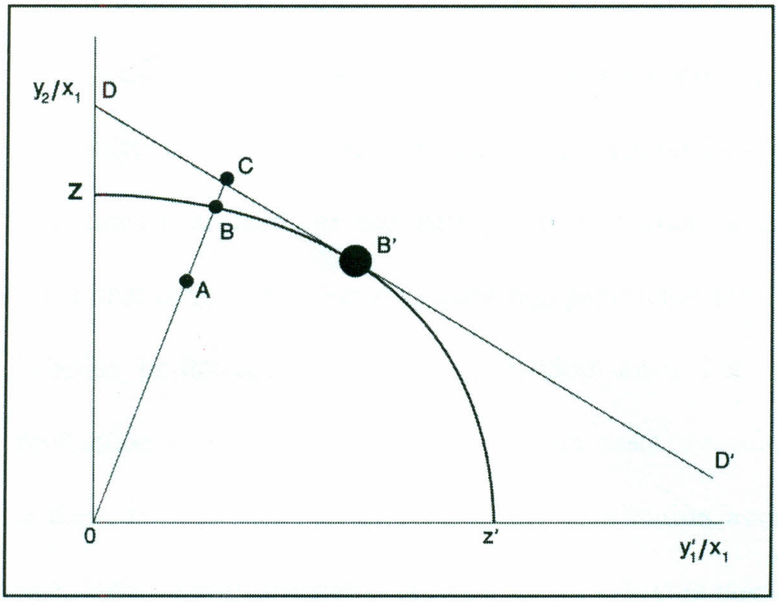

Figure 1.2: Technical & Allocative Efficiencies from an Output Orientation

Source: Coelli, *et al,* (1998).

Line ZZ' is the unit production possibility curve (upper bound of the production possibilities). Point A therefore represents an inefficient firm given that it lies below the curve. A firm operating at point A is technically inefficient and the Distance AB represents amount by which output could be increased without requiring extra input. Hence output orientated Technical Efficiency (TE) is the ratio OA /OB (TE_i = OA /OB) and it also takes the value between zero and one ($0 \leq TE_0 \leq 1$)

If we have price information an isorevenue line, DD′ can be drawn and Allocative Efficiency (AE) defined as OB /OC (AE_0 = OB /OC). It is equally bounded between zero and one ($0 \leq AE_0 \geq 1$). AE has a revenue increasing interpretation (similar to the cost reducing interpretation of allocative efficiency in input orientated case).

Overall Economic Efficiency can hence be defined as: EE_0 = (OA /OC) = (OA /OB) × (OB /OC) = $TE_0 \times AE_0$. It takes the value between zero and one ($0 \leq EE_0 \leq 1$).

1.7.2: The Parametric and Non Parametric Efficiency Estimation Methods

Efficiency estimation methods are primarily parametric and non parametric. These methods differ primarily in the assumptions imposed on the data in terms of:

a) The functional form of the best practice frontier- a more restrictive parametric functional form versus less restrictive non parametric form,
b) Whether or not account is taken of random error that may temporarily give some production units high or low outputs, inputs, costs or profits and,
c) If there is random error, the probability distribution assumed for the inefficiencies (e.g. Half-normal, truncated normal) used to disentangle the inefficiencies from the random error.

Therefore the established approaches to efficiency measurement primarily differ in how much shape is imposed on the frontier and the distributional assumptions imposed on the random error and inefficiency. The parametric approaches discussed hereunder are the Stochastic Frontier Analysis whereas the non parametric approach is the Data Envelopment Analysis.

1.7.2.1 Stochastic Frontier Analysis

This model permits the estimation of standard error and tests of hypothesis using traditional maximum likelihood methods. The random error $\mathbf{v_i}$ is added to the non negative random variable u_i to provide the following model (Coelli *et al*, 1998 pp 184):

$$\ln(Y_i) = X_i\beta + v_i - \mu_i \quad i = 1, 2, \ldots, N$$

....(1.3)

Where $i = 1, 2, \ldots, N$ refers to the individual unit.

The random error v_i accounts for measurement error and other random factors such as effects of weather, strikes, luck among others, on the value of output variable, together with the combined effects of unspecified input variables in the production function. The model above is called the stochastic frontier production function because the output values are bounded above by the stochastic (random variable), expressed as ($\mathbf{x}_i\boldsymbol{\beta} + v_i$). The random error, v_i can be positive or negative and so the stochastic frontier outputs vary about the deterministic part of the frontier model, expressed as ($\mathbf{x}_i\boldsymbol{\beta}$) (Coelli et al, 1998). Stochastic frontier production function measures efficiency of firms. This is a model that permits the estimation of standard error and tests of hypothesis using traditional maximum likelihood methods.

The main weakness of SFA is that being parametric in nature; it requires the assumption of a functional form to specify the relationship between inputs and outputs. In so doing, the SFA model has the disadvantage of suffering from specification error (Hawdon, 2003).

1.7.2.2 Data Envelopment Analysis (DEA)

Data Envelopment Analysis (DEA) uses linear programming techniques Analysis. In DEA, a producer's performance is evaluated in terms of the ability of the producer to expand its output vector subject to the constraints imposed by the best observed practice

A fundamental assumption in DEA is that if a given hotel A is capable of producing Y units of output with X inputs, then the other hotels should do the same if they were to operate efficiently. Similarly if hotel B is capable of producing X units of output with Y inputs, then other hotels are capable of the same. Hotels A and B can then be combined to form a composite (fused) producer with composite inputs and composite outputs. However because such a composite (fused) producer does not exist, it is called a virtual producer. In DEA one computes the ratio of input to output and describes the hotel with the largest ratio as the most efficient one.

This study will therefore use the Data Envelopment approach to measure performance and efficiency of the selected hotels under the study. Compared to other methods DEA is advantageous in that it encompasses a variety of related models (for instance variable and constant returns to scale models) for evaluating the performance of the decision making unit, it can accommodate multiple inputs and outputs, it does not require the assumption of a functional form to specify the relationship between inputs and outputs, and it does not require the distributional assumption of the inefficiency term. (Coelli et al, 1998). DEA also produces detailed information on the efficiency of the hotel, not only relative to the efficiency frontier, but also to specific efficient hotels, which can be identified as role models (Hawdon, 2003).

The main drawback of this methodology however, is that the results of DEA are sample specific and hence cannot be generalized for the entire population. Secondly, the scores obtained using DEA are relative measures of efficiency and not absolute measures.

3.8.1 The DEA Model: Model Input and Output Measures

The study suggests the fact that the hotel and restaurant sector uses certain inputs to produce certain outputs. This study evaluated the technical efficiency of the hotels and, thus measured how efficiently they were able to utilize their inputs. Efficiency was calculated by the ratio of weighted inputs to weighted outputs.

To successfully estimate efficiency using DEA, it is critical that inputs and outputs are carefully identified (see Oral and Yolalan, (1990) and Yeh, (1996) in Min *et al* 2008 : 5) with a particular focus in the identification of the key business drivers critical to the success of a hotel.

The following categories of variables were selected as inputs as partly applied by Wu *et al* (2010): Food costs and beverage costs to represent the expenses incurred from business operations, total number of rooms and total number of beds available for sale to represent the capital investment of a hotel and full- time food and beverage staff to represent the manpower employed. The following variables were treated as outputs: total food sales, total beverage sales, total room revenue and the Gross Operating Profit (GOP)/operating income, to represent the outputs of a hotel generated from a given level of resource input.

3.8.2 DEA Model Development

According to Korir (2010), there are two types of envelopment surfaces in DEA referred to as Constant Returns to Scale (CRS) and Variable Returns to Scale (VRS). In the CRS, increase in inputs by a certain proportion would result in the increase in output by the same proportion. However in the VRS, output changes more or less proportionately than the changes in all inputs. The succeeding discussion helps to distinguish between CRS and VRS.

Constant Returns to Scale (CRS) Model

Let us assume there is data available on ***K*** inputs and ***M*** outputs in each of the **N** decision making units (DMU). For the j-th DMU these are represented by vectors x_i and y_i respectively. The data for all N DMUs may be denoted by the $K \times N$ input matrix (X) and $M \times N$ output matrix (Y). The best way to introduce DEA is via the ratio form. For each hotel we would like to obtain a measure of the ratio of all outputs over all inputs such as

$u'y_i / v'x_i$ where $\boldsymbol{u}$ is an mx1 vector of output weights and $\mathbf{v}$ is a kx1 vector of inputs weights. The optimal weights are obtained by solving a mathematical programming problem (Coelli, 1998):

$$\max_{u,v} (u'y_I/v'x_I),$$

$$\text{st} \quad u'y_j/v'x_j \leq 1, \; j=1,2,...,N,$$

$$u, v \geq 0. \qquad (1.0)$$

This involves finding values for u and v, such that the efficiency measure for the j- th DMU is maximized, subject to the constraints that all efficiency measures must be less than or equal to one. One problem with this particular ratio formulation is that it has an infinite number of solutions. To avoid this, one can impose the constraint $v'x_j = 1$, which provides,

$$\max_{\mu,v} (\mu'y_I),$$

$$\text{st} \quad v'x_I = 1,$$

$$\mu'y_j - v'x_j \leq 0, j=1,2,...,N,$$

$$\mu, v \geq 0, \qquad (1.1)$$

Where the change of notation from u and v to μ and v is used to stress that this is a different linear programming problem. This form of equation is known as the multiplier form of the DEA linear programming problem.

Using duality in linear programming, one can derive an equivalent envelopment form for this problem.

$$\min_{\theta,\lambda} \theta,$$

$$\begin{aligned} \text{st} \quad & -y_i + Y\lambda \geq 0, \\ & \theta x_i - X\lambda \geq 0, \\ & \lambda \geq 0, \end{aligned} \qquad (1.2)$$

The value of θ obtained will be the efficiency score of the i-th DMU. It will satisfy $\theta \leq 1$, with value of 1 indicating a point on the frontier and hence technically efficient DMU. The vector λ is an $N \times 1$ vector of weights which defines the linear combination of the peers of the i-th DMU. Thus, the linear programming problem needs to be solved N times and a value of θ is provided for each unit in the sample. This envelopment form involves fewer constraints than the multiplier form (K+M < N+1) and generally is a preferred form to solve.

The Variable Returns to Scale (VRS) Model and Scale Efficiencies

According to Coelli, *et al* (1998), the constant returns to scale (CRS) DEA model is only appropriate when the firm is operating at an optimal scale. Some factors such as imperfect competition, constraints on finance among others may cause the firm not to operate at an optimal level in practice. The use of CRS specification when not all DMUs are operating at optimal scale will result in measures of TE which are confounded by scale efficiencies (SE). The use of VRS specification will allow the calculation of TE devoid of SE effects. To allow for this possibility, Banker, *et al* (1984) introduced the variable returns to scale (VRS) DEA model by extending the CRS model by adding convexity constraint $N1'\lambda = 1$.

The resulting envelopment form of the input-oriented VRS DEA model is specified as:

$$Min_{\theta,\lambda}\theta,$$

$$\text{s.t } -y_i + Y\lambda \geq 0$$

$$\theta x_i - X\lambda \geq 0$$

$$N1'\lambda = 1$$

$$\lambda \geq 0, \qquad (1.3)$$

Where N1 is an Nx1 vector of ones, this approach provides TE scores which are greater than or equal to those obtained using the CRS model. The convexity constraint $N1'\lambda = 1$ essentially ensures that an inefficient firm is only benchmarked against firms of similar size.

Because the VRS model is more flexible and envelops the data in a tighter way than the CRS model, the *TE VRS* score is equal to or greater than the CRS or 'overall' TE score. The relationship can be used to measure scale efficiency (SE) of the i-th DMU as:

$$SE_i = TE\ CRS\ /\ TE\ VRS$$

Where SE = 1 implies scale efficiency or CRS and SE < 1 indicates scale inefficiency. However, scale inefficiency can be due to the existence of either increasing or decreasing returns to scale. This may be determined by calculating an additional DEA problem with Non-increasing returns to scale (NIRS) imposed. This can be conducted by changing the DEA model in equation (1) by replacing the $N1'\lambda = 1$ restriction with $N1'\lambda \leq 1$

The NIRS DEA model is specified as:

$$Min_{\theta,\lambda}\theta$$

$$\text{s.t} \ -y_j + Y\lambda \geq 0$$

$$\theta_{xj} - X\lambda \geq 0$$

$$N1'\lambda \leq 1$$

$$\lambda \geq 0 \qquad (1.4)$$

If the NIRS TE score is unequal to the VRS TE score, it indicates that increasing returns to scale exist for that region. If they are equal, then decreasing returns to scale apply. By solving the above equations, the efficiency of DMU is maximized subject to the efficiencies of all DMUs in the set with an upper bound of 1. The above model is solved *n* times to evaluate the relative efficiency of each DMU.

1.8 Conceptual Framework

Figure 1 shows the conceptual framework. This framework shows how the various inputs in a hotel are used to generate outputs through varying degrees of efficiency and how they relate to overall hotel efficiency.

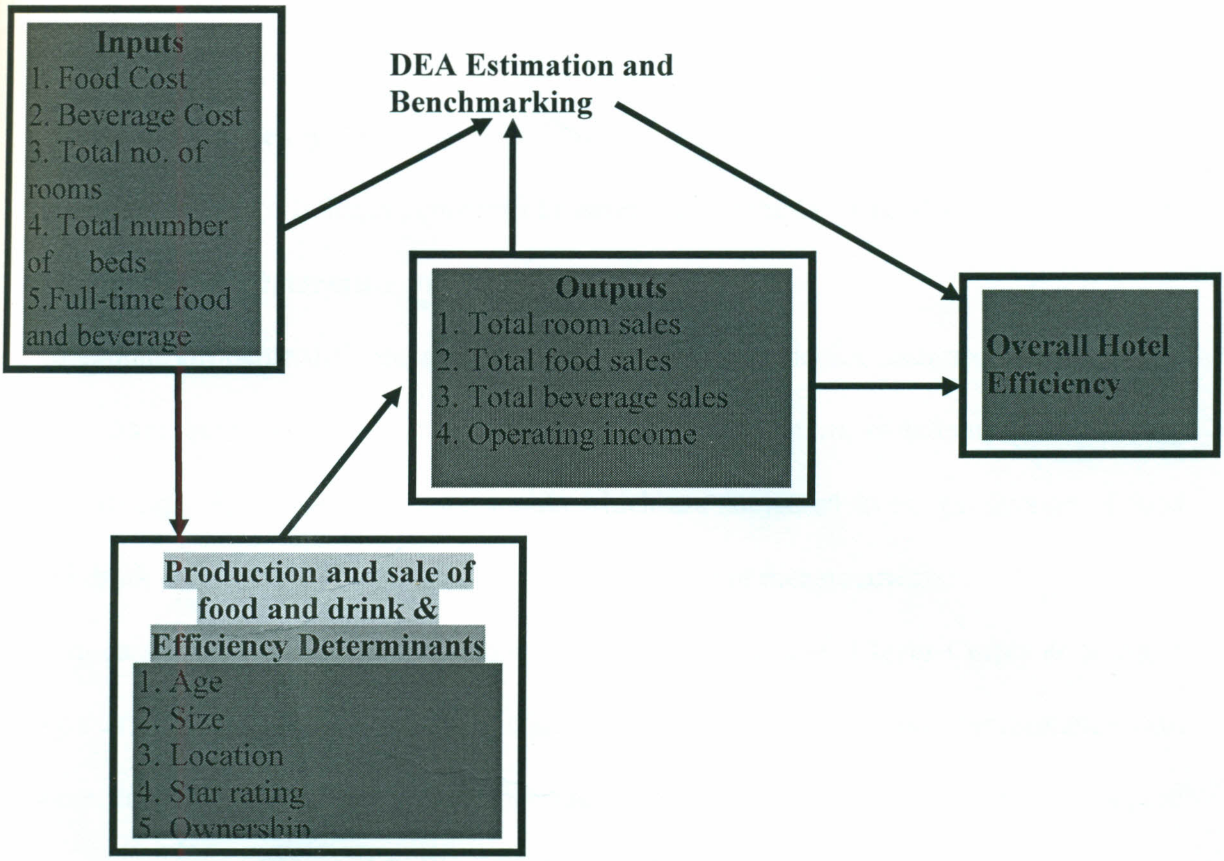

Figure 1.3: Conceptual Framework: inputs in a hotel as used to generate outputs through varying degrees of efficiency

Source: Author's framework

1.8.1 Inputs and Outputs

In normal hotel operations, there are several inputs which are used in the production of food and drinks and the sale of rooms to generate outputs. The inputs used here are food cost and beverage cost (cost of food sales and beverage sales respectively), full time food and beverage personnel, the cost of room sales and energy and utility expenses. These inputs are subjected to production with various degrees of efficiency to produce outputs. The outputs used in this study are; food and beverage cost reduction (cost reduction as a percentage of respective total sales), total room sales, food and beverage sales, and sales per full time food and beverage staff, the operating income and the Average Spend per Customer (ASP).

1.8.2 Hotel Efficiency Score

The relative hotel efficiency score will be generated by the DEA model.

1.8.3 Efficiency Determinants

To explain probable differences in efficiency, a set of variables assumed relevant to the study have been obtained. These are hotel size, age, location, ownership, and category (star rating). Others are the hotel inputs which are subjected to the production of food and drink and the sale of rooms and the attendant output measurements.

Various studies have classified firms according to their size (Claver-Cortés *et al* 2007; Ngui *et al*, 2007). Studies too have compared this variable with hotel performance with some concluding that the bigger the size of the hotels the higher their revenue and occupancy rates (Pine and Philips, 2005). Hotel size is defined as family hotels with 1-100 beds, small hotels with 101-150 beds, medium-sized hotels with 151- 300 beds, and large hotels with more than 300 beds (Camisón, 2000). This study used the same measurement of size and it was expected that there would have been a relationship between hotel size and efficiency.

Firm age represents the effect of development process as manifested by learning and doing (Ngui *et al*, 2007). Hotel age was measured by the number of years a hotel had been in operation. It was expected that there would have been a positive relationship between the hotel age and its efficiency profile.

Studies have shown that when a hotel belongs to a chain, its chances of survival improve. Other studies have also found that no clear differences in performance exist between chain hotels and independent hotels (Claver-Cortés *et al* 2007). This study classified hotels according to their status as chain-affiliated or independent establishments.

Different studies have shown that the higher the hotel star rating the higher the hotel cost performance (Bichage, 2006; Pine and Philips, 2005). The rating used here refered to the hotels classification under the Hotels and Restaurants Authority. Hotels were analyzed as two sets of homogeneous groups, comprising of two and three stars as one set, and four and five stars as the second set because the criteria used in classification was/is not significantly different within each set.

Location refers to the area where the hotel is sited. The location of a hotel affects its capability to draw customers especially if it can be accessed easily, is convenient and attractive to the expected demand. Studies have also shown that international tourist hotels located in resort areas are more efficient than those located in metropolitan areas (Chyan, 2009). This study analyzed if there is a relationship between efficiency and the hotel location. A positive/negative relationship between efficiency and hotel location was expected.

1.9 Operational Definitions of Terms

Bed occupancy: The definition of bed occupancy in Kenya mirrors the recommendations of the European Union directive in the Eurostat Methodological Guidelines in Basic Travel and Tourism Statistics and the UN draft on tourism statistics and the World Tourism Organization recommendations. The bed occupancy is obtained dividing the total overnight stays by the product of bed spaces on offer and the number of days when the bed spaces are actually available for use for the same group of establishments and multiplying the quotient by 100 to express the result as a percentage (EU council directive 95/57/EU)

Beverage Cost: The cost of beverage as a percentage of beverage sales revenue.

Beverage revenue/sales Revenue derived from sales of alcoholic beverages, soft drinks, cigarettes and cigars. They include revenue from restaurants, bars coffee shops, room service, conference and banqueting.

Data Envelopment Analysis: A linear programming based method for evaluating the relative performance of a Decision Making Unit (DMU) such as a hotel in the presence of many inputs and outputs.

Decision Making Unit: A distinct unit such as a hotel that has flexibility with respect to some decisions it makes, but not necessarily complete freedom with respect to these decisions.

