ADDIS ABABA UNIVERSITY
COLLEGE OF BUSINESS AND ECONOMICS
DEPARTMENT OF ACCOUNTING AND FINANCE

The Measurement of Efficiency in Addis Ababa Hotels: A Data Envelopment Analysis Approach

A Thesis Submitted to the department of accounting and Finance, AAU in Partial Fulfillment of the Requirement for Master of Science Degree in Accounting and Finance

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Declaration

I, Osman Hussien, hereby declare that the thesis entitled The Measurement of Efficiency in Addis Ababa Hotels: A Data Envelopment Analysis is the outcome of my own effort and study and that all sources of materials used for the study have been duly acknowledged. This study has not been submitted for any degree in this University or any other University. It is summitted for the partial fulfillment of the requirement for master of science degree in Accounting and Finance at Addis Ababa University

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Certification

Addis Ababa University

School of graduate studies

This is to certify that the thesis prepared by Osman Hussien entitled:

The Measurement of Efficiency in Addis Ababa Hotels: A Data Envelopment Analysis Approach submitted in partial fulfillment of the requirements for the degree of Master of Science in accounting and finance compiles with the regulations of the university and meets the accepted standards with respect to originality and quality.

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Advisor Degefe Duressa. (PhD) Signature _____ Date_____

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Osman Hussien

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ACRONYMS

AU	Africa Union
BCC Index	Banker-Charnes-Cooper index
CCR Index	Charnes- Cooper- Rhodes index
CRS	Constant Return to Scale
COLS	Corrected Ordinary Least Squares
DEA	Data Envelopment Analysis
DMU	Decision Making Units
DFA	Distribution Free Approach
ETO	Ethiopian Tourism Organization
ETB	Ethiopian Birr
FDH	Free Disposal Hull
GDP	Gross Domestic Product
MoCT	Ministry of Culture and Tourism
MICE	Meeting Incentive Conference and Exhibitions
NGO	Non-Government Organizations
STA	Stochastic frontier approach
TFA	Thick Frontier Approach
TTCI	Travel and Tourism Competitiveness index
USD	United states Dollar
UN	United Nations
VRS	Variable Return to Scale
WTO	World Tourism Organization

Abstract

Efficiency has become an essential emphasis in today's highly competitive business environment. Efficiency measurement determines how hotels provide an optimal combination of financial services with a set of inputs. The purpose of this thesis is to study the relative efficiency between hotels operating under international brand and local hotels, in Addis Ababa, Ethiopia that identifies the inefficiency causes and suggest managerial implications to relevant business experts and managers in order to increase hotel efficiency in the city. The research adopted an explanatory survey design. The population of interest for this study was all hotels in Addis Ababa. The sample was constituted by 15 five and four-star hotels operating in Addis Ababa in 2018 of which 4 hotels are operating under international brand and 11are operating as Local Hotels with purposive sampling technique. The efficiency for the above hotels is estimated through the data envelopment analysis methodology. The study utilized primary and secondary sources of data. International brand hotels are efficient and local hotel are partly efficient and partly the least efficient. The hotels' inefficiency causes are mainly due to the input/output configuration. The inefficiency causes are identified, and suggestions are made to hotel owners and managers, at the level of strategic and operational management to enhance hotel efficiency. A direction for future research could be increase input and output variables. The thesis would be better, if data set have more variables for more than one year in order to understand the dynamics nature of hotel efficiency. It is also advised to incorporate more international brand hotel as the data set on this thesis are not even in international brand hotel and local hotel. This is the first study measuring hotel efficiency in Addis Ababa. Moreover, it identifies the inefficiency causes of hotels and offers suggestions, at the level of strategic and operational management, to increase hotel efficiency, which are applicable to Addis Ababa.

Keywords Performance measurement, Technical efficiency, Slack analysis, Data Envelopment Analysis, Decision Making Unit(DMU), CCR model and BCC model.

CHAPTER ONE

INTRODUCTION

1.1 Background of the study

The competitive environment encourages firms to innovate, reduce costs and become more efficient. Studies on firms in a wide range of economic sectors have found that measures of competitive pressure positively impact business efficiency and growth rates of productivity (Blundell, Griffith, and Van Reenen, 1995; Nickell, 1996). Market structure can also be an indication of the level of competitiveness, for example, a less concentrated market can be more favorable to increased competition than a more concentrated market with entry and exit barriers (Aw, Chung, and Roberts, 2003).

Performance at the firm level is measured either by productivity or by efficiency. Productivity is defined as the ratio of outputs over inputs, which can be calculated for a single input and output or by aggregating multiple inputs and outputs. Efficiency relates to the concept of the production possibility frontier (Anderson, Lewis, and Parker, 1999). Thus, it reflects the current status of technology available to the industry.