Efficiency: The ratio of actual output to maximum/potential output

Efficiency Measure: A ratio of actual output to maximum potential output obtainable from a given input level, or the ratio of minimum potential input to actual input required to produce a given output.

Food Cost: The cost of food as a percentage of food sales income.

Food sales Revenues derived from food including sales from tea, coffee, juices and other drinks from the still-room. They include such sales emanating from restaurants, room service, banqueting and conferences.

Inefficiency: The extent to which actual output falls short of potential output.

Occupancy The percentage of available rooms that have been sold over the period being analyzed calculated by dividing the number of room per night sold during a period by the total number of rooms available for sale during the same period.

Productivity: The ratio of outputs to inputs or aggregated outputs to aggregated inputs.

Returns to Scale: This reflects the degree to which a proportional increase in all inputs increases output.

Room sales Revenues from bedrooms rented or leased for a day, week or longer.

Star rating: Hotels are classified by the Kenya Gazette on behalf of the Hotels and Restaurants Authority under regulations 2 and 7 of the Hotels and Restaurants Regulations 1988.

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

This chapter reviews literature on the measurement of performance using different methods. Section 2.1 deals with the general travel and tourism trends globally, regionally and locally. The other sections review literature on financial ratio analysis and empirical studies that have used DEA in estimating efficiency. The last section 2.3 describes concept of benchmarking.

2.1 General Tourism Trends – Hotels and Restaurants

According to a study by United Nations Conference on Trade and Development (UNICTAD, 2010), tourism is a 3 billion dollar a day business globally. The worldwide contribution of tourism to GDP exceeds 5 percent and its annual turnover has been growing at a faster pace than GDP. As an export category, tourism ranks fourth after fuels, chemicals and automotive products.

United Nations World Tourism Organization (UNWTO, 2009), however reports that travel and tourism in Africa has had a small share of the tourism global economy as it received only 3 percent (USD) of the global tourism receipts compared to say, 50 percent receipts for Europe. This report suggests that the travel and tourism industry directly contributes an estimated 3.3 percent to GDP and 2.5 percent to employment in Africa. This nevertheless compares favourably to tourisms' direct contribution to the global economy that is approximately 3.2 percent of global GDP and 2.7 percent of total employment.

In Africa, Egypt, Tunisia. South Africa and Morocco account for 73 percent of the total African tourism receipts. Regionally East Africa received 16 percent of the total tourism receipts in Africa compared to 52 percent for North Africa and 21 percent for South Africa. Kenya received 2 percent as a share of the total tourism receipts in Africa.

UNICTAD (2010) indicates that tourism was traditionally placed below manufacturing and agriculture since it was not seen as a significant source of growth. This perception has however changed in view of the fact that tourism is nowadays seen as a potential means of earning export revenue and generating large numbers of jobs, promoting economic diversification and a more service oriented economy especially through hotels and restaurants. It is worth noting that generally in tourism, the main investments are in hotels and restaurants and also in tour operations and global reservations systems (*ibid*).

Globally, international tourist arrivals have grown from 25 million in 1950 to 922 million in 2008, with tourism receipts rising from $ 2billion to $ 944 billion. Developing countries have particularly had substantial growth in arrivals as evidenced by the fact that in 1950, the top 15 destinations absorbed 88 percent of international arrivals whereas by 2007 this figure had dropped to 57 percent. The inward Foreign Direct Investment (FDI) stock in the hotels and restaurant sector have risen more than six–fold, from $ 4.7 billion in 1990 to $ 29.2 billion in 2007. This report however notes that the FDI stocks in hotels and restaurants remains limited in relative terms. For instance their FDI stock in hotels and restaurants as a share of total FDI stock in their services sector is only 1 percent UNICTAD, (2010).

Hotels usually impact the local economy through a variety of economic pathways. For instance, the backward linkages established by hotels include those with suppliers of inputs that are needed for immediate consumption such as meat and fish, dairy produce, vegetables and beverages. Backward linkages also establish long-term relationships such as with construction companies and manufacturers of equipment, linen and uniforms. Strong linkages catalyse a multiplier effect that generates broad based economic benefits at the national level as well as employment opportunities and poverty reduction at the local level (*ibid*).

2.2 The History of Hotels in Kenya

Hotels in Kenya have been singled out as being one of Kenya's tourism support services (Wadawi, 2008). The following is a brief history of early hotel development in Kenya.

The history of the hotels in Kenya dates back to 1898 when the legislation establishing game reserves was gazzetted (Ikiara, 2001 and Wadawi, 2008). This law led to the protection of wildlife and created a framework for hunting that is believed to have initiated the sector as an industry. According to the Kenya Utalii College (1994:1 and Murungi, 2010) the first hotel in Kenya was called Grand Manor Hotel that was built in Mombasa. Among the first hotels in Nairobi and a forerunner to the current Stanley Hotel was one called Tommy Woods Store that was run by a lady in her prime going by the name Ms. Mayence Bent. This hotel was burnt down in 1904. It was reconstructed and renamed 'New Stanley'.

By 1906, four hotels, namely; The New Stanley, The Empress Hotel, The Commercial Hotel and The Norfolk were in existence. The hotel industry grew substantially in the 60's and 70's partially fuelled by the establishment of national parks and game reserves in addition to political stability (Utalii College, 1994:1 and Murungi, 2010).

One particular attribute for hotels and restaurants is that the consumer comes to the producer rather than the other way round. This enables even the smallest transaction to be part of the global economy since for instance every sale to a tourist, be it food or a haircut represents an export (*ibid*). Therefore if offered properly, hotels and restaurants within the bigger tourism sector should offer significant opportunities for poverty reduction through its income generating and job creating effects.

The following section presents the financial performance measures that are traditionally common in hotels.

2.3 Financial Performance Measures

Competitiveness of a country is derived from the efficiency of its enterprises (Mostafa, 2007). Therefore for hotels to ensure achievement of their goals and objectives management uses various performance measures to evaluate, control and improve production processes (Ghalayini, 1996).

Performance measures have traditionally been based on managerial accounting system with most measures focusing on financial data such as Cost-Volume Profit Analysis (CVP) and yield management (Bichage, 2006; Chung and Parker, 2006; Ghalayini and Noble, 1996).

Managers of hotels have remained primarily focused on these traditional financial measures. For instance some writers argue that the food cost percent is the only tool available that analyzes and measures performance in the food cost area (Essam, 2007). According to Wu *et al* (2010) the drawback of such analyses is that they focus on the outcome of operations and hence fail to harness as appropriately as they might the available resources that contribute to the production of products and services. It is however important to note that these financial measures do not bring out the relative efficiency of these business units.

Financial performance measures can be categorized into two evaluation platforms. In the first evaluation platform, individual performance measures which include investment in training and development are used to evaluate the reliability and efficiency of the operational system and its different processes. These measures are significant in detecting and dealing with specific inefficiency-related problems. (Gomes *et al* 2007). The second performance evaluation platform is focused on an organizational-wide management-perspective. Under this platform, the involvement of the executive is viewed to be critical to the success of the organizational performance measurement process (Gomes *et al*, 2003).

Claver-Cortés (2007) did a study to establish why differences in performance levels exist between different strategic hotel groups in Alicante Spain and what possible factors may justify those differences. The study found significant differences in occupancy rates per rooms and beds and Gross O perating Profit (GOP). In the case of GOP, the study concluded that this variable increased with firm size, since the bigger the hotel, the bigger was its chance to generate economies of scale. The study also found that occupancy rates increased in hotels affiliated to chains.

Anderson *et al*, (2000) in Sanjeev (2007 pp 3) observed that most of the previous studies in the hotel industry have used traditional financial ratio analysis such as return on equity or return on assets. These ratios however, do not ideally bring out the relative efficiency of these hotels and the benchmarking of their operational performance is inadequate.

Such statistics do not reveal the actual efficiency of the hotels. This therefore calls for a measure of performance and efficiency that overcomes these limitations.

The following section presents a review of some of the studies that have used DEA in estimating efficiency.

2.4 Review of Studies That Have Used DEA in Estimating Efficiency

DEA has been explored extensively in the service sector such as restaurants, police units, hypermarkets, listed companies, luxury hotels and retail industry (Anthanassoppoulos, 1995; Fernando and Cabanda, 2007; Sanjeev, 2007; Verma and Garvineni, 2006; Barros and Alves, 2003; Mostafa, 2007; Min *et al*, 2008).

Min and Min (2008) used DEA to measure the relative efficiency of six Korean luxury hotels namely; Marriot, Hyatt, Hilton, Ritz Carlton, Renaissance and Intercontinental between 2001 and 2003. The results showed that all the hotels except Marriott experienced declining efficiency in productivity. Marriott consistently recorded an efficiency score of 1 (100) percent in respect to revenue and profit. Hyatt's technical efficiency scores with respect to revenue ranged from 83.77% to 95.40%. However, its technical efficiency with respect to profit dropped from 51.74 percent in 2001 to 48.83 percent in 2003 though it outperformed the hotels in its overall pure technical efficiency in revenue by registering an efficiency score of 100% for the three years. This implies that revenue growth might not necessary imply an increase in profit.

Min *et al* (2008) also found that although a decline in occupancy ratio often contributed to a decline in financial efficiency in profit, a reduction in room price did not lead to increased occupancy ratio. For instance, Hyatt lowered its average daily room from $267 to 2002 to $238 in 2003 to attract more guests but with its occupancy ratio dropped to

63.2 per cent in 2003 from 69.5 percent in 2002. Hilton's occupancy ratio declined from 80.8 percent in 2002 to 66.9 per cent in 2003 despite a reduction in their average room rate from $200 to $180 in the same period. This result is confirmed by another study in USA (Smith and Travel Research, 2010) in which the upper-upscale hotels discounted their room rates in order to increase occupancy. This discounting though boosting these hotels' occupancy, however had the opposite effect characterized by declining Revenue per Available Room (RevPAR).This therefore casts a shadow on a pricing strategy dependent upon discounts without cost saving efforts in mitigating a hotel's financial problems.

Sanjeev (2007) analysed the efficiency and performance of restaurants in India. In this study 16 of the 68 hotel and restaurants companies studied were fully technically efficient with a score of 1 (100) percent. Four companies scored less than 0.5 implying wastage of inputs to the tune of 50 per cent to arrive at their respective levels of output. In general the hotel and restaurant companies had an average score of 76 per cent. This showed that for the industry as a whole, the inputs could be reduced by 24 percent to produce the same level of outputs. This study further revealed that there was a positive correlation between size and efficiency with most large companies likely to be efficient.

Using DEA and Malmquist productivity index, Hwang and Chang (2003) measured the efficiency of 45 hotels in 1998 and the efficiency change of the 45 hotels from 1994 to 1998 in Taiwan. The results showed that managers were 79.16 percent efficient and that 20 of the 45 hotels improved the managerial efficiency over time.

Korir (2010) used DEA and SFA to measure hospital efficiency in Kenya in the years 1995 to 2000. The results showed that the mean efficiency estimates steadily rose from

0.5159, 0.5248, 0.5337, 0.5424 and 0.5511 respectively. However analysis of variance (ANOVA) confirmed that there was no difference in the mean cost efficiency in the five years. The results further revealed that the average efficiency of the health facilities was 134.31%, implying that the hospitals as a group operated above the minimum cost by 34.31%. The survey results also showed that had the hospitals operated more efficiently, over 40% of the recurrent cost ranging from 0.99 billion to 1.17 billion could have been saved.

A study by Barros and Alves (2003) on hypermarket store efficiency in Portugal found that 37 percent of the outlets operated at a high level of technical efficiency with 63 percent of the outlets being technically inefficient. The dominant source of efficiency was the scale of economies. Among other factors, the technical inefficiency in this study was attributed to the pattern of rotation of outlet managers, structural rigidities associated with the labour market, unequal access to information between the various outlets, time lags in the outlets acquisition of new technology vis-à-vis the commensurate skills upgrade among the personnel.

Neves (2008) used DEA in a study on the selection of strategies that improved the performance of a worldwide sample of 83 hotel companies. The results revealed that the efficient frontier was dominated by hotel companies which had a focused strategy (no diversification to other related activities). These companies were 71% of the efficient frontier. The efficiency of the diversified companies was lower than average probably because focused strategies tended to generate higher performance than diversification. The majority of companies in the sample operated under DRS which meant that a decrease in firm size would allow an increase in the TE, since a decrease in the inputs would have a less than proportionate effect in the outputs.

Barros (2005) also used DEA to explore the managerial performance of Taiwan's International Tourist Hotels (ITHs). The result revealed that the overall technical inefficiencies of Taiwanese ITHs were primarily due to the pure technical inefficiencies rather than the scale inefficiencies. This implied that the number of these hotels was approaching market saturation. In regards to the Pure Technical Efficiency (PTE), the study revealed that, on average, the hotels could produce the same level of measured output with 12.67 percent less inputs, if they held the current input ratios constant. Approximately 54 percent of these hotels needed to reduce their inputs if they were to become efficient.

This study also investigated the status of returns to scale for ITHs. The results showed that about 30percent of the ITHs operated in the Constant Returns to Scale (CRS) region whereas 61percent of the ITHs operated at Decreasing Returns to Scale (DRS) region. The rest of the ITHs operated at Increasing Returns to Scale (1RS). These results revealed that ITHs were facing a highly competitive environment in Taiwan. The results also indicated that the international chain ITHs were more efficient on average than independent-owned ones. The results also reported that the hotels located in resort areas operated slightly better on average than ones located in urban areas.

Debnath and Shankar (2009) used Data Envelopment Analysis (DEA) to examine the performance of 20 management institutes. The efficiency scores were obtained for 20 management institutes under Constant Return to Scale (CRS) and Variable Return to Scale (VRS). In this study 5 out of 20 management institutions included in the analysis were identified as efficient when the DEA-BCC and DEA-CCR models were applied respectively. Of the 20 management institutions, the 5 scale efficient institutions showed constant return to scale. The rest of them showed decreasing return to scale. One institution showed a constant return to scale.

Empirical result also revealed that there existed substantial waste in the operation of the institutions in the sample. For instance, the average efficiency of institutions derived from applying the DEA-CCR model amounted to 0.80. This indicated that in theory, the management institutions under study could, on average, increase the level of their output to 1.25 times as much as their current level while using the same inputs. The results also showed that the scale of operations significantly influenced the efficiency of a management institute.

Verma and Garvineni (2006) measured police efficiency in India using DEA. The inputs chosen were the total expenditure in Rupees, the total number of police officers, the number of investigating officers and the total number of investigated cases. They considered the following variables as outputs – number of persons arrested, number of persons charge sheeted, number of persons convicted and the number of trials completed. Results from this study showed that 11 out of the 25 states were relatively efficient.

Mostafa (2007) evaluated the competitive market efficiency of top listed companies in Egypt. The following variables were chosen as inputs: assets (any item of economic value owned by a company that could be converted into cash) and the full- time employees. The variables chosen as outputs were; net profit and market capitalization. The results from this study showed that these companies were on average 46 percent efficient. This meant that, if the average company in the sample was to achieve the level of its most efficient counterpart then the average company could realize a 54 per cent cost saving.

Barros (2003) measured the efficiency of hypermarkets and supermarkets in Portugal and identified the efficiency drivers. The variables chosen as inputs were: full –time workers and capital (assets of the firm). The outputs were the sales, the operating results and the value added. The results showed that the efficiency score under the Variables Returns to Scale (VRS) was 99 percent. This showed that a majority of these stores were efficient in managing their resources because the magnitude of waste due to inappropriate sales and operating results was negligible.

Mostafa (2009) assessed the market performance of the top retailers in the USA in 2007 using Data Envelopment Analysis. The results indicated that the efficiency scores ranged from 41 to 100 percent for the retailers in the sample, with an average of 73.15 percent when using the CCR model (CRS) and from 42 to 100 per cent, with an average of 80.32 per cent when using the BCC model (VRS). This meant that, if the average retailer in the sample was to achieve the level of its most efficient counterpart, then the average retailer could realize a 27 per cent cost saving. A similar calculation for the most technically inefficient company reveals cost savings of 58 per cent. Among the major limitations of this study is that the selected variables might not have been exhaustive, and the data set was short. This study also used a cross-sectional data set to evaluate the efficiency of the top US retailers even though the efficiency could have been evaluated better through analysis of average efficiencies across time using a longitudinal design.

Bdour and Al-khoury (2008) used DEA to obtain the relative efficiency of commercial Banks in Jordan from 1998-2004. The results showed that under the CCR model there was an increase in bank efficiency in all years except 2003 and 2004 where a decrease in bank efficiency was evident for several banks in the sample. In 1998 only 2 out of 17 banks were efficient, and the average bank efficiency was only 53.09 per cent. However, efficiency increased in subsequent years. The number of efficient banks rose rapidly resulting in a much higher average efficiency of 96.36, 98.77, 98.38 and 99.03 per cent in 1999, 2000, 2001 and 2002, respectively. The cause of inefficiency was attributed to the worldwide recession and the gulf war, which adversely affected Jordan's economy causing a major decline in income, high inflation, and an increase in unemployment and poverty.

Avkiran (1999) examined the efficiency of 65 bank branches by observing a branch's relative efficiency on a selection of variables over a number of years in order to provide an insight into the performance of each branch compared to its peers. The DEA model used in this study was a considered a variation on the production theme where the number of teller windows represented capital (branch size) and staff numbers represented input of labour. This study used a single stage adjustment in which uncontrollable input was included in DEA in such a manner that it did not actually enter the calculation of the efficiency score for DMUs (i.e. it becomes a constraint in linear programming). The results of the study showed that 18 branches were identified as efficient. Further, those branches that steadily lost ground to others were likely to become candidates for closure or downsizing.

Taylor *et al* (2009) applied Multi-factor Menu Analysis (MFMA) using Data Envelopment Analysis. Data on menu sales was obtained from three similarly positioned full-service restaurant outlets of a Mississippi-based full-service restaurant company. In order to create a holistic MFMA, the study used a Delphi technique through a questionnaire that identified, expanded, and validated relevant categorical labor factors from a panel of experts. The Delphi technique was utilized to elicit information from industry experts in developing a final labor factor list. For this study, the panel of experts consisted of Research and Development (R&D) chefs and experts based across the US. Four rounds of factor development were conducted via electronic mail and consensus was reached when all the panel members were in agreement on the relevance of the labor factors. Each set of responses was analyzed and summarized into mean scores of agreement that were determined for each round. Labor factors that achieved 90 percent agreement were then presented to the panelists for further analysis. Menu data was collected from sales records included sales mixes collected from point-of-sale systems and associated food costs over a three-month period. The three operations used identical menus, production systems and pricing schemes. The final labor factors used in the DEA were:

Overall total number of ingredients.

1. Number of purveyors required to receive all ingredients for the menu item.
2. Batch size of recipes for a menu item.
3. Marinating/seasoning process.
4. Number of unique ingredients.
5. Pre-made vs. made to order.
6. Cross utilization of menu items in other recipes.
7. Number of stations.
8. Number of pars for the menu item.

9. Shelf-life of menu item ingredients.

10. Specialized equipment to prepare menu item.

The final step in the MFMA model development phase of this study involved performing a DEA to evaluate the menu items, using the CCR method – facilitating output maximization. A total of five variables were used in the final analysis: three input variables and two output variables. Inputs were designated as controllable or non-controllable by the facilitator in the DEA process prior to analysis. The inputs chosen were; marination (since the preparation and purchasing process could affect the level of preparation of a menu item), number of purveyors, and the number of kitchen line stations required to prepare the menu item.

The output variables consisted of gross profit and popularity. Gross profit was defined as the selling price of the menu item less the food cost expended to produce the menu item. Popularity referred to the number of menu items sold during the analysis period. A total of 65 menu items segmented into six categories were offered and 145,240 menu items were sold throughout the period of study, for a total of $1,265,349.70 in revenue. Total food cost for the period was $396,148.83 or 31.31 percent, resulting in a gross profit of $869,200.87. The 65 menu items were segmented into six categories for analysis:

1. Appetizers (11 items).

2. Salads (10 items)

3. Sandwiches (6 items).

4. Entrées (26 items).

5. Desserts (7 items).

6. Kids meals (5 items).

All six menu categories were analyzed separately. Efficiency scores for each menu item within each meal category were compared using a quartile-analysis. The quartile analysis was used to segment the menu items into three groupings: efficient (top 25 percent), improvement needed (middle 50 percent), and inefficient (lowest 25 percent). The improvement-needed grouping consisted of the second and third quartile groupings. Inefficient menu items were removed from the menu and projected revenues during the last stage of the study.

A menu analysis comparison was performed using three models: Menu Analysis Model (MAM) the Menu-Engineering Model (MEM); and the Cost/Margin Menu Analysis Model (CMAM). Actual sales prices, food costs, and sales counts were used for the comparative.

The MAM classified the menu items into a total of 'losers', 'marginal II's', 'marginal III's', and 'winners'. The MEM distributed menu items among the four quadrants with; 'dogs', 'puzzles', 'plow horses', and 'stars'. The CMAM yielded the most undesirable menu items. The distribution included; 'problems', 'sleepers', 'primes', 'Eight standards'.

The results showed that the CMAM model classified one-half of the salads and virtually all of the steaks, with the exception of the 6 oz filet, as undesirable, ranking the 6 oz filet as a prime. Additionally, the CMAM ranked one-half of the sandwiches as primes. Once undesirable menu items based on the CMAM analysis were removed, projected revenues were recalculated. The MFMA model identified the largest number of desirable menu items, classifying 23 as efficient, followed by 23 improvement needed menu items and 19 inefficient menu items. Using a quartile analysis grouping process, the MFMA yielded the most uniform distribution of menu items into meal categories of all the models under comparison.

Of the four models in the study, the MAM was the most conservative. The MEM was the most aggressive and had the highest projections of both revenue and gross profit. The CMAM analysis, essentially a hybrid of the MAM and MEM, projected an intermediate gross profit. The CMAM model projected the lowest food cost. The projected gross profit of $861,823 exceeded the projected gross profit of the MAM, but fell short of the projected gross profit of both the MEM and MFMA models. The projected gross profit of the CMAM also fell short of the gross profit of the original menu. In this study the MEM model yielded the best results, followed closely by the MFMA model, relative to projected gross profit. However, only the MFMA model considered menu item efficiency as a determinant of menu item evaluation and included labor measures.

This study, though ideal in identifying desirable menu items, was however narrow in scope because it did not address the overall relative efficiency the restaurants. Secondly, this method did not simultaneously include quantitative and qualitative variables to fully assess menu efficiency and profitability.

Hu *et al* (2009) measured the efficiency of primary schools in Beijing, China using DEA. The Inputs of this study were; student-teacher ratio, teachers' average teaching experience, ratio of teachers' educational, ratio of teachers' professional title, none-personal educational expenditure per student, total educational expenditure per student, number of books (in library) per student, average income of teachers per month, average income of administrators per month and the average hours for students in school.

Soteriou and Stavrinides (1997) used DEA to measure the performance of bank branches and specifically included service quality as an output. The model's input were: clerical personnel (person hours); managerial personnel (person hours); computer terminals (terminal hours); working space (m^2); number of personal accounts; number of savings accounts; number of business accounts and the number of credit application accounts. The model's output consisted of the employee SQ perceptions of the bank branches. An Average Serviqual Measure was calculated for each branch from the responses of its personnel, and used as a single output indicator of the SQ level of the internal customer perceptions for the branches included in the study. The results from the input minimization model showed that branch efficiencies varied from 39 per cent to 100 per cent, with an average efficiency of 78.6 per cent. The main drawback of this study is that though the model provided guidelines and direction towards service quality pitfalls, it cannot be used alone to assess branch performance since it only considers a single SQ output which may ignore other important bank branch performance measures.

Borenstein *et al* (2004) measured the efficiency of Brazilian post office stores using Data Envelopment Analysis. The main objective of this study was to build a suitable performance measurement methodology aimed at continuous improvement of a state owned company with multi-unit services spread across Brazil. The results showed that the mean relative efficiency rate of the 113 stores analyzed was 87.1 percent, with a standard deviation of 16.2 percent. 44 percent of the stores were technically efficient. The authors point out that 68 of these stores had their relative efficiency rates above 80 percent. The relative efficiency rates of client service stores were all above 70 percent with 50 percent of them having scores rates of 100 percent. 50 percent of the distribution stores had efficiency scores of 100 percent whereas 64 percent of these stores having efficiency scores above 80 percent. Integrated stores were relatively less efficient, and this was attributed to their hybrid condition. Only 38 percent of the integrated stores had relative efficiency rates equal to 100 percent.

The major limitation of this study was the difficulties faced in obtaining data and in its reliability. The authors state that it was difficult to reach a final definition of the variables, because of their dispersion level, and the absence, in the company databases, of established methods of regular collection.

Sarrico and Rosa (2010) measured the performance of Portuguese secondary schools using Data Envelopment Analysis. The objectives of this study were; to explore the expectations of school performance for the different stakeholders in the system; to understand the socio-economic factors which significantly determined the performance of the schools; and to find out the extent to which performance differences were attributable to socio-economic input factors or managerial factors. The inputs of this study were Mean school years of parents; Percentage of pupils without income support; Ratio of teachers per student and the Mean number of years of teachers at the school. The outputs were; Mean 12th grade classification of the school; Percentage of pupils that complete 12th grade; Percentage of pupils that do not abandon.

The results showed that efficiency scores were generally high, ranging from 87.21 to 100. 13 out of the 29 schools were in the frontier of observed performance, 11 of which were peers to inefficient schools. The study found no significant relationship between the school efficiency, location, size, number of pupils taught, and the rotation rate of the executive committee (elected governing body) in the previous ten years. These results notwithstanding, it is important to note that the sample used was not only small but also self-selected.

In a study of the performance of Spanish wineries, Sellers-Rubio, R. (2010) evaluated the economic performance of 1,222 Spanish wineries in 2007 using traditional profitability and productivity measures and DEA. The results showed that the mean economic efficiencies obtained for the CRS, VRS and DEA frontiers were 0.533 and 0.571, respectively. The results also revealed substantial productive inefficiency. On average, the firms considered could have used 45 per cent fewer inputs to obtain the same outputs. The mean scale efficiency for the sample analysed was 94 percent, suggesting a poor use of inputs.

This study (*ibid*) identified four different clusters. The first cluster was characterized by the highest efficiency and productivity ratios. This cluster comprised of only 12 firms. The second cluster comprised of 40 wineries. This cluster had firms that obtained very good productivity and efficiency ratios. The wineries belonging to cluster three showed profitability, productivity and efficiency ratios over the global sample mean except for CRS efficiency. This cluster outperformed wineries belonging to cluster four. The fourth cluster was characterized by the lowest efficiency, productivity and profitability ratios. Most of the wineries analysed belonged to this cluster.

In yet another study, Bachiller (2009), applied the Data Envelopment Analysis (DEA) and Tobit analysis to analyze efficiency changes and to determine the effect of the ownership and board structure on technical efficiency of five of the biggest Spanish state-owned companies. The technical efficiency of these firms ranged from 0.75 - 1.0. This means that in the most inefficient firm it would be possible to obtain the same output with a saving of 25 percent of its inputs. Tobit analysis results showed that privatization was inversely correlated with efficiency. This implies that privatization did not lead to improvements on efficiency.

The following section discusses benchmarking as a management methodology.

2.5 Benchmarking

Camp (1989) defines benchmarking as "the search for industry best practices that lead to superior performance". Wu *et al* (2010) adds that benchmarking has become a popular technique over the last two decades. Benchmarking is one of the most popular exercises adopted by organizations in understanding how well they are performing relative to their competition. It is also widely used to identify what management practices are worthwhile to apply in one's own firm, when aiming to reach desired performance goals.

Benchmarking was first proposed by Japanese manufacturing sector and subsequently popularized by international business practitioners (Camp, 1989). As a management methodology benchmarking gained notable attention from academics in the early 1980s (Broderick *et al,* 2010). Many companies that have indulged in benchmarking practices have reaped numerous benefits and succeeded in their businesses (Underdown and Talluri, 2002). Forker and Mendez (2001) note that benchmarking is usually triggered by a company's need for information that arises due to among others: the need for cost reduction, efforts to improve firm productivity, changes in management, the introduction of new processes or products, and/or competitive onslaughts that require reconsidering the prevailing strategies. Voss *et al* (1997) describes benchmarking as one way of identifying and understanding the practices needed to reach new goals. By identifying how superior companies organize their processes, a company can seek to adopt and adapt these practices. Sweeney (1994) further describes the essence of benchmarking as a proactive process of changing operations in a structured way to achieve superior performance.

Research in benchmarking has predominantly been conducted within manufacturing industries (*ibid*). Kozak and Rimmington (1998) however observe that while benchmarking applications are growing substantially in large organizations, they have, as yet, had limited application among small hospitality businesses.

Wu *et al* (2010) also argue that efficiency measurement are important to hotel managers since their establishments will achieve desirable outcomes only when resources are adequately allocated and utilized. While academicians have examined ways to assist managers in measuring the efficiency of their operations, some researchers have also been interested in searching for practical benchmarking and best practices from which inefficient hotels could learn.

2.6 Overview of Literature Review

The reviewed literature indicated that travel and tourism in Africa has had a small share of the tourism global economy. Tourism was shown to be traditionally placed below manufacturing and agriculture since it was not seen as a significant source of growth. The reviewed literature however showed that the perception has however changed since tourism is seen as a potential means of earning export revenue and generating large numbers of jobs, promoting economic diversification and a more service oriented economy especially through hotels and restaurants.

There is generally well documented literature on performance measurement in the field of management accounting, but less so in the hospitality management. Hotels generally use the financial ratios in measuring performance. These ratios however, do not ideally bring out the relative efficiency of these hotels and the benchmarking of their operational performance is inadequate.

Traditional performance measures too have many limitations that make them less applicable in today's competitive market. The traditional management accounting systems were initially developed with the labour cost being the major cost driver. Other costs were de-emphasized and heaped together under the overhead category. However today labour cost rarely exceeds 12 percent while overhead is usually 50-55 percent of the total manufacturing costs. Therefore, because overhead is allocated based on the minor element of direct labour cost, this allocation is not valid.

Secondly, since financial reports are usually closed monthly, they are lagging metrics that are a result of past decisions. Thirdly, traditional performance measures try to quantify performance and improvement efforts in financial terms. However, most improvement efforts such as customer satisfaction and service quality cannot be quantified in dollars/ shillings.

Another limitation of traditional performance measures is that if standards are not carefully set, they have the effect of setting norms rather than motivating improvement. Workers may hesitate to perform to their maximum if they realize that the standard of the upcoming period may be revised upwards by the current results.

It is important to note that for a hotel to survive in a competitive environment, it should concentrate on quality, delightful customer service among others. Reducing costs at the expense of any of these can be counterproductive (Ghalayini and Noble, 1996). This study will therefore not use the financial measures of performance.

From the studies that have used DEA to estimate efficiency it was noted that some were narrow in scope because they did not address the overall relative efficiency. Some of these studies were cross-sectional in nature whereas efficiency could have been evaluated better through longitudinal designs. Another gap identified was that some of the studies did not simultaneously include quantitative and qualitative to assess efficiency and profitability. The other studies reviewed were faced with difficulties in obtaining data and the reliability of this data was therefore questionable. Some of these studies used small samples that were self-selected.

With respect to benchmarking, it is noted that it has predominantly been conducted within the manufacturing industries with limited application among small hospitality businesses.

Stochastic frontier production function measures efficiency of firms. This is a model that permits the estimation of standard error and tests of hypothesis using traditional maximum likelihood methods.

However, compared with the Stochastic Frontier Analysis, DEA imposes neither a specific functional relationship between production output and input, nor any assumption on the specific statistical distribution of the error terms. In so doing, the DEA model has the advantage of minimal specification error. DEA also produces detailed information on the efficiency of the unit, not only relative to the efficiency frontier, but also to specific efficient units, which can be identified as role models or comparators (Hawdon, 2003).

CHAPTER THREE

METHODOLOGY

3.0 Introduction

This chapter deals with the methods that were adopted by the study. These included the study design, study area, sampling procedures and the data collection and analysis procedures.

3.1 Research Design

The study was a longitudinal survey that covered a period of three years between 2007 and 2009. This is a research in which data are collected for each variable for two or more distinct periods (2007,2008 and 2009 being three such distinct periods); the subjects or cases analyzed are the same, or at least comparable, from one period to the next (the subjects analyzed were 36 hotels whose efficiency estimations were analyzed for each period); and the analysis involves some comparison of data between or among periods (analysis involved comparing within each period and between the periods). Longitudinal data permits the description of patterns of change over time and can be used to locate the causes of phenomena (Ruspini, 2000).

3.2 Location of the Study

The study was conducted in Nairobi and the Coast region. The Coast region comprised of hotels found within the Mombasa Island, the North Coast, up to and including Mnarani/Kilifi and the South Coast with the furthest point being the hotels around Ukunda. These two regions accounted for 69 percent of the total occupied beds in 2007 (GOK, 2008). Therefore this made it an ideal location for a study of this nature.

3.5.1 Structured Interview Schedules

Structured interviews guides were administered to the general managers. A structured interview followed this specific guide. Oatey (1999) indicates that this research instrument is usually used as the basis for most surveys with quantitative data such as this one. The standardised guide was administered and specific questions were asked in a set order and in a set manner to ensure no variation between interviews. Respondents' answers were recorded on a questionnaire form with usually with pre-specified response formats and the completed questionnaires were analysed quantitatively.

The respondents were assured that their individual responses would remain confidential and only accessible to the researcher. This helped control any response biases. These schedules focused on the demographic information, number of rooms, the number of food and beverage staff amongst other variables.

3.5.2 Secondary Data

Secondary sources of data based on hotel financial statements and government publications perused were used for information on room and bed occupancy, food and beverage costs and revenue and room costs. Information from this source complimented data from the interviews.

3.6 Instrument Validity and Reliability

Research instruments were pre-tested in two one star hotels in order to establish the validity of the instruments. This enabled the instruments to be adjusted to reflect the core of the study. Further to this, Cronbach's alpha statistic (α-statistic) and the Squared Mean Correlations (SMC) were used. For reliability α-statistic of more than 0.6 and validity, SMC greater than 0.5 were considered significantly reliable and valid.

3.7 Data Collection Techniques

The respondents were informed on the purpose of the study. They were assured that the information they provided, though sensitive was going to be treated with confidentiality. The researcher secured appointments both by phone and e-mail before arranging for interview sessions with the respondents.

3.8 Data Analysis

Data envelopment analysis calculations were done using the DEA software version 2.1. This used five inputs[1] and four outputs[2] for the 36 DMUs for the three year[3] average. This was repeated for each year of the three periods. When Y_1, Y_2 ,....,Y_n were the DEA efficiency scores, the errors terms for the models could be independent of each other because the methodology computing DEA efficiency scores are dependent to each other. The calculation of the DEA efficiency score for one DMU involved all the other DMUs in the observation set, hence the dependency in the sample of the computed scores, $\emptyset_1$, $\emptyset_2$,..., $\emptyset_n$.

DEA calculated the relative efficiency of each hotel by transforming the multiple inputs and outputs into a single virtual (fused) input and virtual output. This virtual input and output was computed as weighted sums where the weights were selected in a manner that each hotel had the highest possible (but no greater than unit) efficiency rating. This was achieved through the formulation and a solution of a sequence of linear programs, one associated with each DMU (hotel). The hotels that had an efficiency rating of 1.0 were deemed efficient and the convex envelop connecting them called the efficient frontier.

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[1] Food cost, beverage cost, number of beds, number of rooms and number of full time F&B staff
[2] Food sales, Beverage Sales, rooms sales and pre-tax profit.
[3] 2007,2008,2009

The hotels inside the efficient frontier were identified as inefficient and their relative efficiency rating was based on the distance from the efficient frontier. For each inefficient hotel, the point on the efficient frontier which was closest (it could be an efficient hotel or a convex combination of a few efficient ones) was identified as its reference point. It is from this reference point that best were identified and transferred to an inefficient hotel in order to make it efficient.

The input orientation model was used for this study based on the fact that managers of hotel companies have higher control of the inputs of hotels (such as assets, costs, and capital) than of their outputs (such as revenues, operational profit) which largely depend on demand. Data Envelopment Analysis computer software (DEAP version 2.1) was used for analysis.

For each hotel, the software searched for a linear combination of hotels in the sample that produced a greater level of output with fewer inputs. The model searched for excess input usage of the hotel under analysis. In solving the LP problem three characteristics of the model must be specified by the user: the returns to scale, the valuation system, and the orientation system.

Returns to scale may either be CCR or VRS. The orientation system, which defines the objective function, can be designated as input-orientation or output-orientation. This study used the VRS input-orientation model with the default weights suggested by the software.

The VRS model measures pure Technical Efficiency (TE) only. However, for comparative purposes, the study also employed the CRS scores, which were composed of a non-additive combination of pure TE and scale efficiencies. A ratio of the overall efficiency scores to pure TE scores provided a scale efficiency measurement.

To test whether there were extreme outliers which would affect the frontier and efficiency scores exploratory data analysis was performed using SPSS. This procedure enabled outliers to be identified. This necessitated call-backs through which the figures were clarified and adjusted.

Since the data was not normally distributed censored tobit regression was undertaken to get the factors which significantly explained the efficiency differences amongst the sampled hotels.

Censored tobit regression was also undertaken to get the factors which significantly explained the efficiency differences amongst the sampled hotels.

CHAPTER FOUR

RESULTS AND DISCUSSIONS

4.0 Introduction

This study aimed at measuring the efficiency levels of 2 – 5 star hotels; profiling these hotels based on their performance; analyzing their efficiency distribution and identifying the determinants of efficiency differences.

Data was gathered from 37 hotels ranging from two to five stars found both in Nairobi and Mombasa .As mentioned earlier, this study initially targeted all the 57 classified two - five star hotels. However eight hotels were no longer operational. Another four hotels though outwardly appearing autonomous were managed centrally. This left a target of forty-six hotels. Due to non responses perhaps due to survey fatigue, only 36 hotels completed the survey. The response rate was therefore 80 percent.

Data Envelopment Analysis calculations were done using the DEA software version 2.1. Censored tobit regression was undertaken to get the factors which significantly explained the efficiency differences amongst the sampled hotels. The results are presented under the following sub-topics:

- Descriptive statistics of the hotels,
- The efficiency scores of 2 – 5 star hotels and a profile of these hotels based on their performance,
- Efficiency distribution of the two – five star hotels and,
- The determinants of efficiency differences of 2 - 5 star hotels.

4.1: Descriptive Statistics of the Hotels

The following section presents some important statistics discussed under: distribution by working experience; a description of the hotel age; average number of beds and average number of rooms available for sale; average room prices; average bed occupancy; average room occupancy; and average yearly food and beverage cost, gross operating profit, expenses from room sales and energy and utility expenses.

The working experience of the respondents by gender is shown in table 4.2

Table 4. 1 **Distribution of Work Experience by Gender (N= 36)**

Work Experience (in years)	Sex		Total, n (%)
	Male, n (%)	Female, n (%)	
1- 5	4 (11.1)	1 (2.8)	5 (13.9)
6 – 10	8 (22.2)	3 (8.3)	11 (30.6)
11 – 15	2 (5.6)	0	2 (5.6)
Above 15	16 (44.4)	2 (5.6)	18 (50.0)
Total	30 (83.3)	6 (16.7)	36 (100.0)

Source: Author's calculations.

The study collected data by interviewing the general managers though a few of them delegated this responsibility to their financial controllers. The top management of the hotels under study was generally male dominated (83.3 percent). This confirms the results of an earlier study by Bichage (2006) that the Kenyan hotels are predominantly male dominated. Half of these respondents had a work experience of more than fifteen years. It appears that Kenya has a steady reservoir of well experienced hoteliers based on this data. These are employees who are likely to be efficient in their work as a result in learning and doing. Inefficiency in these hotels may have little to do with training and experience.