Particularly, in the hotel sector, efficiency is a comparative measure of how well it actually processes inputs to achieve its outputs, as compared with its maximum potential for doing so, as represented by its production possibility frontier. Brown and Dev (1999) argued that increases in productivity and efficiency are related to market segment, leadership and management styles (brand management, independent management companies, etc.). Also, the size of the hotel (measured by the number of rooms) and the type of property appear to play a role in terms of productivity.

Yu and Lee (2009) stated that because of the simultaneity and perishability of services, when evaluating hotel performance, the provision of services is more difficult to measure than production and consumption processes in the manufacturing sector because services are created and consumed at the same time and there is an interaction between consumer and supplier. Once

supply is not consumed (the rooms are not occupied), the levels of efficiency will be seriously affected

1.2 Background of the Organization

The global tourism industry has huge economic importance. It contributes 10% of the world's gross domestic product and 6% of exports. One billion people a year travel somewhere in the world. (Orthodox Tefera 2018)

Africa's natural and cultural points of interest give the continent tremendous tourism potential. In 2015, the sector generated USD$ 36 billion in Africa (7% of all exports in the region), up from USD$ 10 billion in 2000. Travel and tourism also directly support 466,000 jobs. It's expected that by 2030 the number of tourists will reach 134 million annually. (Orthodox Tefera 2018)

But African countries' tourism industries are often constrained by source of infrastructure development, air connectivity and financing. Ethiopia is an example. The country has immense natural, cultural and historical attractions, but is a largely untapped tourism market. It suffers from a lack of infrastructure and the negative publicity the country received after the famine in the 1980s and various conflicts. It needs to make a big effort to market its potential and develop the measures to support the industry. (Orthodox Tefera 2018).

The Federal Democratic Republic of Ethiopia (FDRE) has been enjoying unprecedented tourism growth in the recent years. International tourist arrivals have been on a growth trajectory since the 90s rising from 64,000 in 1990 to 681,249 in 2013. This has been matched by growth in the contribution of the travel and tourism sector's direct contribution to the country's GDP which in 2013 was 4.2%, translating to ETB 35,766.6M and is expected to grow by 4.8% per annum. reaching ETB 59, 495.2M (3.6% of GDP) by 2024. (Ministry of Culture and Tourism 2015)

Comfortable hotels play a vital role in attracting tourists. After the fall of the communist government 27 years ago, Ethiopia started privatizing most of the state-owned hotels and tourism establishments. But, while the hotel industry is growing, the number of available hotel rooms is still the lowest. In terms of room availability, Ethiopia is globally ranked 134 out of 140, compared to Kenya, Uganda and Tanzania at positions 122, 121 and 118 respectively (Ministry of Culture and Tourism 2015)

Ethiopia did not have enough hotels recognized under international rankings or ratings – they generously awarded themselves their own stars. This made it hard for visitors to judge the quality of a hotel. This changed in 2015 when the Ethiopian government, with the help of World Tourism Organization, started rating hotels in the country. Though participation in the grading process is mandatory, the graded hotels still haven't undergone annual audits to ensure they're keeping up with the standard they were awarded. (Orthodox Tefera 2018).

Addis Ababa is well gifted with the potential to tap in to the MICE (Meeting, Incentives, Conference and Exhibitions) tourism owing to the fact that the city is the seat of the headquarters of the African Union (AU) and the United Nations Economic Commission for Africa (UNECA). It is also the third city with the highest number of diplomatic missions in the world; world class meeting venues of the African Union Congress Centre (AU-convention facilities) and the UNECA, together with international standards hotels like Sheraton, Radisson, Hilton, Marriott, Hyatt Regency, skylight and many others. Bole International Airport is now becoming an increasingly important air hub in Africa. Owing to these conditions, the city has become a leading conference and event tourism destination in Africa. (MoCT 2015)

However, the relatively low numbers of conference visitors and number of meetings hosted signifies some of the challenges faced by the city in developing tourism sector. The TTCI, in this regard, for instance, ranks the country at position 81 compared to South Africa and Kenya at positions 37 and 56 respectively in terms of the number of international fairs and exhibitions hosted. (MoCT 2015)

Addis Ababa has a quality supply of 78 hotels and a total of 5,167 keys currently in the market, giving an average number of 67 rooms per hotel. (Ministry of Culture and Tourism 2015). If it is consider the average Number of rooms of star rated hotels five thousand one hundred sixty seven (5,167) and average occupancy for industry in the range of 50 % (this is considered as lower level of occupancy and fairly challenging business environment in hotel industry) the supply could be considered Two thousand five hundred eighty four (2,584 rounded to full figure)/ day. This translates in to Nine Hundred forty-three thousand one hundred sixty (943,160) rooms/annum. This is just a minimum figure in which the Hotels could operate without having a major challenge to service their loan. (MoCT 2015)