The results from table 4.2 show that about 14 percent of the hotel managers' work experience ranged from 1-5 years. These are managers who are transitory in nature as they are likely to move out their current employment as they look for greener pastures. As the managers do not stay for long in one station, this might have a bearing on efficiency since there is likely to be lack of reliable and consistent service which is an element of inefficiency.

A description of the hotel age is given in figure 4.1.

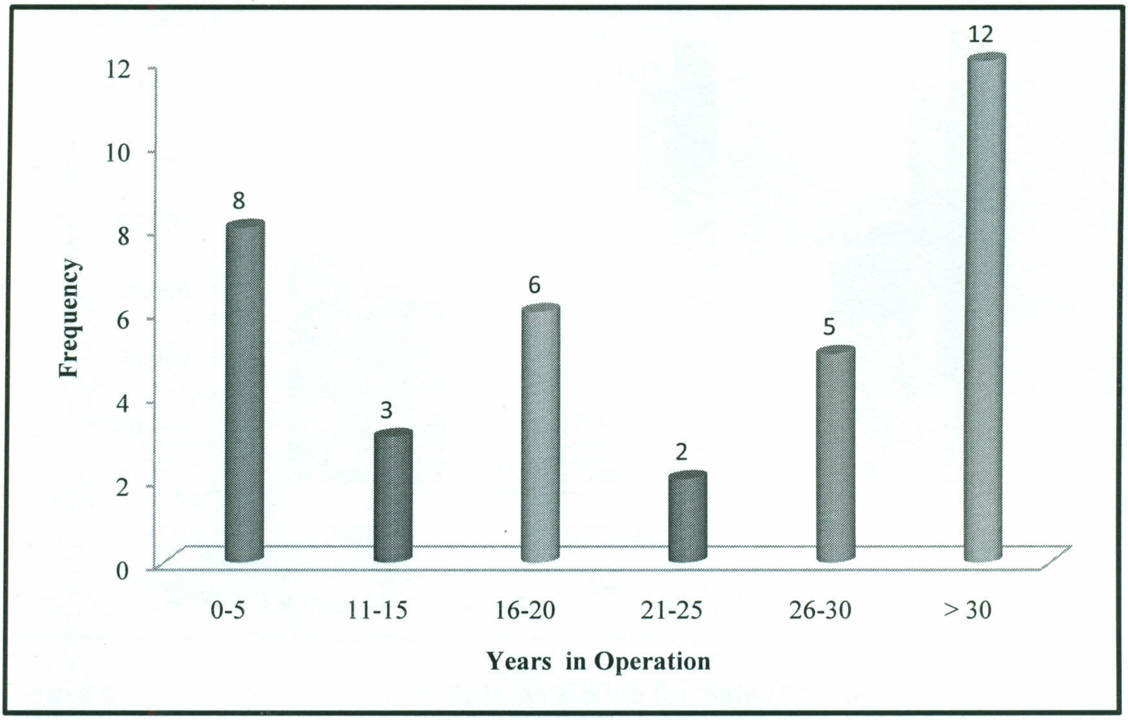

Figure 4.1: Hotel Age

Source: Author's own

The figure shows that a third of the hotels had been operational for more than 30 years. This is consistent with the personnel data given that more than half of the managers had worked for more than fifteen years.

The results also revealed that 16 hotels had been operational between 11 and 30 years. A study by Ngui (2007) revealed a significant relationship between age and efficiency in the manufacturing sector. Since age represents the effect of development process as manifested by learning and doing it was worthwhile to establish whether there was a relationship between hotel age and efficiency.

A computation of the number of beds available for sale is shown in figure 4.2.

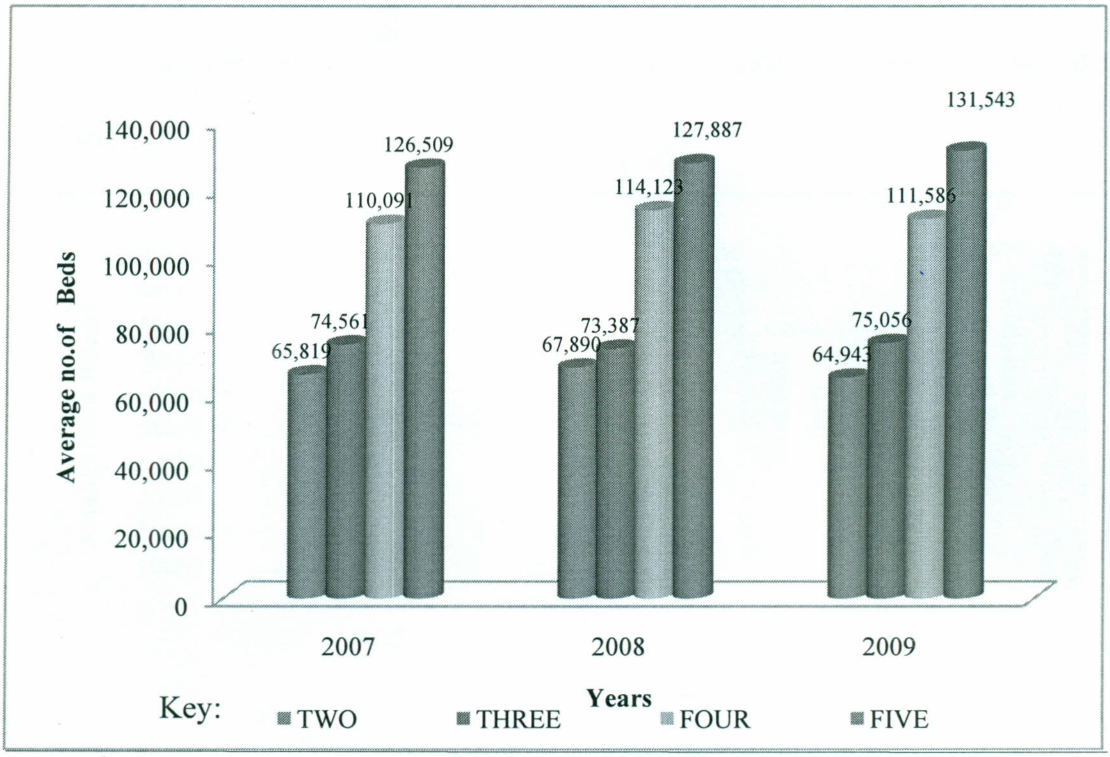

Figure 4 2: Average Number of Beds Available for Sale (N= 36)

Source: Author's.

Five star hotels had the highest number of beds available for sale with 126,509, 127,887 and 131,543 beds in 2007, 2008 and 2009 respectively. A key feature of these hotels is that most of them are found in Nairobi. Four star hotels had 110,091, 114,123 and 111,586 beds in 2007, 2008 and 2009 respectively. Two star hotels had the fewest number of beds available for sale that stood at 65,819, 67,890 and 64, 943 in 2007, 2008 and 2009 respectively. Generally, it was noted that higher rated hotels had more beds for sale compared to their low rated counterparts. More beds in the higher rated categories had consequent likelihood of these hotels generating higher revenues given that they had invested in more beds than the lower rated hotels.

To earn more from 2 and 3 star hotels it is imperative to invest in more beds and improve their occupancy.

Figure 4.3 presents the average number of rooms available in the hotels surveyed from 2007 to 2009.

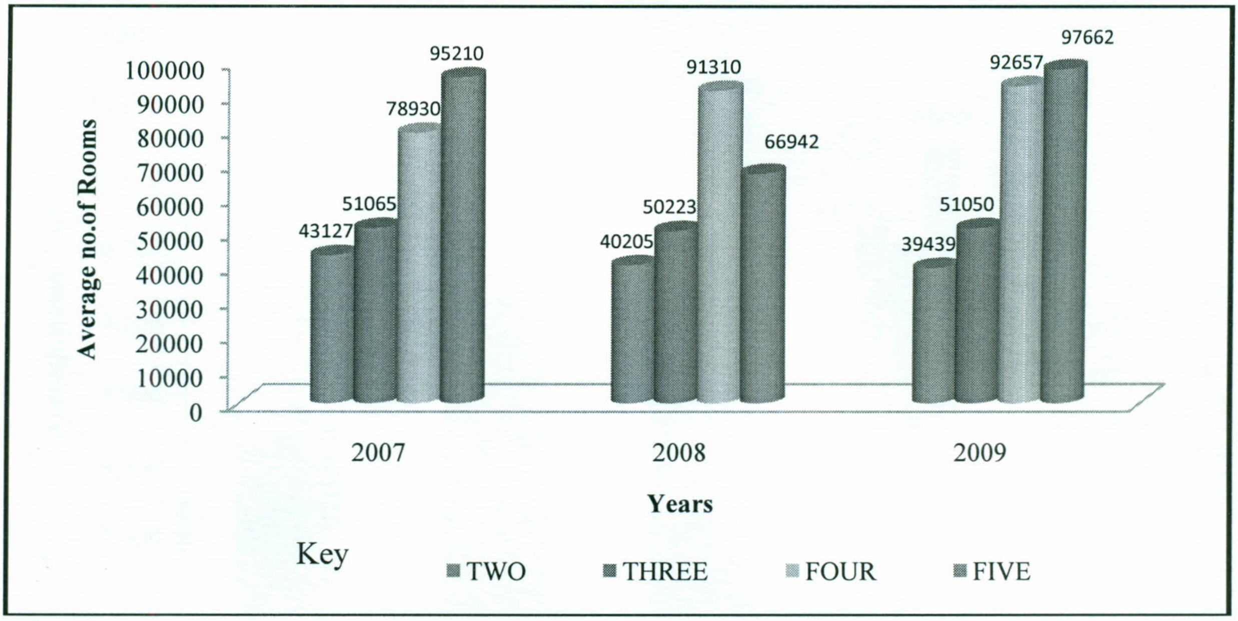

Figure 4.3: Average Number of Rooms for Sale (N= 36)

Source: Author's.

On average five star hotels had the highest number of rooms available for sale with 95,210, 91,310 and 987,662 rooms in 2007, 2008 and 2009 respectively which is in tandem with their high number of beds as shown in figure 4.2. Closely following were four star hotels with 78,930, 66,942 and 92,657 rooms in 2007, 2008 and 2009 respectively. Three star and two star hotels had on average about 50,000 and 40,000 rooms for sale in 2007, 2008 and 2009 respectively. The implication here therefore appeared that higher rated hotels had a more likelihood chance of generating higher revenues from rooms given that they had invested in more rooms than the lower rated hotels. It needs to be noted that most of these hotels are found in Nairobi. Mombasa being one of Kenya's main tourism destinations lags behind. It is probable that the revenues generated from hotel room sales could be improved if investors built higher rated hotels in Mombasa and improved their efficiency.

The average room prices as sold are presented in figure 4.4.

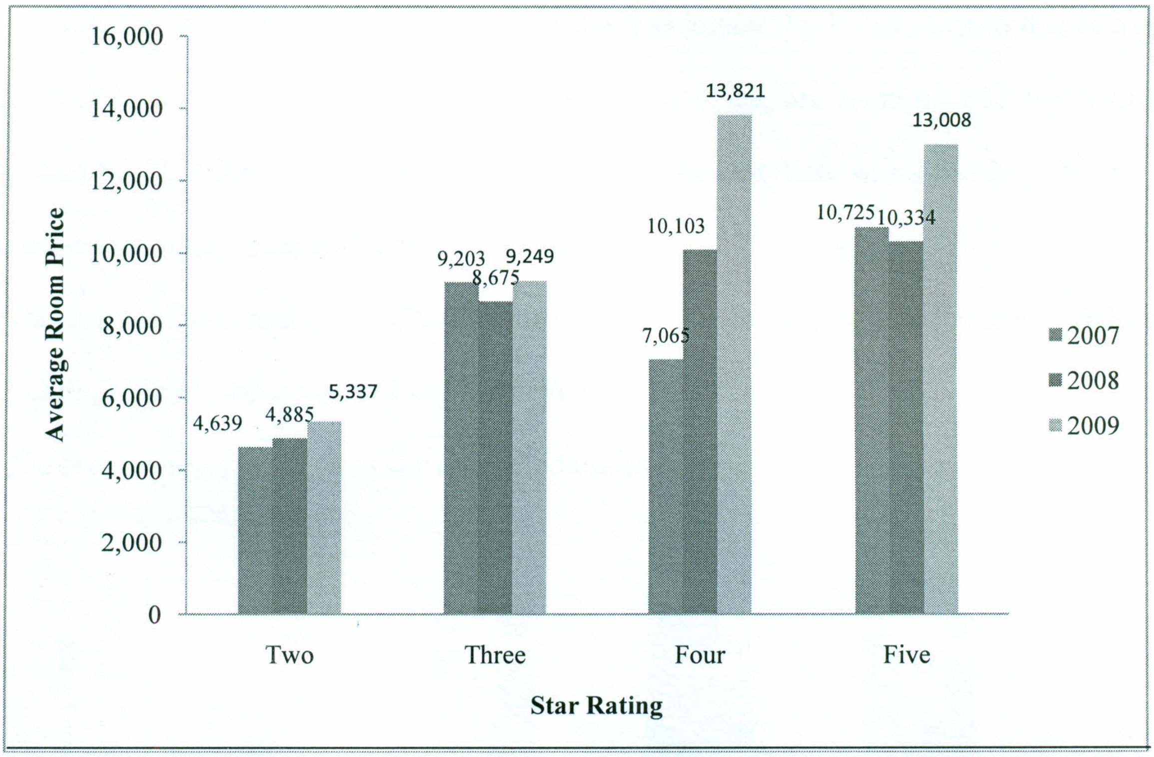

Figure 4.4: Average Room Prices (N= 36)

Source: Author's.

From figure 4.4 it is clear that the average room rate has been climbing steadily across the whole spectrum of the hotels. Two star hotels were the least expensive. More of these were found in Mombasa than in Nairobi. On average their room rates ranged from Ksh. 4,639 in 2007 to Ksh 5,337 in 2009 - a change of Ksh. 698 (15%). This implied that by increasing these hotels' efficiency, the accruing monetary realization may be substantial.

The three stars' average room rate fluctuated between Ksh. 9,203, 8,675 and 9,245 in 2007, 2008 and 2009 respectively. The change in room rate was minimal except in 2008 when it declined by Ksh 528. It should however be noted that the difference in the average room rate between two and three star hotels ranged between Ksh 3,900 and 4,500.

Four and five star hotels had almost similar room rates except in 2007. As a matter of fact in 2009, the average room rate for the four star was higher (by Ksh 813) than that of five star hotels. Regardles of the hotel star category, on average, one room in 2007 was selling at Ksh 8,372, 8,590 in 2008 and 10,213 in 2009. Note that there was a steady increase in the average room price within this three year period.

The average room rate of £ 110[4] compares favourably with those of selected cities such as Dublin, Madrid, Johannesburg and Singapore.

The average room occupancy for the period under study is shown in figure 4.5

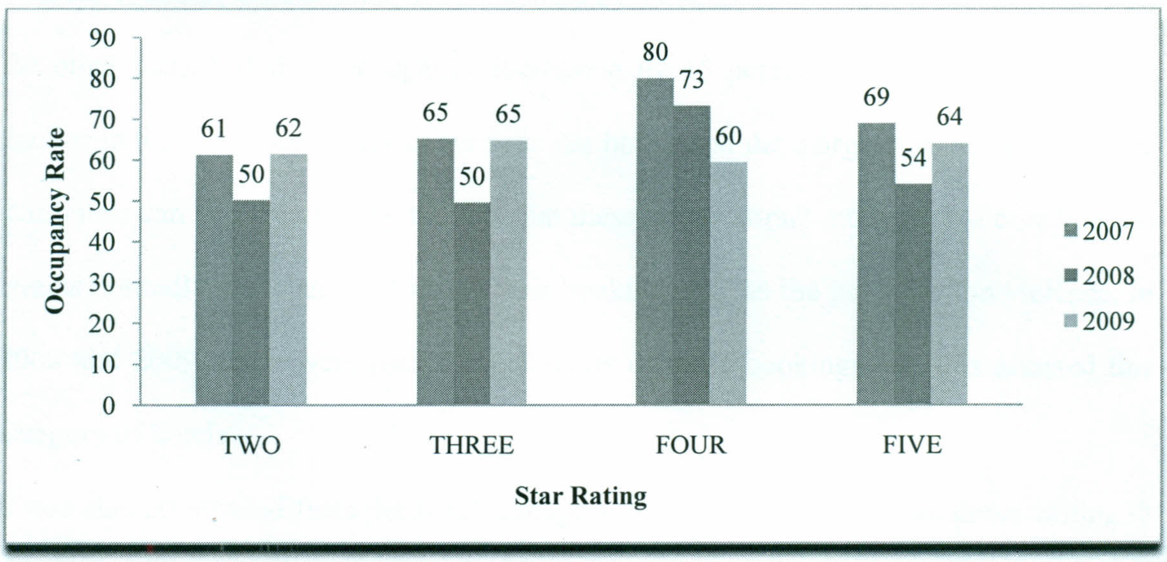

Figure 4.5: Average Room Occupancy (N= 36)

Source: Author's.

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[4] 1 £ = approximately Ksh. 90.00 at the survey time.

This figure shows that the average room occupancy generally declined from 2007 to 2009. Four star hotels' had their room occupancy declining from 80, 73 to 60 percent in 2007, 2008 and 2009 respectively. This was a 20 percent decline. Five star hotels' room occupancy declined by 15 percent from 69 percent in 2007 to 54 percent in 2008. In 2009 their occupancy increased by 10 percentage points to stand at 64 percent. Three star hotels' room occupancy declined from 65 percent in 2007 to 50 percent in 2008 before increasing to 65 percent in 2009. This was a 15 percent increase. Two star hotels' bed occupancy declined from 62 percent in 2007 to 50 in 2008 before increasing to 62 percent in 2009. This was a 12 percent increase.

Though there was a general increase in room occupancy from 2008 to 2009 four and five star hotels did not perform well even though their occupancy was higher than that of the two and three star hotels. Five star hotels had a 10 percent increase in room occupancy whereas four star hotels' occupancy declined by 13 percent. Two and three star hotels on the other hand had their occupancy increasing by 15 percent in the same period. The decline in the room occupancy of the four star hotels and the marginal increase in the five star hotels can be explained by the fact that these hotels attract international clients. Such clients normally made and confirmed their booking prior to the post-election violence. In 2008 and 2009, there were mass cancellations of these bookings and this affected this category of hotels.

It was also established from the hotel managers that tourists in Kenya are downshifting to new hotels that have been recently built and are neither star rated nor registered. This downshift is thought to have affected clients who particularly frequent higher rated hotels leading to lower occupancies witnessed. It was also noted that there was a general recession in the world economy in 2008 and 2009. During such period, clients seeking hotel accommodation must have been very price conscious and thereby sought cheaper accommodation in lower rated hotels in the two and three star categories. The sustainable marketing campaign initiated by the GOK in 2008 is thought to have lured domestic tourists who generally are thought to seek accommodation in cheaper two and three star hotels.

This notwithstanding, the occupancy levels compared favourably with those of American hotels 61.3 percent and 60.4 percent in 2007 and 2008 respectively, the Caribbean 61.8 percent in 2008 and UK 70 percent and 69.1 percent in 2007 and 2008 respectively. (Lodging industry profile, 2009, 2010; STR Global, 2010; Hotstats, 2010).

The overall bed occupancy was 63, 52 and 61 percent in 2007, 2008 and 2008 respectively. Table 4.2 presents a description of bed occupancy of the hotels from 2007 to 2009 by location, ownership and star rating.

Table 4 .2 Average Bed Occupancy by Location, Ownership and Star Rating

Year	Bed Occupancy by Location		By ownership		By Star			
	Nairobi	Mombasa	Indepe ndent	Chain	**	***	****	*****
2007	68.3	67.4	62.6	73.3	61.3	65.2	80.1	69.0
2008	53.6	55.6	48.5	61.3	50.2	49.7	73.3	54.2
2009	65.7	61.9	59.9	67.6	60.2	62.4	68.3	64.9

Source: Author's calculations.