On the other hand, if we see the demand side from point of view of arrival to the country, it is estimated by PWC that close to Nine hundred thousand visitors / annum. Under such circumstances, one needs to review on the merit of the decision or the unknown factors which justifies the continuous allocation of the resource. (MoCT 2015

1.3 Statement of the problem

Competitiveness between hotels is increasing, hotel managers are starting to realize that improving their performance can become their advantage and with competitive benchmarking these improvements can be identified and made (Min and Min, 1997). Company efforts to achieve superior performance include the implementation of various emerging business tools and management philosophies (Hernaus, Bach, and Vukšic, 2012). When financial resources are limited, business practices must be focused on the activities that have the most significant influence on hotel efficiency, as well as on financial results. Sources of inefficiency should be determined first so that hotel managers can devote their attention on areas that will result in better performance. This is particularly significant for the hotel industry where there is a high degree of seasonality. Efficiency is one of the key factors of management control and a prerequisite for making improvements. There are many different approaches on how to measure the efficiency of hotel companies (Baker and Riley, 1994; Van Doren and Gustke, 1982; Fay, Rhoads, and Rosenblatt, 1971; Ismail, Dalbor, and Mills, 2002; Kimes, 1989; Wassenaar and Stafford, 1991).

Investors operators in the hospitality sector strategically choose towards branding business models because of their need to exploit the advantages of sound reputation, image, and customer loyalty jointly with managerial and operational practices giving rise to economies of scale and efficiency increases (Bradley, 2002; Brown and Ragsdale, 2002; Hwang and Chang, 2003). Yet, becoming part of a network without successfully adapting to the local market involves the risk of loss of local flavor (Czinkota and Ronkainen, 2004; Palumbo and Herbig, 2000).

In Ethiopia, Corporate demand growth prospects are positive with strong GDP forecasts and growing regional demand, complementing the significant and well-established aid and diplomatic markets that are already present in the city. Currently Addis Ababa has received significant investment into the hotel sector in recent years, with several successful local

entrepreneurs investing in hotels. This has largely shaped the type of supply in the market, with a number of these investors having turned to international brands to manage their properties. The extensive list of branded hotels that has been announced, is evidence that this trend has changed. This is due to exploit the advantages of sound reputation, image, and customer loyalty jointly with managerial and operational practices which is giving rise to economies of scale and efficiency of the hotels. The latest branded entrants are the Hyatt, the Best western and the Skyline Addis Ababa.

According to the assessment made by Calibra hospitality, the demand of international brand hotel could be met after five to seven years. It is also supported by the assessment made by Ethiopian Tourism Organization, the demand and supply would breakeven shortly as the organization go forward in line with its plan. (Addisfortune 2017). As we are over supplied with number room compared to the number of tourist inflow and we will reach breakeven shortly. If the competitive between hotel is increased and improving efficiency of hotel performance is curial on this competitive environment. Therefore, this study intended to fill the gap by examining efficiency of hotel in Addis Ababa operating under international brand and local hotel.

A number of researches were conducted on efficiency of hotel industry in the world. The following illustrated few researches on efficiency of hotel operating under international brand and local hotels.

Hwang and Chang (2003) study the overall efficiency evolution in 45 hotels operating either as independent or belonging to international chain hotels in Taiwan. Their findings suggest that hotels belonging to international franchise-chains are more efficient than independent hotels.

Chiang (2004) examine the relative pure technical efficiency of 25 hotels in Taipei, under three operational styles: independently owned and operated, franchise licensed, and managed by international hotel operators. They find that the franchised hotels and those managed by international operators perform more efficiently than the independently operating ones.

Manasakis, C., Apostolakis, A and Datseris, G. (2013). Evaluate the relative technical efficiency among hotel chains in Crete, Greece and nationally branded hotels are relatively the most

efficient; internationally branded are the least efficient, while those operating under a local brand and the independent ones lie in between.

All of these studies showed varying results. Hence, it is of high interest to examine hotel efficiency in Addis Ababa. Therefore, this study therefore intended to fill this gap evaluating hotel efficiency in Addis Ababa and more specifically to compare the independently operating hotels' efficiency with the respective for those operating under international brand in a local context.

1.4 Research Questions

Hotel managers usually measure their success with classic performance measurement tools like revenue per available room, occupancy rate, return on investment and similar indicators, but to get a more in-depth analysis efficiency results should be used. These classic performance measurement indicators are usually determined as a ratio of two variables (Thanassoulis, Boussofiane, and Dyson, 1996) and do not represent the overall hotel company performance. The main advantage of efficiency measured by the DEA over other performance measurement indicators is that it can evaluate and monitor multiple dimensions of performance (Wöber, 2002) and allows a combination of financial, as well as non-financial, measures.

This research paper attempts to address the following three questions:

- What is the relative efficiency of hotels operating under a brand as compared to those operating as totally independent in Addis Ababa?
- What are the relevant inefficiency causes among these hotels?
- What are the suggestions and implications of the above analysis to relevant business experts and managers in order to increase hotel efficiency in Addis Ababa?