The difference in the bed between the occupancy in Nairobi and Mombasa was minimal. It ranged from 53.6 to 68.3 percent (a nominal difference of 0.9 – 3.8 percentage points). In terms of ownership; chain owned hotels clearly enjoyed a better bed occupancy than the independent owned hotels. The percentage difference in occupancy ranged from 7.7 to 12.8 percent. In terms of the hotel star category, four star hotels had the highest occupancy (68.3- 80.1 Percent), followed by five star hotels (54.2- 69 percent). Closely following were the three star hotels with a bed occupancy ranging from 49.7 to 65.2 percent. Two star hotels had their bed occupancy that ranged from 50.2 to 61.3 percent.

Table 4.3 presents the percentage average hotel revenue.

Table 4. 3: Revenue from Room, Food Beverages and Other Sales (as a % of Total Revenue)

Year	Room Sales	Food Sales	Beverage Sales	Other sales
2007	48	29	15	7
2008	46	29	15	7
2009	50	28	17	7

Source: Author's calculations.

Almost half of the total hotel revenue was generated from room sales particularly in 2007 and 2009. In 2008 however, the total revenue generated from room sales accounted for 46 percent of the total hotel revenue. This implies that rooms division is an integral and vital department in revenue generation. Inefficiency in this department can have serious repercussion in the overall hotel profitability. Percentage revenues generated from food sales accounted for 29 percent of the total hotels' revenue in 2007 and 2008. In 2009, these revenues slightly dropped to 28 percent. This contribution is higher compared to UK hotels whose average contribution in 2009 was 18.7 percent (ibid). Beverage sales are some of the outputs that accounted for 15-17 percent of the total revenue between 2007 and 2009. Other revenue generating departments within these hotels contributed 7 percent to the total hotels' revenue. These included parking fees, sales from scratch cards, health club sales among others. Note that these are some of the outputs used in this study to measure relative efficiency.

Table 4.4 shows a summary of average food and beverage costs, GOP, expenses from room sales and the energy and utility expenses

Table 4. 4: Average Food & Beverage Cost Gross Operating Profit Expenses from Room Sales, Energy and Utility Expenses

Year	Food Cost (%)[5]	Beverage Cost (%)[6]	OP[7]	Energy &utility expenses
2007	32.5	29.6	25	11
2008	32.7	30.7	24	11
2009	32.9	29.4	28	11

Source: Author's calculations.

Some of the inputs that have been used to measure the relative efficiency include food cost, beverage cost, and energy and utility expenses. The results indicated that the average monthly annual food cost was 32.5 percent in 2007, 32.7 percent in 2008 and 32.9 percent in 2009.

The beverage cost was 29.6 percent, 30.7 percent and 29.4 percent in 2007, 2008 and 2009 respectively. The average gross operating profit (GOP)/profit before tax ranged from 24-28 percent between 2007 and 2009. Note that GOP is one of the outputs used in this study. The average energy and utility expenses for all the hotels stood at 11 percent in each of the three years.

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[5] This is the cost of selling food i.e. food cost as a percentage of total food sales

[6] This is the cost of selling beverages i.e. Beverage cost as a percentage of total beverage sales

[7] Operating Profit. Also called operating income or earnings before interest and taxes (EBIT) : The amount of profit realized from a hotel's operations after taking out operating expenses such as cost of food and beverage costs , wages and depreciation i.e. Gross profit less other operating expenses and depreciation.

4.2: The Efficiency Scores of 2 – 5 Star Hotels

This section presents the relative efficiency scores of the hotels derived by performing DEA-CRS and DEA-VRS (input-oriented model under the Constant Returns to Scale (CRS) and Variable Returns to Scale (VRS) assumptions respectively). The efficiency scores for two and three star hotels are discussed as one set and those of four and five star hotels are discussed as a second set.

Table 4.5 presents the efficiency scores of the two and three star hotels for the year 2007 and the identification of the returns to scale.

Table 4 5:Technical Efficiency Scores and Identification of Returns to Scale of 2&3 Star Hotels: Year 2007

Hotel Name	Star Rating				
		CRS	VRS	Scale	
1	2	1	1	1	-
2	2	1	1	1	-
3	2	0.761	0.788	0.966	drs
4	2	1	1	1	-
5	2	1	1	1	-
6	2	1	1	1	-
7	2	1	1	1	-
8	2	1	1	1	-
9	3	0.744	0.856	0.869	irs
10	3	0.839	0.918	0.914	irs
11	3	1	1	1	-
12	3	1	1	1	-
13	3	0.594	0.792	0.75	irs
14	3	1	1	1	-
15	3	1	1	1	-
16	3	1	1	1	-
17	3	1	1	1	-
18	3	1	1	1	-
19	3	1	1	1	-
Mean		0.944105	0.966	0.974	

Source: Author's calculations.

From table 4.5 it is evident that in 2007 four hotels scored between 78.8 percent- 91.8 percent (DEA VRS). This implies that these hotels were not using their inputs efficiently compared to the best practice.

Fifteen hotels included in the analysis were identified as efficient when the DEA-CRS and DEA-VRS models were applied respectively. From table 4.8 it is also clear that the DEA-VRS model yielded more efficient DMUs than the DEA-BCC model. This result is in concurrence with other studies which confirm that the DEA-VRS model yields more efficient DMUs. This is based on the fact that the constant return to scale provides information only on technical efficiency while the variable returns of scale model identifies pure technical efficiency alone (Debnath and Shankar, 2009). The efficiency scores for 2009 are presented in table 4.6.

Table 4 6: Technical Efficiency Scores and Identification of Returns to Scale of 2&3 Star Hotels: Year 2008

Hotel Name	Star Rating				
		CRS	VRS	Scale	
1	2	1	1	1	-
2	2	1	1	1	-
3	2	0.849	1	0.849	drs
4	2	1	1	1	-
5	2	1	1	1	-
6	2	0.661	0.913	0.724	irs
7	2	1	1	1	-
8	2	1	1	1	-
9	3	0.905	1	0.905	drs
10	3	0.829	0.832	0.997	drs
11	3	1	1	1	-
12	3	1	1	1	-
13	3	0.574	0.663	0.866	irs
14	3	1	1	1	-
15	3	1	1	1	-
16	3	0.848	0.861	0.984	irs
17	3	1	1	1	-
18	3	0.654	0.901	0.726	irs
19	3	1	1	1	-
Mean		**0.912**	**0.956**	**0.950**	

Source: Author's calculations.

Table 4.8 presents the efficiency scores and the identification of returns to scale for the two and three star hotels for the year 2008. In this year, the number of inefficient (VRS model) hotels was five. These hotels' efficiency scores ranged from 66.3 percent to 91.3. These hotels were not using their inputs efficiently compared to the best practice.

It was also noted that the overall pure technical efficiency among these inefficient units decreased in 2008 compared to 2007 by 12.5 percent and this was attributed to the post-election violence that was witnessed in Kenya. 12 hotels included in the analysis were identified as efficient when the DEA-CRS and DEA-VRS models were applied respectively. The efficiency scores for 2009 and the identification of returns are presented in table 4.7.

Table 4. 7 : Technical Efficiency Scores and Identification of Returns to Scale of 2&3 Star Hotels: Year 2009

Hotel Name	Star Rating				
		CRS	VRS	Scale	
1	2	1	1	1	-
2	2	1	1	1	-
3	2	0.82	0.877	0.935	drs
4	2	1	1	1	-
5	2	1	1	1	-
6	2	0.669	0.744	0.899	irs
7	2	1	1	1	-
8	2	0.995	1	0.995	irs
9	3	0.756	1	0.756	drs
10	3	0.808	0.859	0.941	irs
11	3	1	1	1	-
12	3	1	1	1	-
13	3	0.714	0.715	0.998	irs
14	3	1	1	1	-
15	3	0.763	0.764	0.999	drs
16	3	0.668	0.76	0.947	irs
17	3	1	1	1	-
18	3	0.664	0.744	0.893	irs
19	3	1	1	1	-
Mean		**0.887**	**0.919**	**0.966**	

Source: Author's calculations.

In 2009, the number of inefficient (VRS) hotels increased to seven. These hotels' efficiency scores ranged from 71.5 percent to 87.7 percent. Ten hotels included in the analysis were identified as efficient when the DEA-CRS and DEA-VRS models were applied respectively.

The nature of technical inefficiencies can be due to the ineffective implementation of the production plan in converting inputs to outputs (pure technical inefficiency). It can also be due to the divergence of the DMU from the most productive scale size or size of its operations. It is otherwise called scale inefficiency (Avkiran, 1999; Banker *et al.* 1984).

The mean pure technical efficiency for the two and three star hotels was 0.966, 0.956 and 0.919 in 2007, 2008 and 2009 respectively whereas scale efficiency was 0.974, 0.950 and 0.966 respectively in the same period. The result revealed that the overall inefficiencies of these hotels were mainly due to pure technical inefficiencies rather than scale inefficiencies. These results are consistent with Barros (2005) whose findings revealed that the overall technical inefficiencies of Taiwanese ITHs were primarily due to the pure technical inefficiencies rather than the scale inefficiencies. Just like the hotels in Taiwan, these hotels were ineffective in converting inputs to outputs. These results are also in concurrence with those of Neves and Lourenco (2008) whose findings suggested that managers of hotel companies should give priority to PTE because it has a higher potential percentage increase. They therefore need to improve the efficiency of operations in transforming inputs to outputs.

The nature of returns to scale in Tables 4.5, 4.6, and 4.7 revealed that some hotels were operating at decreasing returns to scale while others were at optimal returns to scale or increasing returns to scale. Avikram (1999) notes that those hotels with SE of 1 (one) were operating at optimal returns to scale, which means that a rise in inputs would have lead to a proportionate rise in outputs. These hotels were generally operating at the most productive scale size because they enjoyed the maximum possible economy of scale (Cooper *et al.*, 2000). Fifteen hotels were fully efficient (100 percent) in both the CRS and VRS scores in 2007 and twelve hotels in 2008. In 2009 ten hotels were still fully efficient in both the CRS and VRS scores but it was noted that some hotels that were initially fully efficient in both models in 2007 and 2008 were no longer fully efficient in both models in 2009. These included hotel number 6, 8, 15, 16 and 18.

Hotel number 3, 9 and 15 were in one year or more operating under Decreasing Returns to Scale. This meant that their technical inefficiency could be attributed to the size of operations. The implication is that that a decrease in these hotels' size of operations would permit an increase in the efficiency. This is because a decrease in the inputs would have a less than proportionate effect in the outputs (Neves and Lourenco, 2008). This finding is consistent with industry studies and common knowledge of underused capacity and low occupancy rates (Enz *et al.*, 2001; Neves and Lourenco, 2008).

Hotels 6, 10, 13, 16 and 18 respectively were all operating in the Increasing Returns to Scale region at least once (or more times) within the three year period. For these group of hotels, an increase in inputs would have had a higher than proportional increase in outputs. Therefore the efficiency of these hotels could be increased by enlarging their scale of operations. This means they could be more efficient if they invested in more available beds for sale; more available rooms for sale, and produced more food and beverages for sale.

The efficiency scores of the four and five star hotels for 2007 and the identification of returns are presented in table 4.8.

Table 4. 8 : Technical Efficiency Scores and Identification of Returns to Scale of 4&5 Star Hotels: Year 2007

	Star	CRS	VRS	Scale	
20	4	1	1	1	-
21	4	0.844	0.866	0.975	irs
22	4	0.972	1	0.972	drs
23	4	1	1	1	-
24	4	1	1	1	-
25	4	0.928	1	0.928	drs
26	4	0.781	0.848	0.921	irs
27	5	1	1	1	-
28	5	1	1	1	-
29	5	1	1	1	-
30	5	1	1	1	-
31	5	1	1	1	-
32	5	0.949	0.964	0.984	irs
33	5	1	1	1	-
34	5	0.763	0.775	0.984	irs
35	5	1	1	1	-
36	5	0.84	0.893	0.941	irs
		0.945706	**0.962**	**0.983**	

Source: Author's calculations.

In the year 2007 ten out of the nineteen four and five star hotels were efficient when DEA-VRS and CRS Models were applied. Seven other hotels were also inefficient when the two models were applied. The scores for the inefficient hotels (DEA VRS) ranged from 77.5 percent to 96.4 percent. These hotels were not using their inputs efficiently compared to the best practice.

The efficiency scores of the four and five star hotels for 2008 and the identification of returns are presented in table 4.9.

Table 4. 9 : Technical Efficiency Scores and Identification of Returns to Scale of 4&5 Star Hotels: Year 2008

Name of Hotel	Star Rating	CRS	VRS	Scale	
20	4	0.907	0.93	0.975	drs
21	4	1	1	1	-
22	4	1	1	1	-
23	4	1	1	1	-
24	4	1	1	1	-
25	4	0.499	0.658	0.758	irs
26	4	1	1	1	-
27	5	1	1	1	-
28	5	1	1	1	-
29	5	1	1	1	-
30	5	1	1	1	-
31	5	1	1	1	-
32	5	0.834	0.89	0.937	irs
33	5	1	1	1	-
34	5	0.914	0.926	0.987	drs
35	5	1	1	1	-
36	5	0.853	0.869	0.981	irs
		0.942	**0.957**	**0.979**	

Source: Author's calculations.

In 2008 twelve hotels respectively were efficient when DEA-VRS and CRS Models were applied. In 2008, five inefficient hotels had efficiency scores (VRS) ranging from 65.8 percent to 93 percent.

The efficiency scores of the four and five star hotels for 2009 and the identification of returns are presented in table 4.10.

Table 4. 10 : Technical Efficiency Scores and identification of Returns to Scale of 4&5 Star Hotels: Year 2009

Name of Hotel	Star Rating	CRS	VRS	Scale	
20	4	0.781	0.835	0.935	irs
21	4	0.938	0.946	0.992	drs
22	4	0.622	0.724	0.858	irs
23	4	0.586	0.775	0.756	irs
24	4	0.873	0.882	0.99	irs
25	4	0.723	0.762	0.95	drs
26	4	1	1	1	-
27	5	1	1	1	-
28	5	1	1	1	-
29	5	0.948	1	0.948	drs
30	5	1	1	1	-
31	5	1	1	1	-
32	5	0.863	0.876	0.985	drs
33	5	1	1	1	-
34	5	0.682	0.698	0.978	irs
35	5	1	1	1	-
36	5	0.711	0.771	0.922	irs
		0.866	**0.898**	**0.96**	

Source: Author's calculations.

In 2009 seven hotels were efficient when DEA-VRS and CRS Models were applied. In 2009, nine inefficient hotels had their efficiency scores ranging from 69.8 percent to 94.6 percent. These hotels were not using their inputs efficiently compared to the best practice.

Generally, for this group of hotels (4 and 5 star), the mean pure technical efficiency was 0.962, 0.957 and 0.898 in 2007, 2008 and 2009 respectively whereas scale efficiency scores were 0.983 0.979, and 0.960 respectively. The hotels were generally more scale efficient. The results therefore reveal that the overall technical inefficiencies of these hotels were mainly due to the pure technical inefficiencies rather than the scale inefficiencies. This implies that these hotels were effective in converting inputs to outputs. These results are also consistent with those of Neves and Lourenco, (2008) whose findings suggested that managers of hotel companies should give priority to PTE because it has a higher potential percentage increase. They therefore need to improve the efficiency of operations in transforming inputs to outputs.

The nature of Returns to Scale for the four and five star hotels is presented in Tables 4.8-4.10. It was revealed that some hotels were operating at decreasing returns to scale while others operated at optimal returns to scale or increasing returns to scale. Only five hotels were fully efficient (100 percent) in both the CRS and VRS scores in the three year period. As noted earlier, these two hotels were operating at the most productive scale size because they enjoyed the maximum possible economy of scale. Therefore a rise in these hotels' inputs would have led to a proportionate rise in outputs.

Hotel number 25 consistently operated under Decreasing Returns to Scale for in the three year period except in 2008. Its technical inefficiency could be attributed to the size of operations. The inference therefore is that a decrease in the hotel's size of operations would permit an increase in the efficiency. As Neves and Lourenco (2008) note, a decrease in the inputs would have a less than proportionate effect in the outputs. As mentioned above, this finding is consistent with industry studies and common knowledge of underused capacity and low occupancy rates (Enz *et al.*, 2001; Neves and Lourenco, 2008). It is better for the management of this hotel to refrain from further investments as its outputs do not seem to be proportional to the inputs invested in them. Four other hotels operated in the Increasing Returns to Scale region in the three year period. For these group of hotels also, an increase in inputs would have had a higher than proportional increase in outputs. Therefore the efficiency of these hotels could be increased by enlarging their scale of operations. Just like in the two and three star group, these hotels can be more efficient if they invested in more available beds for sale; more available rooms for sale, and produced more food and beverages for sale. There is a lot of potential to be realized if these hotels expanded their operations in the future. Table 4.11 presents the mean efficiency scores when both the CRS and VRS DEA model were applied.

Table 4 .11: Average Efficiency Scores

		Average Efficiency Score	
Year	**Star**	**CRS**	**VRS**
2007			
	2 & 3	0.944	0.966
	4 & 5	0.945	0.962
2008			
	2 & 3	0.912	0.956
	4 & 5	0.942	0.957
2009			
	2 & 3	0.887	0.919
	4 & 5	0.866	0.898

Source: Author's calculations.

Table 4.11 indicated that the DEA-VRS model produced higher efficiency estimates in comparison with the DEA-CRS model.

Also in terms of consistency, VRS model proved better, as its standard deviation of.0703, 0.087 and 0.11for 2007 to 2009 respectively was lower than the CRS model (standard deviation; 0.102, 0.132 and 0.143 respectively). This confirms the conclusion of an earlier study by Debnath and Shankar (2009) whose conclusion was consistent with this result. In general two and three star hotels had an average score (VRS) of 96.6 per cent, 95.6 percent and 91.9 percent in 2007 to 2009 respectively. This means that for this group of hotels, their inputs could be reduced by 4-8 percent to produce the same level of outputs.

Four and five star hotels had an average score (VRS) of 96 per cent, 95.7 percent and 89.8 percent in 2007 to 2009 respectively. This efficiency scores were on a decline over the three year period.

4.3: A profile the 2 – 5 star hotels based on their performance and Slack Analysis for Inefficient Hotels

As indicated and discussed in tables under 4.5-4.7 fifteen two and three star hotels included in the analysis in 2007 were identified as efficient when the DEA-CRS and DEA-VRS models were applied respectively. In 2008, 12 of these hotels were identified as efficient when the DEA-CRS and DEA-VRS models were applied respectively. In 2009, ten of these hotels were identified as efficient. Broadly therefore, the number of efficient two and three star hotels gradually declined over the three year period.

As indicated in tables under 4.8-4.10, in the four and five star hotel group in 2007, ten out of the nineteen of these hotels were efficient when DEA-VRS and CRS Models were applied. In 2008 however the number increased to twelve. In 2009 the number of the efficient hotels however dropped to seven hotels when the same models were applied.

A profile of the inefficient hotels based on their performance and an analysis of slacks is discussed hereunder.

The extent of inefficiency is given by the level of overconsumption of inputs used and/or deficient (underproduction of) outputs produced by inefficient hotels. These inefficiencies are called slacks which represent potential improvement. The inefficient hotels' efficiency scores indicate the extent to which they lack efficiency in comparison to the efficiency of their reference subset hotels. These efficiency reference subset hotels represent the basis vectors of the linear programme solution for each inefficient hotel. In other words, a convex combination of the actual outputs and inputs of the reference subset hotels results in a composite hotel that produces as much as/or more outputs, but uses as much as/or fewer inputs than as the inefficient hotel.

Excess input consumption and/or deficient output production must be eliminated before a given hotel is said to be efficient relative to its composite reference set of hotels.

Table 4.12 presents the input slacks for all inefficient hotels in the sample for 2009. This table shows that all inefficient hotels with efficiency scores less than 100 per cent could reduce their input variable by certain amounts composite of efficiency reference set of hotels in all years.

Table 4. 12 : Input Slacks

Hotel	Reference hotels	No. Of beds% waste	No of rooms % waste	Food cost % waste	Beverage cost % waste	F&B staff % waste
22	15, 5	27.5	27.5	11.0	10.5	40
13	29, 1, 10, 12, 11	28	27.5	11	6.8	33
32	29, 5, 15, 14, 16	42	**26**	3.8	3.8	35
8						
23	14, 29, 15, 1	59	28	7.8	6.5	23
16	12, 11, 30, 1, 5	**36**	**23**	11.7	8.5	43
25	27, 5, 6, 16	**54**	**31**	9.7	7.8	24
24	1, 5, 27, 29	**51**	**35**	10	7.8	25.5
36	11, 27, 15	48.6	36	7.3	7.8	54
21	11, 7, 1, 27, 29, 10	52	22	1.6	1.3	2
18	15, 1, 5, 29	55	25.5	9.7	7.9	26
6	15, 5, 29, 1	54.7	26	9.7	7.9	25.7
3	5, 3, 10, 11	38.1	12.7	4.8	5.14	25.4
34	29,11, 5, 9, 30	53.7	30.2	13	9.3	35
10	1, 27, 15, 29	30	55	4.1	4.3	14
20	29, 1, 15	52	38.7	5.3	5.4	2.3
15	7, 29, 27, 5	**51**	39	9.2	8.3	23

Source: Author's calculations.

The input slacks for some selected hotels are discussed hereunder. For example, in 2009, hotel number 13 had its efficiency score of 0.715. Its reference set of hotels were 29, 1, 10, 12, and 11. The efficiency score of 71.5 percent showed the extent to which it lacked efficiency compared to the efficiency of its reference subset hotels. These efficiency reference subset hotels represent the basis vectors of the linear program solution for hotel

13. As it were, a convex combination of the actual outputs and inputs of the reference subset hotels resulted in a composite hotel that produced as much as/or more outputs as number 13, but uses as much as/or fewer inputs. In 2009, if 13was to be as efficient as its reference set hotels, it could have reduced its number of beds by 28 percent, number of rooms by 27.5 percent. This hotel's food cost and beverage cost could have been reduced by 11 percent and 6.8 percent respectively.

Hotel 25 had in 2009 a VRS efficiency score of 76.2 percent. Its reference hotels were, 27, 5 and 6. This hotel could become efficient by increasing its efficiency from 76 to 100 percent by reducing its beds by 54 percent, its rooms by 31 percent, its food cost and beverage cost by 9.7 and 7.8 percent respectively and its food and beverage staff by 24 percent.

It should be noted that these inefficient hotels were specifically characterized by inefficient usage of the beds and guest rooms. These hotels had serious underutilized capacity with regard to their beds and rooms. To become efficient these hotels needed to cut back their number of beds by 30- 59 percent and their number of rooms by 13- 55 percent. On average these inefficient hotels were characterized by 30- 59 percent underutilized beds and 13- 55 percent underutilized rooms.

Avkiran (1999) indicates the DEA model can identify the global leader. The global leader is determined by identifying the branch that most frequently appears in reference sets. This means that every inefficient hotel is compared to a set of efficient hotels with similar input/output configuration and the hotel that appears in these reference sets more than others becomes known as the global leader.

From this model therefore in the two and three star categories, Hotel number 7, was a global leader in 2007 since it was a peer for five hotels whereas hotel number 5 was a global leader in 2008 and 2009 respectively since it was a peer, to 11 other branches. The benefit of this finding is that the managers of the inefficient hotels have efficient peer hotels that they can emulate in raising their performance.

In the set of four and five star categories, it was noticed that and hotel number 33 was global leaders since it was a peer for another 6 branches. Just like in the previous category of hotels, the other managers of the inefficient 4 and 5 star hotels had efficient peer hotel that they can emulate in raising their performance.

From the DEA model it was noticed that hotel 35 and was the global leader in 2008 since it was a peer for 6 other branches. Just like in the previous category of hotels, the other managers of the inefficient 4 and 5 star hotels had efficient peer hotel that they can emulate in raising their performance.

4.4: The Hotels' Efficiency Distribution

This study sought to find out the efficiency distribution of the hotels that were sampled. The following section therefore describes the efficiency distribution by star rating; by location; by ownership; and by size.

Table 4.13 shows the efficiency distribution by star rating.

Table 4. 13 : The Efficiency Distribution by Star Rating

Efficiency Distribution (VRS) by Star				
Star Rating	2*	3*	4*	5*
2007	0.9735	0.960545	0.959143	0.9632
2008	0.989125	0.932455	0.941143	0.9685
2009	0.952625	0.894727	0.846286	0.9345
Overall	0.97175	0.929242	0.915524	0.9554

Source: Author's calculations.

The efficiency scores based on the star rating (1*- 5*) were on average 97 percent, 92.9 percent 91.5 percent and 95.6 percent efficient respectively from 2007 to 2009. Four star hotels were generally the least efficient since their efficiency declined by 11.3 percent. These were followed by three star hotels whose efficiency declined by 6.7 percent. The efficiency scores of the five star hotels declined by 2.9 percent. Two star hotels appeared most consistent in their efficiency scores because their decline in efficiency was the least (2.1 percent).

Hypothesis 1 of this study stated that there was no difference in the efficiency levels of the hotels between the years under study. To this end a Mann-Whitney U test was performed to test whether there was a significant difference in the efficiency levels of the hotels between the years under study as presented in table 4.14

Table 4. 14 : Mann-Whitney U-Test Efficiency Distribution

Year	Mean Rank	X^2	P-Value
2007- 2008	36.86	0.036	0.850
	36.14		
2007- 2009	41.02	4.69	0.030
	31.96		
2008- 2009	40.31	3.22	0.073
	32.69		

The results of this test showed that there was a significant difference between the efficiency scores of particularly 2007 and 2009 (p-value = 0.030) thereby rejecting the null hypothesis. This confirms that the efficiency scores were significantly different between 2007 and 2009.

Hypothesis 2 of this study stated that there was a difference in the efficiency distribution among the different categories of the hotels. A Kolmogorov-Smirnov test was performed to establish if there was a significant difference in the efficiency scores between two and three star hotels and four and five star hotels in the years 2007, 2008 and 2009. The results of this test are shown in table 4.15.

Table 4. 15 : Efficiency Distribution of 2&3 Star Hotel

		2007	2008	2009
Most extreme differences	Absolute	0.148	0.364	0.420
	Positive	0.148	0.364	0.420
	Negative	-0.125	0.000	0.000
Kolmogorov-Smirnov Z		0.318	0.783	0.905
Asymp. Sig. (2-tailed)		1.000	0.573	0.386

Source: Author's calculations.

The results in table 4.15 revealed that there was no significant difference in the efficiency distribution of the two and three star hotels in 2007, 2008 and 2009 respectively (Z-statistic; 0.318, 0.783 and 0.905 and P-values of 1.00, 0.573 and 0.386 in 2007, 2008 and 2009 respectively). This therefore rejects this null hypothesis.

It is notable to mention that generally, it costs more to build a three star hotel compared to a two star according to the implication of schedule four East African community (EAC) criteria for classification of hotels and restaurants yet their efficiency are basically similar. The implication is therefore for investors to invest in two star hotels that are cheaper to establish but more significantly, equally as efficient as the higher rated three star hotels.

Table 4. 16 : Efficiency Distribution of 4&5 Star Hotels

		2007	2008	2009
Most extreme differences	Absolute	0.186	0.157	0.557
	Positive	0.100	0.157	0.000
	Negative	-0.186	-0.143	-0.557
Kolmogorov-Smirnov Z		0.377	0.319	1.131
Asymp. Sig. (2-tailed)		0.999	1.000	0.155

Source: Author's calculations.

The results in table 4.16 also revealed that there was no significant difference in the efficiency scores of the four and five star hotels in 2007, 2008 and 2009 respectively (Z-statistic; 0.377, 0.319 and 1.131 and P-values of 0.999, 1.000 and 0.155 in 2007, 2008 and 2009 respectively) further therefore rejecting the second null hypothesis. These results are however inconsistent with those of Assaf and Cvelbar (2010) whose findings found a positive relationship between star rating and efficiency which was attributed to the better service offerings of high-star hotels. Most of these hotels had a higher average room rate than lower star hotels, and in most cases they operated at a larger scale.

Efficiency distribution by location is presented in table 4.17.

Table 4. 17 : Efficiency Distribution by Location

Efficiency Distribution (VRS) by Location		
Year	**Nairobi**	**Mombasa**
2007	0.948	0.977
2008	0.974	0.943
2009	0.943	0.882
Overall	0.955	0.934

Source: Author's calculations.

The hotels in Mombasa appeared slightly less efficient than those found in Nairobi with efficiency scores of 0.934 and 0.955 respectively. The efficiency scores of the hotels in Mombasa actually declined by 9.5 percent whereas for the hotels in Nairobi, the decline was 3.1 percent. This result is inconsistent with the findings of Chyan, (2009) which showed that international tourist hotels located in resort areas are more efficient than those located in metropolitan areas. It is important to note that Mombasa has been Kenya's main tourism focus with regard to leisure tourism and yet it was characterized with declining efficiency. Hypothesis 3 stated that the determinants of efficiency were not significantly different amongst the different categories of hotels.

A Kolmogorov-Smirnov test was performed to establish if there was a significant difference in the efficiency distribution between the hotels in Nairobi and those in Mombasa. The results of this test are shown in table 4.18.

Table 4.18: Kolmogorov-Smirnov Test on Efficiency Distribution by Location

		2007	2008	2009
Most extreme differences	Absolute	0.225	0.175	0.338
	Positive	0.000	0.175	0.338
	Negative	-0.225	-0.000	0.000
Kolmogorov-Smirnov Z		0.671	0.522	1.006
Asymp. Sig. (2-tailed)		0.759	0.948	0.263

Source: Author's calculations.

Using a Kolmogorov-Smirnov test (p-values = 0.759, 0.948 and 0,263 for 2007, 2008 and 2009 respectively), it was confirmed that indeed there was no significant difference in efficiency scores between the hotels in Nairobi and those from Mombasa in each of the three years. Therefore the null hypothesis 3 was rejected.

Table 4.19 presents a summary of efficiency distribution by hotel ownership.

Table 4.19: Efficiency Distribution by Hotel Ownership

Efficiency Distribution (VRS) by Ownership		
Year	**Independent owned**	**Chain owned**
2007	0.951	0.978
2008	0.943	0.972
2009	0.903	0.917
Overall	0.932	0.956

Source: Author's calculations.

The results from table 4.19 show that chain owned hotels were slightly more efficient compared to the independently owned (average efficiency score of 95.6 percent and 93.2 percent respectively). However their efficiency decline of 6.1 percent was actually higher than that of the independently owned hotels, whose efficiency declined by 4.8 percent. It therefore calls for the government and all the stakeholders to give more focus to independently owned hotels since their efficiency scores were more consistent. Most of these hotels are also locally owned.

Table 4. 20 : Kolmogorov-Smirnov Test to test Efficiency Distribution by Ownership

		2007	2008	2009
Most extreme differences	Absolute	0.204	0.211	0.180
	Positive	0.204	0.211	0.180
	Negative	-0.059	-0.031	0.077
Kolmogorov-Smirnov Z		0.612	0.631	1.538
Asymp. Sig. (2-tailed)		0.848	0.821	0.934

Source: Author's calculations.

Using a Kolmogorov-Smirnov test as shown in table 4.20 (p-values = 0.759, 0.948 and 0,263 for 2007, 2008 and 2009 respectively), it was established that certainly there was no significant difference in efficiency scores between the independent owned and chain owned hotels for each of the three years. This result further rejected the null hypothesis 3. This result is in tandem with Claver-Cortés *et al* (2007) whose findings also showed that no clear differences in performance exist between chain hotels and independent hotels. Results of a study by Carlos and Dieke (2008) that estimated the technical efficiency of 12 hotels in Luanda, Angola, however pointed out a different picture. This study revealed that to be a member of a chain contributed positively to efficiency which was derived from the network management of a hotel group. This study also revealed that those hotels that were members of an international chain were more efficient, though this parameter was statistically insignificant. Additionally results of a study by Sigala *et al* (2005) revealed that chain-owned hotels significantly outperformed independently owned hotels in terms of combined productivity. This may have been explained by the fact that chain-managed hotels as well as hotels linked to a consortium had access and were promoted to several distribution and reservation systems that could in turn significantly impact demand and capacity management.

Table 4.21 gives a summary of the ownership structure of the hotels that were studied by star rating.

Table 4. 21 : Distribution of Ownership Structure by [8]Star Rating (N= 36)

Star Rating	Ownership Structure		Total, n (%)
	Independent, n (%)	Chain, n (%)	
2	3 (8.3)	5 (13.9)	8 (22.2)
3	10 (27.8)	1 (2.8)	11 (30.6)
4	4 (11.1)	3 (8.3)	7 (19.4)
5	2 (5.6)	8 (22.2)	10 (27.8)
Total	19 (52.8)	17 (47.2)	36 (100.0)

Source: Author's calculations.

Table 4.21 shows the ownership structure of the hotels. 52.8 percent of the hotels were independently owned whereas 47.2 percent were chain affiliated. Most of the independent owned hotels were in the three-star category whereas most of the five star hotels were chain affiliated and were located in Nairobi. Of the 22.2 percent of the hotels 13.9 percent were chain-owned while 8.3 percent were independently owned. Some of the chain affiliated hotels are foreign owned. UNICTAD (2007) reports that foreign

[8] Hotels are star rated by the Hotels and Restaurants Authority (Kenya) based on such aspects as, location, design and architectural features, foregn exchange service, concierge service, languages spoken by staff, amenties, furniture and decor, minimum size of public rooms amongst others

ownership of hotels can lead to a leakage of profits. However, it has its benefits such as transfer of skills and technology, enhancing a country's profile and increasing the national tax base stimulated by the entry of these firms to the local economy. On the downside, questions on the distribution of revenues and profits between these multinational hotels and the locally owned ones arise. This notwithstanding, the findings of this study found that foreign ownership accounts of these chain was around one third or even much less (*ibid*).

The study also sought to find out the efficiency distribution by hotel size. The findings are presented in table 4.22.

Table 4. 22 : Efficiency Distribution by Size

Efficiency Distribution (VRS) by Size			
Year	**Family**	**Medium**	**Large**
2007	0.947	0.964	0.969333
2008	0.97825	0.9663	0.933667
2009	0.90525	0.9299	0.876083
Overall	0.9435	0.9534	0.926361

Source: Author's calculations.

The average relative efficiency scores for family, medium and large sized hotels were 94.3 percent, 95.3 percent and 92.6 percent respectively. Medium sized hotels appeared most efficient whereas large hotels were least efficient. These hotels' efficiency scores declined by 3.5 percent whereas those of the large sized hotels declined by 9.3 percent.

A Kolmogorov-Smirnov test to confirm if there was a significant difference in efficiency scores between family and medium size hotels is presented in table 4.23

Table 4. 23 : A Kolmogorov-Smirnov test to test efficiency distribution by family and medium sized hotels

		2007	2008	2009
Most extreme differences	Absolute	0.167	0.333	0.250
	Positive	0.083	0.333	0.250
	Negative	-0.167	0.000	-0.167
Kolmogorov-Smirnov Z		0.289	0.577	0.433
Asymp. Sig. (2-tailed)		1.000	0.893	0.992

A Kolmogorov-Smirnov test was performed to test if there was a significant difference in the efficiency distribution between family and medium size hotels. The results however showed that the efficiency scores were not significantly different between family and medium sized hotel in each of the three years (p-value = 0.985, 1.000, 0.999 in 2007, 2008 and 2009 respectively).

A Kolmogorov-Smirnov test to confirm if there was a significant difference in efficiency scores between family and large size hotels is presented in table 4.24

Table 4. 24 : A Kolmogorov-Smirnov test to test efficiency distribution by family and large size hotels

		2007	2008	2009
Most extreme differences	Absolute	0.167	0.333	0.250
	Positive	0.083	0.333	0.250
	Negative	-0.167	0.000	-0.167
Kolmogorov-Smirnov Z		0.289	0.577	0.433
Asymp. Sig. (2-tailed)		1.000	0.893	0.992

A Kolmogorov-Smirnov test was performed to test if there was a significant difference in the efficiency distribution between family and large size hotels. The results however showed that the efficiency scores were not significantly different for each of the three years (p-values; 1.000, 0.893, 1.000).

A Kolmogorov-Smirnov test to confirm if there was a significant difference in efficiency scores between medium and large size hotels is presented in table 4.25

Table 4. 25: A Kolmogorov-Smirnov test to test efficiency distribution by medium and large size hotels

		2007	2008	2009
Most extreme differences	Absolute	0.117	0.267	0.283
	Positive	0.117	0.017	0.067
	Negative	-0.083	-0.267	-0.283
Kolmogorov-Smirnov Z		0.320	0.730	0.776
Asymp. Sig. (2-tailed)		1.000	0.660	0.584

A Kolmogorov-Smirnov test was performed to test if there was a significant difference in the efficiency distribution between medium and large size hotels. The results however showed that the efficiency scores were not significantly different (P-values; 1.000, 0.660, 0.809). These three results further rejected hypothesis three.

These results are however inconsistent with those of Sanjeev (2007) whose findings showed a positive correlation between restaurant size and efficiency with most large restaurants likely to be efficient. The results are also inconsistent with those of Assaf and Cvelbar (2010) whose findings found size to be a strong determinant of efficiency of Slovenian hotels. According to this study, large hotels possess stronger economies and can generate more operational savings since these hotels offer a variety of food and beverage cuisines, spa and wellness products, conference facilities, as well as golf products.

4.5: Determinants of Efficiency Differences

The study also sought to explain the determinants of efficiency differences among the hotels that were sampled. Because the dependent variable was truncated, it was imperative to use tobit regression. The results of the tobit regression are presented in table 4.26.

Table 4. 26 : Tobit Model

	Coefficients	Std error	*t*-statistic	*p*-value
Age	0.000638	0.000837	0.72	0.479
Medium size hotels	.378061	.06011355	0.63	0.535
Large size hotels	-.0003635	.0770481	-0.00	0.996
Location 2 (Mombasa)	-.0952739	.0380248	-2.51	0.019*
Star 2 (4&5 Star)	-.0636961	.0426234	-1.49	0.147
Ownership2(Chain Owned)	-.0097963	.0390741	-0.25	0.804
Constant	1.014197	.06605	15.23	0.00
Sigma	.0951188	.0112099		

No. of observations = 36
LR X^2 (10) = 11.67
Prob > X^2 = 0.3075

Source: Author's calculations

As presented in table 4.26 Tobit analysis was carried out to identify those variables that determined the efficiency differences of the hotels that were studied. The dependent variable was the efficiency scores that were obtained under the variable returns to scale model. The independent variables were the various age categories of the hotels, hotel size, hotel location, hotel star rating and hotels ownership.

From the results obtained one variable significantly explained the efficiencies of the hotels. This variable was the hotel [9]location (t=-2.28, p-value = 0.031) although it was not significant univariately.

The results revealed that the hotels located in Mombasa were likely to be less efficient than those located in Nairobi. This result is consistent with the findings of Barros (2005) in a study that estimated the efficiency of Portuguese state owned hotel chain (referred in this study as pousadas). The results of this study concluded that location explained hotel efficiency. The study further revealed that hotels in, or near, the cities were more efficient than those in more remote locations. This was attributed to the fact that demand played a role in organizational efficiency, with the hotels near more populated zones attracting more clients. Therefore higher demand enabled greater efficiency even though the hotels had the same managerial expertise. Barros and Mascarenhas (2005) argue that the rationale for this pattern is that there are economies of scale in the hotel industry, with larger hotels that are located on the principal tourist itineraries attaining a higher efficiency. Moreover, hotels with a larger market share are probably committed to increasing the latter by relying on efficient procedures.

The result of this study is however conflicting with the findings of Chyan, (2009) whose findings concluded that hotels located in resort areas were more efficient than those located in the urban areas. This result was also conflicting with the findings of Hsieh and Lin (2010). This study evaluated the performance of Taiwanese international tourist

[9] Location was not significant univariately (Kolmogorov-Smirnov test) but was significant multivariately meaning that the Tobit regression was a more powerful method and that there was a confounder variable for location that was needed be added/was added.

hotels and one of its conclusions was that hotels in scenic areas tended to be more efficient. A further analysis of the hotels' distribution by location is shown in table 4.27.