1.5 Objectives

1.5.1 General Objective

The objective of the study to assess the efficiency of the hotels is relation to international branding and local hotel in Addis Ababa.

1.5.2 Specific Objectives

- To examine the impact of number of employees on hotel efficiency.
- To assess the impact of number of rooms on hotel efficiency
- To examine the impact of total operational cost on hotel efficiency
- To examine the impact of total revenue on hotel efficiency
- To examine the impact of occupied room on hotel efficiency
- To assess impact of brand on efficiency of the hotels

1.6. Significance of the Study

More recently, Xiao (2012), in a sample of 2,012 hotels across the US, find that brand affiliation has the largest impact on revenues and profits, as compared to the respective impact of segment, operator, and location. Tavitiyaman (2012) approach hotel branding from the resource-based point-of-view and provide evidence of how competitive branding jointly with organizational structure, human resources, and information technology strategies explain hotel performance. This evidence suggests that hotel branding should receive particular attention from hotel owners and managers. However, international branding requires more investment during signing up the contract and operating under this brand. In consideration of the supervision and direction the operator, the investor pay fee to certain percentage of total revenue and gross operating profits. On top of that, there are different payments for the use of brand reservation and marketing fees.

It is, therefore, the results of this study will be significantly practical and helpful for

- **Investors:** It contributes to the discussion through the comparison of relative efficiency scores between independently operating hotels and hotels operating under international brands and identifies the relevant inefficiency causes
- **Management of the hotel:** It offers suggestions on how to increase hotel efficiency
- **Theoretical:** it is the first study measuring hotel efficiency in Ethiopia, and more specifically for the Addis Ababa which is a fast-growing regional economic center and the capital of

Ethiopia. It is home to the African Union, the UN Economic Commission for Africa, foreign missions, regional NGO's and the UN Conference Centre

1.7 Scope and Limitation of the Study

Addis Ababa has 78 star rated hotels and a total of 5,67 keys currently in the market as per Ministry of culture and Tourism.

The study focused only 15 Hotels which are four and five stars rated hotels. The study was not cover three-star hotels as there is only one international brand hotels at this category. It is not enough to make a comparison. There is no international branded hotel at two- and one-star category.

The limitation of the study is lack of previous studies in Ethiopia about efficiency of the hotels as far as the researcher knowledge. It underlines the need for continuous efficiency measurement in the hotel sector of Addis Ababa. Hence, this research could be extended through a larger sample of hotels as several international brand hotels are coming to the capital city and an increase data set covering more variables for more than one year in order to understand the dynamics of hotels efficiency.

1.8 Organization of the Study

The paper consists five chapters. The first chapter deals with the introduction part that consists of background of the study, statements of the problem, objectives of the study, significances of the study, scope of the study. Chapter two contains a review of the related literature. The research design and methodology are presented in chapter three. In chapter four, the results and findings of the study is discussed. Finally, the last chapter deals with the conclusions and recommendations that are forwarded based on the result obtained.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

The role of the tourism industry in Ethiopia's socio-economic development has always been recognized in the country. Such economic prominence of the industry is illustrated by its direct contribution to the country's GDP which in 2013 was 4.2%, translating to ETB 35,766.6M and 9.4% of total economy in 2018 which contributed ETB 214,600M (World Travel and Tourism Council's 2019)

This primarily reflects the economic activity generated by industries such as hotels, travel agents, airlines and other passenger transportation services. But it also includes, for example, the activities of the restaurant and leisure industries directly supported by tourists. (MoCT 2015)

However, the country experiences serious challenge is the Tourism Infrastructure referring to hotel's rooms and other tourism facilities such as restaurants. This is as a result of the country having very few hotel rooms by international comparison. (MoCT 2015)

The availability and quality of these facilities and services remain a major challenge facing the country in its effort to develop as a globally competitive destination. The country, for instance, lacks a sufficient number of 5, 4 and 3 star rated facilities and those that are available are mainly concentrated in Addis Ababa. In fact, key destinations in the country, such as Lalibela, Aksum, Arba Minch and Gambela, experience inadequate accommodation facilities that could be of tourist standards. (MoCT 2015)

Though this situation is changing with a hotel construction boom being witnessed in most areas within the country, which is quite a welcome development, there is need to adopt a cautionary approach because there is lack of clarity on several issues. For instance, given scarcity of reliable data, several questions arise including: what is informing the current construction boom, whether there is a danger of over-supply, and whether there are any considerations about zoning issues. For instance, a number of hotel investors view the AU and UNECA as key markets in deciding

on hotel development. However, majority of the meetings held in these two venues tend to be seasonal and sometimes unplanned. (MoCT 2015)

In terms of the available number of hotel rooms, Ethiopia is ranked 134 out of 140 economies globally compared to Kenya, Uganda and Tanzania at positions 122, 121 and 118 respectively. This indicates the existence of sizeable demand for good quality accommodation facilities throughout the country ranging from non-rated or unclassified to 5-star ones. There is need for a strategy to guide and inform the development of such infrastructure, which could, for example, detail the number, type and class of accommodation facilities required in different parts of the country for which necessary incentives could be availed. This includes investor support, infrastructural support, legal support and so on. (MoCT 2015)

Furthermore, the quality and standards of existing accommodation facilities on the whole, continue to pose a major challenge throughout the country given the constraints in reinforcing the classification system. This raises questions concerning the control of the quality of accommodation facilities and services in the country (MoCT 2015)

2.2 Determinants of efficiency

Unfortunately, economic theory does not supply a theoretical model of the determinants of efficiency'. However, Caves and Barton (1990) and Caves (1992) developed a strategy to identify the determinants of efficiency cited in Gumbau and Maudos (2002) for the manufacturing industry, but as Sigala (2002) questioned whether productivity and efficiency should be approached differently in services and manufacturing, because in the knowledge era the distinction between products and services is blurred; services are increasingly being industrialized while products informalized. These determinants are:

- ✓ Factors outside the company, such as the degree of competitiveness in the market where the company operates.
- ✓ Characteristics of the company such as the company size, type of organization, intensity of investments made and benefits of localization.
- ✓ Technological improvements that stimulate the growth of efficiency in the analyzed sector.

- ✓ The number of stars which captures the quality of the services provided

Regarding the first factor above, competitiveness is measured by the market concentration (company's sales divided between the four main competitors' sales). Authors such as Carlsson (1972) and Caves and Barton (1990) have mentioned that the presence of competitors increases the diffusion of information and technical knowledge that could be considered a source of expertise, which can then increase the efficiency of agents participating in the market. A negative relationship between efficiency and market concentration might be expected because firms with smaller market power might develop strategies for differentiation or innovation to change their competitive positions, whereas firms with large market power do not need to alter their market conditions. A positive relationship between efficiency and market power could be obtained if firms experience a high level of competitive intensity and, in this case, all the stimuli to carry out these strategies disappear when those potential gains are captured by their competitors. An example of this measure for the services industry is the article of Lee (2012).

The second factor is related to analyze whether there are differences in efficiency as a function of the size. Business size is related to the scale of operations if, as according to Thomas and Long (2001), it is assumed that maintenance or improvement in manager performance requires a certain level of costs. This cost is not proportional to the firm's output, but on the contrary: the larger the size of the firm the lower the unit cost in terms of the firm's management (Caves, 1992). Size is measured as the number of rooms.

The third factor is related to technological improvements that stimulate the growth of efficiency in the analyzed sector. A positive relationship is, therefore, expected between gross capital formation and technical efficiency. In order to capture the effects on the efficiency of each hotel that may be caused by factors such as the greater availability of services, intermediate information channels or productive inputs which may encourage efficient use of productive resources,

The fourth factor is related to the number of stars which captures the quality of the services provided.

2.3 Measuring Business Performance

The issue of efficiency has been guiding aspects of all human activities from the very beginning of time. The limitation and scarcity of the resources at humans' disposal in every field causes the inability to fulfil all needs simultaneously and enforces making optimal decisions and economic choices. Therefore, the issue of the efficiency and methods of measurement are very importance. Measuring performance can be defined as a process "where performance is correlated with actions converted into numbers" (ul-Arifeen, 2014) and includes both financial and non-financial indicators (Amiry and Kumaraswamy, 2012) that can also seek to identify causal links among measures, strategies, and outcomes (Sainaghi, 2013).

The concept of measuring business performance has been very broad (Zigan and Zeglat, 2010). Sin, Tse, Heung, and Yim (2005) suggested that two broader concept performance included either how well the hotel does against its competition or how well it does against internal established goals

Following Lovell (1993), the productivity of a production unit can be measured by the ratio of its output to its input. However, productivity varies according to difference in production technology, production process and differences in the environment in order its contribution to productivity.