Table 4. 27 : Distribution of Hotel Star Rating by Location (N= 36)

Star Rating	Location		Total, n (%)
	Nairobi, n (%)	Mombasa, n (%)	
2	3 (8.3)	5 (13.9)	8 (22.2)
3	3 (8.3)	8 (13.9)	11 (30.6)
4	2 (5.6)	5 (13.9)	7 (19.4)
5	8 (22.2)	2 (5.6)	10 (27.8)
Total	16 (44.4)	20 (55.6)	36 (100.0)

Source: Author's calculations.

More than half of the hotels studied (55.6%) were found in Mombasa. A study by United Nations Conference on Trade and Development (UNICTAD),in 2007 notes that the location of the hotels depend on the extent of the tourism demand for a specific destination. In this study managers of multinational hotels reported that demand for business and recreational travel was an important determinant in their location decision. This therefore implies that there was perhaps a big business market in Mombasa region though there is the attendant danger of saturation.

A further careful look at table 4.1 reveals that 53 percent of the hotels were in the two and three star category most of which are in Mombasa. Generally these are hotels that attract low-end tourists. It is no surprise then that GOK describes these hotels as inefficient and characterized by downward spiralling of revenue, poor quality operations, erratic occupancy levels, poor service standards and poor quality accommodation. A number of these hotels apply the all-inclusive concept with their accommodation charges much lower than those in Nairobi. It is however possible that by increasing efficiency of these hotels local domestic tourists may be attracted.

On the other hand 80% of 5 star hotels were located in Nairobi whereas Mombasa as the main tourist destination takes only 5 out 17 (29%) of four and five star hotel combined. The reason why investors have not put up resort hotels might be attributed to the fact that resorts are very expensive to establish. According to Jones (2002), to be a resort, a property must be on its own spacious grounds (on average 120-175 acres of land) and offer a central basic theme activity, such as a championship golf course, with a wide array of supporting services (anything from water sports to hunting, and be exclusive. As distinct from conventional hotels, resort hotels are positioned as destinations in their own right.

It is however important to note that Nairobi is not a tourist destination per se particularly for the recreational travellers. These types of travellers can at most be accommodated in the Nairobi hotels for one or two nights as they transit to other locations. The bottom line is that the best hotels are not to be found in resort areas. Kenya is therefore inefficient in its hotel distribution. If Kenya is to earn much from the hotel sector it is important that this unequal distribution is addressed especially in the supply of higher rated hotels in the Coastal region.

It is also important to note that even the average room rate for the hotels in Mombasa was actually lower than the rates of the hotels found in Nairobi. On average, one hotel room in Mombasa was sold at Ksh. 7,843, 8,273 and 9,156 in 2007 to 2009 respectively compared to Ksh 9,008, 8,971 and 11, 468 for a hotel room in Nairobi. The hotels in Mombasa were not only inefficient but were also characterized lower revenues from room sales. This result is however inconsistent with the findings of Sigala *et al* (2005). This study calculated the productivity of three-star hotels in the UK using Data

Envelopment Analysis. The findings of this study revealed that location was not found to affect productivity. The results of this study however revealed that hotel location may have significantly determined levels of demand variability. An ANOVA test performed confirmed that hotels in rural locations faced significantly higher fluctuations in demand than hotels in city centres.

Efficiency of Kenyan hotels was not significantly determined by their size, age, ownership or star rating.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.0 Introduction

This chapter summarizes the findings of the study and makes the necessary conclusions. The necessary policy recommendations and areas for further research are also proposed.

5.1: Summary

The purpose of this study was to measure the efficiency of the hotels in Nairobi and the Coast region and benchmark them based on their performance profiles. The study objectives were: to measure the efficiency levels of the hotels; to profile these hotels based on their performance; to analyze their efficiency distribution and to identify the determinants of efficiency differences.

The top management of the hotels under study was generally male dominated with a work experience of more than fifteen years. More than half of the hotels were independently owned. Most of the independent owned hotels were in the three star category whereas most of the five star hotels were chain affiliated. Generally higher rated hotels had more beds for sale compared to their low rated counterparts. Two star hotels had the fewest number of beds available for sale and though not all the beds were occupied.

The average bed occupancy was 58 percent, 60 percent, 71 percent and 62 percent for two, three, four and five star hotels respectively.

On average five star hotels had the highest number of rooms available for sale and this number declined as one moved down to lower rated hotels. The average room price ranged from Ksh 8372- 10,213. Note that there was a steady increase in the average room price within this three year period.

Kenya has unequal hotel distribution. A majority of lower rated hotels (29% of four and five star hotel combined) were found in Mombasa whereas the rest were found in Nairobi. If Kenya is to earn much from the hotel sector (extrapolating from these two regions), it is important that this unequal distribution is addressed especially in the supply of higher rated hotels in the Coastal region.

The difference in the bed occupancy between Nairobi and Mombasa was minimal. Similarly chain owned hotels clearly enjoyed a better bed occupancy than the independent owned hotels. The percentage difference in occupancy ranged from 7.7 to 12.8 percent. Four star hotels had the highest occupancy.

Almost half of the total hotel revenue was generated from room sales. In 2008 however, the total revenue generated from room sales declined. The average gross operating profit (GOP)/profit before tax ranged from 24-28 percent between.

The hotels' inefficiency scores ranged from 6 percent to 34 percent. From the slack analysis these inefficient hotels were characterized by 30- 59 percent underutilized beds and 13- 55 percent underutilized rooms.

Four star hotels were generally were the least efficient followed by three star hotels. Two star hotels appeared most consistent in their efficiency scores in this study period.

The overall technical inefficiencies of all these hotels were mainl y due to the pure technical inefficiencies rather than the scale inefficiencies. These hotels were ineffective in converting inputs to outputs which was an indication of internal weaknesses in their day to day hotel operations.

Approximately 14 percent of the hotels were operating under decreasing returns to scale for most of the three year period. This meant that a decrease of inputs would have a less than proportional effect on outputs. Therefore the management of these hotels could increase their hotel's efficiency by reducing the size of their operations. Management of these hotels could also focus on existing slacks by reducing the number of beds, number of rooms and the number of food and beverage service staff. As discussed earlier, this pointed to underused capacity (underused rooms, beds etc).

25 percent of the hotels were operating in the increasing returns to scale region in the three year period. This meant that an increase in these hotels' inputs would have had a higher than proportional increase in outputs. Therefore the efficiency of these hotels could be increased by enlarging their size of operations. Management of these hotels could also focus on existing slacks by increasing the number of beds and rooms and reducing their operating food and beverage costs.

All the hotels' efficiency scores declined from 2007 and 2008. There were no significant differences in the efficiency scores for two and three star hotels as one set and four and five star hotels as a second set.

Hotels found in Nairobi were more efficient than those located in Mombasa. Similarly chain owned hotels were slightly more efficient compared to the independent owned though there were no significant differences in these efficiency scores. There was however no significant difference in the efficiency scores between the different hotel star categories. The main determinant of efficiency was hotel location.

5.2: Conclusions

In the light of the research findings, the following conclusions were drawn:

1. The hotels studied were ineffective in converting inputs to outputs since their scale efficiency scores were generally higher than their pure technical efficiency scores. It therefore implies that there were shortcomings in their internal operations.
2. All the hotels studied had declining efficiency scores from 2007 to 2009.
3. Hotel location was the main determinant of efficiency.
4. There was no specific category of hotels among the star rating which had superior efficiency scores.
5. Hotel size was not a determinant of efficiency.
6. The main determinant of efficiency were the location of the hotels
7. International owned chains enjoyed a better bed occupancy than the hotels in private and local ownership.

5.4: Recommendations

The study makes the following recommendations based on the above conclusions;

a. There is need for the government to encourage local investors to invest in the hotel industry especially in the four and five star categories. Most of the hotels in this category were in chain ownership some of which were international in nature. This selective encouragement to invest in the hotel industry will create employment and eradicate poverty.
b. The rooms division is an integral and vital department in revenue generation as it was found to account for approximately half of the hotels' total revenue. Inefficiency in this department can have serious repercussions in the overall hotel profitability. This department should attract maximum attention from hotel managers.
c. The Ministry of Tourism needs to develop strategies for marketing locally owned hotels. Most of these hotels were in the two and three star category and were the most efficient. Therefore, the ministry should play an active role in promoting domestic tourism particularly during the low seasons in order to address the fluctuating tourist numbers.
d. The priority goal of the hotel managers in the hotels studied is to address their hotel's internal weaknesses in their day to day hotel operations. Secondly, the managers of the inefficient hotels should borrow the best practices of their efficient peer if they have to raise their performance.
e. For the inefficient hotels that operated under decreasing returns to scale, the best strategy would be to decrease the hotels size/scale of operations while maintaining their market orientation as this would permit an increase in the efficiency. It is better

for the management of these hotels to refrain from further investments in these hotels, as their outputs do not seem to be proportional to the inputs invested in them.

f. For the inefficient hotels that operated under increasing returns to scale. the best strategy would be for management to enlarge their scale of operations if they have to be more efficient. For these group of hotels, an increase in inputs would have had a higher than proportional increase in outputs. This means they can be more efficient if they invested in more beds for sale; more rooms for sale, and produced more food and beverages for sale. Furthermore, there is a lot of potential to be realized if these hotels expanded their operations in the future based on market orientation through expansion of their size and increasing their market share, number of units and a national coverage of their market (Barros, 2006).

g. Another policy implication for investors is that one can invest confidently in Nairobi since the efficiency of the hotels in this region is likely to be higher compared to Mombasa.

h. Investors should not be skeptical about investing in the small sized hotels. This is because large sized hotels are not necessarily significantly efficient than medium and family owned hotels.

5.5: Recommendations for Further Research

The study uncovered valuable findings that laid groundwork for future studies in efficiency. Specifically, further research needs to be done to address some gaps identified by this study.

This study recommends further research in areas as listed.

1. This study used data on the hotels' performance from 2007 to 2009. A similar study that will capture data up to 2010/2011 needs to be carried out to establish the current efficiency scores and recommend accurate interventions.
2. A similar study also needs to be carried out on other key accommodation that include lodges and tented camps common in national parks and game reserves.

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7.0 APPENDICES

Appendices I –Interview Schedule

KENYATTA UNIVERSITY
DEPARTMENT OF HOSPITALITY MANAGEMENT

I am a PhD student from the School of Hospitality and Tourism Management, of Kenyatta University. I am carrying out research on "*Measuring Efficiency and benchmarking classified two - five star hotels in Nairobi and Mombasa, Kenya using Data Envelopment Analysis*". You have been selected as one of the participants in the study. Please assist me in answering the following questions as accurately as possible. You are assured of absolute confidentiality of any information you give. The information will be used for academic purposes only.

Thank you.

Hotel…………

Code…………..

1. Gender

   a) Male [ ]
   b) Female [ ]

2. Working experience

   a) 1- 5 years [ ]
   b) 6- 10 years [ ]
   c) 11- 15 years [ ]
   d) Above 15 years [ ]

3. Location of hotel

   Nairobi [ ]
   Mombasa [ ]

4. What is the ownership structure of your hotel?

Independently owned [ ]

Chain owned? [ ]

5. How many years has your hotel been in operation?

a) 0- 5 years [ ]

b) 6- 10 years [ ]

c) 11- 15 years [ ]

d) 16 – 20 years [ ]

e) 21- 25 years [ ]

f) 26- 30 years [ ]

g) Above 30 years [ ]

6. What is the bed capacity of your hotel?

1-100 beds [ ]

101-150 [ ]

151- 300 beds [ ]

> 300 beds [ ]

7. State the average number of beds available for sale in the last three years

2007 [ ]

2008 [ ]

2009 [ ]

8. How many rooms were available for sale in the last three years?

2007 [ ]

2008 [ ]

2009 [ ]

9. What was your average room price for the last three years?

a) During the low season 2007 ………………….

b) High season 2007 ………………….

c) Low season 2008 ………………….

d) High season 2008 ………………….

c) Low season 2009 ………………….

d) High season 2009 ....

10. What was the room occupancy during?

a) High season 2007 ....

b) Low season 2007 ....

c) Average room occupancy 2007 ....

d) High season 2008 ....

e) Low season 2008 ....

f) Average room occupancy 2008 ....

g) High season 2009 ....

h) Low season 2009 ....

i) Average room occupancy 2009 ....

11. State your average bed occupancy in:

2007 ....

2008 ....

2009 ....

12. What was your average room revenue in?

a) 2007 ....

b) 2008 ....

c) 2009 ....

13. What was your percentage clientele in terms of?

a) Foreign travelers; 2007 [ ]

b) Foreign travelers; 2008 [ ]

c) Foreign travelers; 2009 [ ]

d) Local travelers; 2007 [ ]

d) Local travelers; 2008 [ ]

d) Local travelers; 2009 [ ]

14. What was the total number of all your food and beverage staffs?

a) 2007 ....

b) 2008 ....

c) 2009 ....

15. How many of these staffs were?

a) Permanent 2007 ....

b) Casual 2007 ....

c) Permanent 2008 ....

b) Casual 2008 ....

b) Permanent 2009 ....

b) Casual 2009 ....

16. What has been your percentage F& B staff turnover for?

a) 2007 ....

b) 2008 ....

c) 2009 ....

17. From your operational performance, please you provide the following?

a) Room sales in:

2007 ....

2008 ....

2009 ....

b) Food sales in:

2007 ....

2008 ....

2009 ....

c) Beverage sales in:

2007 ....

2008 ....

2009 ....

c) 'Other sales' e.g. parking, airtime as a percentage of the total sales in:

2007 ....

2008 ....

2009 ....

18. Kindly Provide your?

d) average monthly food cost for:

a. 2007 ....
b. 2008 ....
c. 2009 ....

e) Average monthly beverage cost for:

a. 2007 ....
b. 2008 ....
c. 2009 ....

f) Profit before tax in:

a. 2007 ....
b. 2008 ....
c. 2009 ....

19. Kindly provide the Average Spend per guest for:

a. 2007 ....
b. 2008 ....
c. 2009 ....

20. What expenses did you incur from room sales in?

d. 2007 ....
e. 2008 ....
f. 2009 ....

21. What was average Energy and utility expenses in:

a. 2007 ....
b. 2008 ....

c. 2009 ....

22. Do you operate a continuous training program for your employees?

a) Yes

b) No

Thank you

Appendix II: DEA Entry Files

all7-dta.txt	DATA FILE NAME
all8-out.txt	OUTPUT FILE NAME
36	NUMBER OF FIRMS
3	NUMBER OF TIME PERIODS
4	NUMBER OF OUTPUTS
5	NUMBER OF INPUTS
0	0=INPUT AND 1=OUTPUT ORIENTATED
1	0=CRS AND 1=VRS
4	0=DEA(MULTI-STAGE), 1=COST-DEA, 2=MALMQUIST-DEA, 3=DEA(1-STAGE), 4=DEA(2-STAGE)

ysingle-dta.txt	DATA FILE NAME
ysingle-out.txt	OUTPUT FILE NAME
36	NUMBER OF FIRMS
1	NUMBER OF TIME PERIODS
4	NUMBER OF OUTPUTS
5	NUMBER OF INPUTS
0	0=INPUT AND 1=OUTPUT ORIENTATED
1	0=CRS AND 1=VRS
4	0=DEA(MULTI-STAGE), 1=COST-DEA, 2=MALMQUIST-DEA, 3=DEA(1-STAGE), 4=DEA(2-STAGE)

Appendix III: Hotel Bed-Nights Occupancy by Country of Residence

Country of Residence	2002	2003	2004	2005	2006	2007	2008	2009
Permanent Occupants	**12,900**	**9,700**	**32,700**	**44,900**	**23,500**	**25,000**	**52,400**	**29,700**
Germany	721,300	420,400	465,900	689,900	917,200	926,100	339,500	685,600
Switzerland	218,300	125,900	145,600	164,300	191,800	174,200	66,800	127,500
United Kingdom	591,400	324,300	516,200	628,400	1,029,400	1,223,100	486,600	909,700
Italy	211,900	144,000	166,900	353,100	479,300	536,500	158,200	383,200
France	164,800	113,900	164,400	183,500	320,400	304,300	63,800	231,800
Scandinavia	56,300	45,600	69,400	88,800	114,800	129,800	48,700	97,300
Other europe	244,900	213,500	606,200	346,500	487,100	543,700	160,000	363,000
EUROPE	**2,208,900**	**1,387,600**	**2,134,600**	**2,454,500**	**3,540,000**	**3,837,700**	**1,323,600**	**2,798,100**
Kenya residents	656,100	738,700	1,190,300	1,129,600	1,374,800	1,869,800	1,566,600	2,150,900
Uganda	26,900	26,200	43,100	37,000	49,200	52,200	43,200	103,000
Tanzania	26,700	30,400	43,400	44,100	55,900	54,700	43,100	71,100
East and Central Africa	34,500	27,600	43,000	55,700	71,600	67,300	41,500	87,100
West Africa	25,100	15,400	27,900	30,200	36,000	35,600	26,300	45,400
North Africa	12,700	16,500	21,000	18,900	25,500	43,900	17,000	25,400
South Africa	42,700	34,400	48,200	51,100	67,800	73,600	52,600	87,800
Other Africa	24,900	39,800	65,100	52,800	56,500	71,800	59,900	65,900
AFRICA	**849,600**	**929,000**	**1,482,000**	**1,419,400**	**1,737,300**	**2,268,900**	**1,850,200**	**2,636,600**
USA	149,800	109,600	165,100	206,800	242,200	270,900	148,100	233,800

Country of Residence	2002	2003	2004	2005	2006	2007	2008	2009
Canada	22,400	17,600	28,700	35,800	48,500	64,000	32,200	58,500
Other America	22,300	17,500	24,600	23,800	24,300	34,200	16,700	33,400
AMERICA	**194,500**	**144,700**	**218,400**	**266,400**	**315,000**	**369,100**	**197,000**	**325,700**
Japan	44,200	26,200	33,500	34,600	37,000	45,700	18,200	37,800
India	25,000	29,200	38,400	44,600	50,800	60,500	51,200	83,300
Middle east	37,700	20,300	23,400	31,300	33,500	38,000	20,000	37,500
China	..	..	..	..	25,000	43,200	20,700	33,200
Other Asia	17,300	18,200	35,900	63,200	35,300	41,700	26,400	41,000
ASIA	**124,200**	**93,900**	**131,200**	**173,700**	**181,600**	**229,100**	**136,500**	**232,800**
Australia and New Zealand	**21,900**	**17,000**	**22,500**	**40,600**	**45,500**	**56,900**	**42,300**	**54,900**
All other countries	**25,000**	**24,200**	**70,200**	**76,800**	**78,800**	**152,500**	**97,100**	**165,200**
Total occupied	**3,437,000**	**2,606,100**	**4,091,600**	**4,476,300**	**5,921,700**	**6,939,200**	**3,699,100**	**6,243,000**
Total available	**8,182,700**	**7,765,700**	**10,030,700**	**10,845,600**	**13,003,500**	**14,711,600**	**14,233,600**	**17,125,300**
% occupancy rate	**42.0**	**33.6**	**40.8**	**41.3**	**45.5**	**47.2**	**26.0**	**36.5**