Producers are efficient if they have produced as much as possible with the inputs they have employed and if they have produced that output at minimum cost (Greene,1997). It is important, however, to be aware that efficiency is only one part of the overall performance; as reported in the figure I a complete analysis also involves the measurement of effectiveness, and the degree to which a system achieves its policy objectives in terms of outcomes accessibility, quality and appropriateness (Worthington and Dollery,2000)

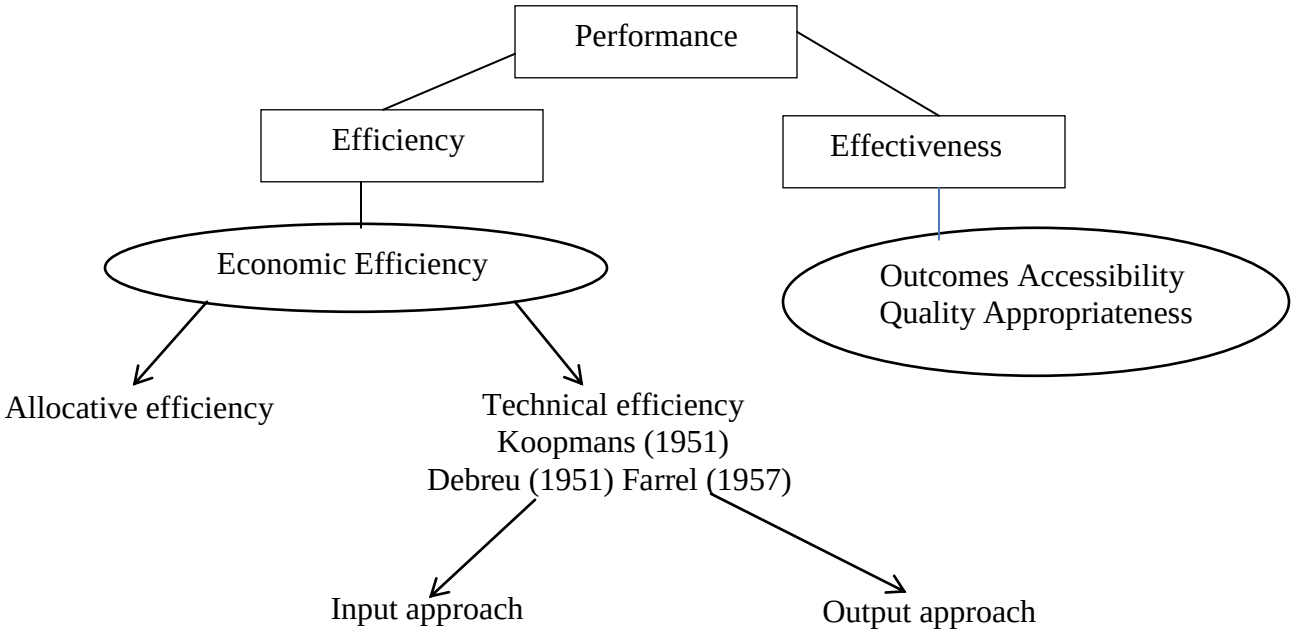


Figure 1: Framework for performance assessment

Source: Francesco Porcelli – Measurement of Technical Efficiency

2.4 Selected definitions of efficiency in economics

Efficiency may be understood in various ways by different authors and Justyna Kulik 2017 complied the definition efficiency as follows.

Efficiency is most commonly interpreted as the relation of achieved results to the expenditure incurred for their production which constitutes a special case of the efficiency relation. Therefore, the issue of efficiency can be recorded with the following mathematical equation:

$$H = \frac{Q}{N}$$

In which: Q denotes the value of the economic effect being obtained, and N denotes the value of expenditure incurred for obtaining the intended effect. The effects and expenditure should be expressed with specific values. The formula for the efficiency calculation quoted above is the general efficiency ratio.

Efficiency means the use of economic resources in a way that is the most effective, and the economy works efficiently if it is located on the edge of production possibilities, while the production of one good cannot be increased without decreasing the production of another good.

Efficiency in the briefest summary means the lack of waste. It is the use of economic resources to maximizes the level of possible satisfaction, the net profit of their use, the relation of the outcome to the input or as an evaluation criterion of organizational efficiency by people who use its resources. Efficiency is defined as the relation between an organization's resources (input variables) and its effects (output variables).

While discussing efficiency it is impossible not to mention the so called Paretian efficiency, also called Pareto's optimum or optimum in Pareto's sense. The name derives from the Italian economist and sociologist, Vilfred Pareto (1848-1923). An economy is efficient if the production of one good is impossible without decreasing the production of other goods, or in other words, efficiency is the improvement of the situation of certain people without the simultaneous deterioration of another people's situation.

2.5 Efficiency analysis in the Hospitality Sector

In a globalized and highly competitive environment, as the tourism sector, it is essential that companies identify the relationship between the results obtained and the resources used, as well as to know the degree of efficiency of each company within the sector (Ibarrondo-Dávila, María Pila and Pérez-López, Gemma, 2018). Tourism is configured as a standardized product, difficult to differentiate, so cost control plays a fundamental role in the search of competitiveness. However, the reduction of costs must be achieved without reducing the quality required by customers, so that efficiency becomes a key factor in the competitiveness of the hotel company. Indeed, the efficient use of productive resources represents a strategy that allows the company to improve its profitability and competitiveness. Although productivity usually refers to the relationship between production and the productive factors used to obtain it, efficiency requires the use of the optimal combination of inputs and outputs in the transformation process