Appendix IV: Data Used in Estimations - Year 2007

	Food sales 2007	Beverage sales 2007	Room sales 2007	Operating profit 2007	Food cost 2007	Beverage cost 2007	Total No. of rooms 2007	Total beds 2007	F& B staff 2007
Hilton	891,955,484	240,855,119	2,038,787,700	932,205,654	267,586,645	78,037,059	314,264	314,264	105
Southern Palms	538,411,500	390,846,867	1,196,470,000	837,529,000	358,941,000	167,505,800	108,770	217,540	200
Sun n' sand	814,150,896	407,075,448	814,150,896	712,382,034	297,165,077	124,158,012	219,000	182,500	84
Safari Park	784,502,854	313,981,401	956,662,080	452,378,515	274,575,999	69,075,908	74,460	108,405	210
Intercontinental	333,641,639	82,165,478	753,183,550	379,921,967	96,756,075	18,076,405	137,240	137,240	232
Travellers Beach Hotel & Resort	640,000,000	480,000,000	960,000,000	312,000,000	256,000,000	163,200,000	100,000	54,000	120
Mombasa Continental	160,043,789	48,297,238	426,152,100	253,797,251	48,013,137	10,142,420	66,795	133,599	105
Southern Sun/Holiday Inn	190,332,437	44,333,654	675,080,640	247,451,111	59,003,056	14,319,770	62,415	94,900	53
Baobab Holiday Resort	265,237,180	265,237,180	127,239,000	230,199,676	74,266,410	53,047,436	30,295	36,865	21
Laico Regency	36,232,270	190,219,420	375,060,612	204,514,183	11,232,004	39,946,078	71,540	71,540	93
Serena Nairobi	259,514,860	77,362,153	528,976,282	198,540,161	99,134,676	24,283,980	66,795	123,708	290
Sarova Panafric	56,590,737	150,342,449	266,716,450	189,459,854	15,845,406	48,109,584	56,210	86,505	250
Serena Beach Hotel & Spa	637,187,253	155,411,525	621,646,100	169,709,385	203,899,921	45,069,342	59,860	119,720	153
Sentrim 680	244,999,680	51,041,600	229,687,200	126,174,835	68,599,910	14,291,648	68,400	108,000	45
Jacaranda	205,130,389	7,940,531	397,026,560	122,019,496	65,641,725	2,858,591	46,720	93,440	112
Silver Springs	160,006,875	21,334,250	309,346,625	98,137,550	49,602,131	7,253,645	60,955	65,700	60
Windsor	201,069,094	63,689,295	194,053,320	91,762,342	55,696,139	14,011,645	45,450	90,900	210
Fairmont The 1	101,741,143	100,239,429	262,800,000	83,195,722	34,490,247	24,859,378	36,500	54,750	97

	Food sales 2007	Beverage sales 2007	Room sales 2007	Operating profit 2007	Food cost 2007	Beverage cost 2007	Total No. of rooms 2007	Total beds 2007	F& B staff 2007
Reef	210,970,000	210,970,000	316,455,000	81,223,450	75,949,200	80,168,600	49,640	99,280	17
Bahari Beach	165,817,143	124,362,857	290,180,000	69,643,200	54,222,206	43,527,000	39,420	73,000	115
Sentido Neptune	47,652,347	30,008,475	92,618,750	45,975,484	14,295,704	6,901,949	51,100	43,800	25
Sportsview	66,627,806	30,989,677	48,034,000	43,695,445	28,649,957	12,705,768	34,310	43,800	55
Diani Sea Resort	111,690,000	37,230,000	223,380,000	40,953,000	36,857,700	14,333,550	62,050	124,100	45
Mombasa Beach	86,999,028	14,236,205	44,290,414	40,747,181	34,799,611	4,697,947	55,115	55,115	30
Utalii	107,492,500	34,397,600	64,495,500	37,149,408	40,847,150	9,631,328	20,805	20,805	100
Sai Rock	9,671,040	48,355,200	108,799,200	33,365,088	2,901,312	14,023,008	52,560	105,120	72
Bamburi Beach	50,187,500	33,458,333	75,281,250	31,785,417	15,056,250	6,691,667	54,750	109,500	90
Royal Castle	21,140,996	6,379,827	75,567,593	28,864,756	5,708,069	1,339,764	24,820	44,530	66
Sarova Stanley	261,851,730	87,283,910	523,703,460	26,185,173	65,462,933	21,820,978	79,205	110,960	181
Nyali Beach	28,061,989	28,061,989	50,629,323	25,620,792	9,400,766	8,112,721	29,565	58,400	230
Plaza Beach	68,704,680	68,704,680	119,486,400	16,698,224	24,733,685	15,802,076	32,120	64,240	38
Pa Pweza Adamsville	10,432,441	3,477,480	55,639,688	13,909,922	4,172,977	1,390,992	5,475	15,370	25
Milele Beach	33,983,363	33,983,363	59,101,500	8,259,435	12,234,011	7,816,173	12,300	24,600	38
Ole-Sereni									
North Coast									
LTI Kaskazi									

Appendix V: Data Used in Estimations - Year 2008

Hotel	Food sales	Beverage sales	Room sales	Operating profit	Food cost	Beverage cost	Total No. of rooms	Total no. of beds	F& B staff
Hilton	725,356,218	201,812,819	1,716,871,372	698,819,880	232,839,346	63,934,301	31,264	314,264	101
Southern Palms	901,930,000	387,493,125	774,986,250	697,487,625	360,772,000	120,122,869	108,770	217,540	80
Mombasa Continental	288,711,565	94,047,360	455,541,900	318,554,313	75,065,007	31,976,102	66,795	133,590	99
Safari Park	666,347,988	169,003,424	600,445,440	301,517,339	191,908,221	38,870,787	74,460	111,690	320
Sun n' sand	711,379,529	237,126,510	474,253,019	284,551,812	284,551,812	101,964,399	219,000	182,500	86
Southern Sun/Holiday Inn	203,682,986	46,286,660	721,941,822	254,640,805	63,141,726	14,811,731	62,415	94,900	51
Serena Nairobi	249,562,413	69,378,753	544,774,034	219,642,775	101,896,333	21,139,706	66,979	133,956	300
Sarova Panafric	62,386,878	170,554,067	261,376,500	182,897,455	17,468,326	56,282,842	56,210	86,505	200
Laico Regency	39,542,161	207,596,346	258,372,076	171,873,598	10,280,962	51,899,086	71,540	71,540	91
LTI Kaskazi	609,468,889	585,090,133	1,097,044,000	160,412,212	201,124,733	218,823,710	124,100	124,100	65
Intercontinental	134,408,081	32,375,669	295,305,347	150,641,046	37,634,263	7,446,404	137,240	137,240	197
Sai Rock	31,260,060	156,300,300	468,900,900	131,292,252	10,315,820	45,327,087	59,130	118,260	80
Jacaranda	191,226,420	7,533,162	370,863,360	113,924,588	61,192,454	2,711,938	46,720	93,440	112
Serena Beach Hotel& Spa	875,452,500	136,181,500	583,635,000	111,668,830	280,144,800	43,578,080	59,860	119,720	147
Sentrim 680	239,678,515	33,554,992	191,742,812	106,944,553	63,514,806	8,724,298	67,231	106,300	40
Windsor	233,000,454	59,095,060	209,956,453	105,430,913	67,104,131	13,591,864	45,580	91,160	320
Silver Springs	131,748,351	20,585,680	234,676,750	96,752,695	42,159,472	6,793,274	60,955	65,700	56
Reef	256,680,167	256,680,167	385,020,250	80,854,253	97,538,463	97,538,463	53,290	106,580	20
Nyali Beach	101,518,801	59,462,027	101,518,801	47,249,933	26,394,888	15,002,269	29,930	58,400	210

Hotel	Food sales	Beverage sales	Room sales	Operating profit	Food cost	Beverage cost	Total No. of rooms	Total no. of beds	F& B staff
Baobab Holiday Resort	92,359,375	92,359,375	44,306,438	45,805,038	27,707,813	18,471,875	30,295	36,865	18
Bahari Beach	115,335,000	96,112,500	153,780,000	43,827,300	43,250,625	33,639,375	39,420	73,000	109
Sportsview	81,174,284	37,057,825	48,034,000	41,566,527	34,093,199	14,452,552	34,310	51,100	60
Diani Sea Resort	102,024,519	40,809,808	265,263,750	36,728,827	36,728,827	15,058,819	62,050	124,100	45
Mombasa Beach	84,050,513	12,007,216	54,890,131	36,227,486	31,098,690	3,962,381	55,115	55,115	28
Royal Castle	24,389,735	8,112,004	72,148,489	31,395,068	7,073,023	1,946,881	24,820	44,530	66
Pa Pweza Adamsville	8,760,000	4,380,000	74,460,000	26,280,000	3,504,000	1,971,000	6,205	24,455	32
Utalii	74,551,250	23,856,400	44,730,750	25,764,912	29,820,500	6,679,792	20,805	20,805	112
Sarova Stanley	266,863,246	88,954,415	489,249,285	25,352,008	68,583,854	19,481,017	79,205	110,960	196
Bamburi Beach	40,651,875	33,876,563	40,651,875	16,125,244	12,195,563	6,775,313	54,750	109,500	65
Fairmont The Norfolk	32,323,200	30,700,800	91,104,000	12,792,624	10,892,918	7,552,397	36,500	54,750	120
Milele Beach	59,448,739	59,448,738	105,386,400	10,765,626	18,429,109	16,645,647	29,520	59,048	41
Sentido Neptune	10,318,185	12,279,330	21,024,000	10,032,948	3,095,456	2,824,246	14,600	18,250	32
Plaza Beach	38,905,968	38,905,968	68,969,670	7,045,517	12,060,850	10,893,671	32,120	64,240	41
Travellers Beach Hotel & Resort	251,162,791	209,302,326	360,000,000	-41,023,256	105,488,372	71,162,791	90,000	32,000	126

Appendix VI: Data Used in Estimations - Year 2009

Hotel	Food sales	Beverage sales	Room sales	Operating profit	Food cost	Beverage cost	Total No. of rooms	Total no. of beds	F& B staff
Hilton 14	803,104,509	210,336,895	2,103,368,952	1,019,196,986	247,356,189	64,994,101	314,264	314,264	98
Southern Palms 23	895,539,667	671,654,750	1,007,482,125	779,119,510	402,992,850	194,779,878	108,770	217,540	170
Mombasa Continental 30	590,383,970	117,619,385	812,227,200	638,496,833	171,211,351	43,519,173	66,795	133,590	107
Safari Park 2	867,402,741	218,662,214	959,044,800	468,330,134	251,546,795	52,478,931	74,460	111,690	384
Ole-Sereni 11	381,371,509	466,120,733	819,242,500	466,685,728	114,411,453	116,530,183	48,910	97,820	96
Reef 22	573,755,667	573,755,667	860,633,500	461,873,312	229,502,267	218,027,153	106,580	106,580	25
Sun n' sand	364,997,664	243,331,776	608,329,440	425,830,608	149,649,042	80,299,486	219,000	182,500	86
Intercontinental	281,512,670	82,881,903	930,277,909	387,107,072	81,638,674	17,405,200	137,240	137,240	226
Southern Sun/Holiday Inn	199,691,839	41,936,448	806,202,072	287,105,518	63,901,388	13,629,346	62,415	94,900	54
Serena Nairobi	307,506,486	79,186,220	671,883,076	275,017,988	126,692,672	24,468,542	66,795	133,590	314
Sarova Panafric	62,110,966	227,496,169	373,234,400	271,765,029	16,148,851	75,073,736	56,210	86,505	260
Laico Regency	45,707,431	239,964,015	392,798,239	264,603,178	10,969,784	47,992,803	71,540	71,540	89
Sai Rock	49,669,200	248,346,000	745,038,000	208,610,640	17,384,220	72,020,340	59,130	118,260	91
Fairmont The Norfolk	135,503,578	125,968,141	356,324,224	185,956,579	43,361,145	33,003,653	60,225	90,337	135
Jacaranda	227,568,089	8,701,133	435,056,640	167,831,465	72,821,788	3,132,408	46,720	93,440	109
Baobab Holiday Resort	193,117,928	193,117,928	92,642,110	167,607,288	54,073,020	38,623,586	30,295	36,865	20

Hotel	Food sales	Beverage sales	Room sales	Operating profit	Food cost	Beverage cost	Total No. of rooms	Total no. of beds	F& B staff
Sentrim 680	333,650,248	66,730,050	266,920,198	166,825,124	91,753,818	18,684,414	69,911	109,730	40
Windsor	242,144,704	61,041,884	267,727,560	130,739,340	70,221,964	14,650,052	46,250	92,500	384
Sarova Stanley	286,346,212	95,448,737	563,147,550	122,842,525	76,454,439	20,330,581	79,205	110,960	190
Silver Springs	174,229,708	34,223,693	373,349,375	116,360,555	50,526,615	10,609,345	60,955	65,700	62
Serena Beach Hotel& Spa	776,562,162	135,898,378	718,320,000	102,739,174	248,499,892	46,205,449	59,860	119,720	147
LTI Kaskazi	324,746,888	337,736,763	519,595,020	74,470,956	107,166,473	115,505,973	122,640	122,640	68
Bahari Beach	206,523,000	160,629,000	246,680,250	73,659,870	92,832,089	56,220,150	39,420	73,000	95
Diani Sea Resort	134,541,106	53,816,442	349,806,875	64,579,731	52,605,572	19,051,021	62,050	124,100	50
Sportsview	124,437,761	46,145,670	69,477,750	57,614,683	48,530,727	19,381,181	34,310	58,400	65
Nyali Beach	85,000,524	60,427,175	85,000,524	52,998,491	22,950,141	16,599,345	29,930	58,400	218
Pa Pweza Adamsville	13,573,438	13,573,438	108,587,500	51,579,063	4,750,703	5,022,172	7,300	18,815	38
Mombasa Beach	98,280,407	12,740,053	54,600,226	44,717,585	39,312,163	3,822,016	55,115	55,115	40
Sentido Neptune	18,570,376	35,913,939	84,096,000	38,802,488	5,199,705	8,619,345	43,800	47,450	38
Utalii	98,823,750	31,623,600	59,294,250	36,050,904	33,600,075	7,273,428	20,805	20,805	113
Royal Castle	41,432,353	8,224,785	76,773,224	31,607,590	8,700,794	2,138,444	24,820	44,530	80
Bamburi Beach	38,598,750	29,592,375	55,324,875	18,527,400	11,579,625	5,918,475	54,750	109,500	68
Milele Beach	100,415,700	100,415,700	174,636,000	12,390,424	38,157,966	31,128,867	30,240	60,480	43
Plaza Beach	67,651,947	67,651,947	117,655,560	8,347,662	25,707,740	20,972,104	32,120	64,240	43
North Coast	2,786,688	2,786,688	3,483,360	3,894,396	836,006	557,338	1,476	2,952	30

Hotel	Food sales	Beverage sales	Room sales	Operating profit	Food cost	Beverage cost	Total No. of rooms	Total no. of beds	F& B staff
Travellers Beach Hotel & Resort	288,245,106	224,190,638	376,320,000	-26,662,672	129,710,298	73,982,911	98,000	56,000	150

Appendix VII: GLM Regression

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. xi: xtgee  efficiency  average_room_prices i.location i.ownership i.star_rating i.year_in_operation, i( sn) t( year) co
> rr(indep) link(iden) fam(normal)
i.location        _Ilocation_1-2        (naturally coded; _Ilocation_1 omitted)
i.ownership       _Iownership_1-2       (naturally coded; _Iownership_1 omitted)
i.star_rating     _Istar_rati_1-2       (naturally coded; _Istar_rati_1 omitted)
i.year_in_ope~n   _Iyear_in_o_1-3       (naturally coded; _Iyear_in_o_1 omitted)

Iteration 1: tolerance =  1.329e-15

GEE population-averaged model                   Number of obs      =       108
Group variable:                         sn        Number of groups   =        36
Link:                             identity        Obs per group: min =         3
Family:                           Gaussian                       avg =       3.0
Correlation:                   independent                       max =         3
                                                  Wald chi2( 6)      =     17.36
Scale parameter:                  .0066213        Prob > chi2        =    0.0081

Pearson chi2( 108):                   0.72        Deviance           =      0.72
Dispersion (Pearson):             .0066213        Dispersion         =  .0066213
```

efficiency	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
average_ro~s	-4.21e-06	1.94e-06	-2.17	0.030	-8.01e-06	-4.05e-07
_Ilocation_2	.0182834	.0176261	1.04	0.300	-.016263	.0528298
_Iownershi~2	.0304206	.017566	1.73	0.083	-.0040082	.0648494
_Istar_rat~2	-.0179528	.0178756	-1.00	0.315	-.0529883	.0170827
_Iyear_in_~2	-.0313051	.0238328	-1.31	0.189	-.0780165	.0154062
_Iyear_in_~3	-.048032	.0219574	-2.19	0.029	-.0910676	-.0049964
_cons	1.004445	.0341599	29.40	0.000	.9374927	1.071397

Appendix VIII: List of some Two to Five Star Hotels in Nairobi and Mombasa as they existed in 2003.

Name of hotel	No of beds	Location	Size
Five star			
1. Hotel intercontinental	770	Nairobi	Large
2. Laico Regency Hotel	388	Nairobi	Large
3. Hilton Hotel	353	Nairobi	Large
4. The Norfolk Hotel	334	Nairobi	Large
5. Nairobi Serena	283	Nairobi	M. Sized
6. The Stanley	434	Nairobi	Large
7. Safari Park Hotel	285	Nairobi	M. Sized
8. Whitesands Resort	716	Mombasa	Large
Four Star			
9. Severin Sea Lodge	380	Kilifi	Large
10. Nyali Beach Hotel	240	Mombasa	M. Sized
11. Mombasa serena	348	Mombasa	Large
12. Indian Ocean Beach club	200	Ukunda	M. Sized
13. Travellers Tiwi Beach H.	420	Kwale	Large
14. Club sand "N" Sand	600	Kilifi	Large
Three Star			
Bounty Hotel	100	Nairobi	Family
15. Fairview Hotel	163	Nairobi	M. Sized
16. Marble Arch Hotel	77	Nairobi	Family
17. Landmark Hotel	242	Nairobi	M. Sized

18. Holiday Inn	342	Nairobi	Large
19. Windsor G. and C. Club	260	Nairobi	M. Sized
20. Nairobi Safari Club	282	Nairobi	M. Sized
21. Ambassadeur Hotel	190	Nairobi	M. Sized
22. Mombasa Beach hotel	302	Mombasa	Large
23. Diani Sea Resort	340	Ukunda	Large
24. L.T.I Kaskazi B. Resort	382	Ukunda	Large
25. Diani Reef Grand Hotel	600	Ukunda	Large
26. Baobab Beach Resort	230	Ukunda	M. Sized
27. Indiana Beach Apt Hotel	398	Mombasa	Large
28. Southern Palms B. Rst.	398	Ukunda	Large
29. Kilifi Baharini Resort	54	Kilifi	Family
30. Reef Hotel	252	Mombasa	M. Sized
31. Bahari Beach Hotel	200	Mombasa	M. Sized
32. Leisure Lodge	506	Ukunda	Large
Two Star			
33. Panafric Hotel	46	Nairobi	Family
34. Silver Springs Hotel	188	Nairobi	M. Sized
35. Hotel Boulevard	146	Nairobi	Small
36. Six Eighty	680	Nairobi	Large
37. Sportsview Hotel	104	Nairobi	Small
38. Neptune Paradise Hotel	516	Ukunda	Large
39. Kasar al Bahir Hotel	80	Mombasa	Family

40. Ocean Village Club	138	Ukunda	Small
41. Chale Island Paradise	35	Ukunda	Family
42. Baobab Holiday resort	100	Mombasa	Small
43. Papillon Lagoon Reef H.	238	Ukunda	M.Sized
44. Palm Beach hotel	400	Mombasa	Large
45. Dolphine Hotel	225	Mombasa	Large
46. Paradise Beach hotel	308	Mombasa	Large
47. Diani Sea Lodge	290	Ukunda	M. Sized
48. Bamburi Beach Hotel	300	Mombasa	M. Sized
49. Kilifi Bay Beach Hotel	110	Kilifi	Small
50. Coral Beach Hotel(unaccessed)	380	Mombasa	Large
51. Malaika Hotel(closed)	184	Mombasa	M. Sized
52. Neptune Beach Hotel(unaccessed)	156	Kilifi	M. Sized
53. North Coast /KU	222	Kilifi	M.Sized
54. Mnarani Club	168	Kilifi	M. Sized
55. Seahorse M. Club(closed)	80	Kilifi	family
56. Giriama Beach Hotel (Milele)	184	Mombasa	M. Sized