2.6 Measurement of Production Efficiency

The methodology behind efficiency measurement begins with the work of Farrell (1957). Farrell introduced the notion of relative efficiency in which the efficiency of a particular decision-making unit (DMU) may be compared with another DMU within a given group. Farrell identified three types of efficiency, technical efficiency, allocative efficiency (referred to by Farrell as ‘‘price efficiency’’), and economic efficiency (referred to by Farrell as ‘‘overall efficiency’’)

2.6.1 Technical Efficiency

Technical Efficiency (TE) measures the ability of a DMU to produce the maximum feasible output from a given bundle of inputs or produce a given level of output using the minimum feasible amounts of inputs. The former definition is referred to as output-oriented Technical Efficiency, whereas the latter definition is referred to as input-oriented Technical Efficiency.

2.6.2 Allocative Efficiency

Allocative efficiency (AE) measures the ability of a technically efficient DMU to use inputs in proportions that minimize production costs given input prices. Allocative efficiency is calculated as the ratio of the minimum costs required by the DMU to produce a given level of outputs.

2.6.3 Economic efficiency

Economic efficiency (EE), also known as cost efficiency, is the product of both Technical Efficiency and Allocative Efficiency (Farrell, 1957). Thus, a DMU is economically efficient if it is both technically and allocatively efficient. Economic efficiency is calculated as the ratio of the minimum feasible costs and the actual observed costs for a DMU.

2.7 Methods of Measuring Technical Efficiency

The efficiency measures proposed by Farrell assume a known production function for the fully efficient DMU. The production function of a DMU is generally unknown in practice, and relative efficiencies must be measured from the sample data available. Two approaches are used to

estimate relative efficiency indices: the parametric approach and the nonparametric or DEA approach (Coelli, 1995).

2.7.1 The Parametric Approach

The parametric Approach are most commonly used to describe models with a homogenous and precisely specified structure. The number of estimated parameters depends on the model's structure. These Approach are based on the production function and assuming suitable assumptions to it. It is the production function that determines the relation between input and output. In reality, however, it is very difficult to identify all the possible combinations of input and output and define the mathematical form of the production function. The interpretation of the production function in the case of subjects belonging to public areas or non-profit organizations, e.g. hospitals, public colleges, schools, banks, is problematic as well. For an evaluation of such subjects' efficiency, the non-parametric methods that do not require the knowledge of the production function and have more flexibility are most commonly used. They are used in the case of models with a less complex structure. Among the parametric Approach, the stochastic frontier approach (SFA), the distribution-free approach (DFA) and the thick frontier approach (TFA) are common ones [Justyna Kulik 2017].

2.7.1.1 The Stochastic Frontier Approach (SFA)

A stochastic frontier production model proposed by Battese and Coelli (1995) in accordance with the original models of Aigner, Lovell and Schmidt (1977); and Meeusen and van den Broeck (1977). These models are characterized in that they are predominantly concentric, which consist of a suitably specified microeconomics function of production or cost for the logarithms of these variables and two random components. One of these random components (symmetrical to zero) shows the effect of random factors and measurement errors. On the other hand, the second (asymmetric and fixed sign) models show potential inefficiencies.

Stochastic boundary analysis allows describing relationships in a given industry by comparing expenditures and the effects of business activity, taking into account two components in the data: random factor and inefficiency. The Stochastic Frontier Approach is a method used in benchmarking. It is applied to holistic methods, mainly used to evaluate the overall activity of a particular enterprise by determining the relationship between inputs and outputs. SFA is a

boundary method based on the assumption that all units are capable of operating at a certain level of efficiency. This Technical efficiency and the methods of its measurement level is a boundary level and is determined by the model, effective units of the sector. These units are a reference to others and point to the ultimate goal of improving their efficiency. These are so-called benchmarks that produce the best performance, which means that with the smallest inputs they deliver the best results or at the lowest cost. The SFA, because it is a parametric method for determining the function of production or cost, serves the functional form of limit values. Parametric methods require a more thorough knowledge of production and costs. The SFA estimates the effective cost or production taking into account the stochastic nature of the input data [Justyna Kulik 2017].

2.7.2 The Non-Parametric Approach

In order to measure technical efficiency, the non-parametric methods are used. Nonparametric Approach used in benchmarking include DEA (Data Envelopment Analysis), Corrected Ordinary Least Squares (COLS), and Stochastic Least Squares (SFA – Stochastic Frontier Analysis)

2.7.2.1 Data Envelopment Analysis (DEA)

Efficiency measurement has been a subject of tremendous interest as organizations have struggled to improve productivity for many years. Early works by Koopmans in 1951 and Debreu in 1951 (Osman, Anouze, and Emrouznejad, 2014) were foundational attempts to define and measure economic efficiency. Farrell (1957), in his classic work argued that, important to both economics and policy makers, was the ability to measure the productive efficiency of an industry through empirical testing and actual efficiency measurements. Previous failures to solve this problem were due to an inability to combine the measurements of multiple inputs into any satisfactory measure of efficiency (Farrell, 1957).

Building on Farrell's original concepts, Charnes, Cooper, and Rhodes developed a model that addressed the deficiencies of Farrell's earlier work (Cook and Seiford, 2009). This method introduced the idea of a data envelopment model (DEA) that used linear programing methods to construct a non-parametric, piecewise linear frontier (Barros, 2005; Coelli, Rao, O'Donnell, and Battese, 2005; Cook and Zhu, 2013; Fukuyama and Weber, 2009). Its goal was to employ a mathematical programming approach to the construction of production frontiers, the

measurement of efficiency in developed frontiers (Barros, 2005) and a new way for "estimating external relations from observational data" (Charnes, Cooper and Rhodes, 1978,). The development of measuring the efficiency of decision-making units (DMUs) in the Charnes, (1978) model was focused on decision-making for non-for-profit entities where data was not readily weighted by reference to market prices or other economic measures such as costs.

Since Charnes,(1978) seminal work on economic and production theories, many different DEA models, and their corresponding real-world applications have continued to appear in the literature (Banker, Cooper, Seiford, Thrall and Zhu, 2004; Osman, et al., 2014; Zhu, 2000).

Since its original introduction in the not-for-profit industry, DEA has been widely applied to various industrial sectors including banks, electric utilities, textile industry, hotels, and industrial management organizations (Zhu, 2000).

2.7.2.1.1 Benefits of DEA

The value of DEA's use of mathematical programming was derived from its ability to estimate inefficiencies or performance, and compare them against peer or a combination of peers to individual decision making units (DMUs) by using multiple inputs and multiple outputs (Zhu, 2014a). Inherently, DEA has the ability to guide organizations to be more efficient, reduce operating costs, and improve profitability in ways that are not possible with other methods although it is fully complementary to these other methods (Fuchs, 2004; Liu, Lu, Lu, and Lin, 2013; Paradi and Sherman, 2014). It has been shown that DEA can be used to generate a multi-factor financial performance model that inherently recognizes tradeoffs among various financial measures (Zhu, 2000).

DEA allows each unit to identify a benchmarking group; that being, "a group of units that are following the same objectives and priorities, but performing better" (Amado, Santos, and Marques, 2012, p. 391).

Another strength of DEA according to Johns, Howcroft, and Drake (1997, p. 122) is that it "can use any type of measurement quantity to make its comparisons and is not limited to monetary units." It is a multivariate technique that can handle several different inputs and outputs at the same time (Johns, et al., 1997).

2.7.2.1.2 DEA Limitations

There are some inherent weaknesses of DEA including sensitivity to the choice of inputs and outputs, confusion of significant insights, influence of sample sizes on findings, and irrelevant weighting. For example, if data was initially omitted and then added, it could change the entire results (Brown and Ragsdale, 2002). Also, "overall measures of performance tend to be summarized well but can also conceal ambiguous" but important information for decision makers (Amado, et al., 2012, p. 391). DEA efficiency scores are sensitive to sufficient size and input-output mix (Mohamad and Said, 2012). For example, when the comparison of the number of DMUs was small relative to the total number of variables in the analysis there was a "lack of discrimination" among efficient DMUs (Angulo-Meza and Lins, 2002, p. 225). The weighting of variables can also be unrealistic, giving disproportionate and less important variables more weight (Angulo-Meza and Lins, 2002).

DEA identifies best practices rather than a best percentage or average estimation making this technique "very sensitive to extreme observations" and a departure from many of the statistical research methods that are more common such as market orientation, market share or profitability (Haugland, Myrtveit, and Nygaard, 2007, p. 1194). DEA can report how well one DMU was doing compared its peers, but not compared to a theoretical maximum (Fuchs, 2004).

The value of DEA lies in its capability to relatively evaluate the individual efficiency or performance of a decision making unit (DMU) within a target group of interest that operates in a certain application domain (Johns, et al., 1997; Liu, et al., 2013). Inputs and outputs are changeable due to a variety of external forces (like weather, the state of operations, etc.), and because DEA was sensitive to outliers, it was very difficult to evaluate the efficiency of DMUs in the traditional method (Guo and Tanaka, 2001).

2.7.2.1.3 DEA in Hotels

Industries have adopted DEA for a variety of reasons from evaluating management to a basis for reallocating resources, and because of its popularity, researchers have found it difficult to keep track of its development (Liu, et al., 2013). Recent research has measured the efficiency of the hotel industry using many different forms of DEA. The hotel industry, like other service industries that produce no tangible wealth in the economic sense and rely on the value added by

total service, find it difficult to measure value. This phenomenon was unlike the comparatively tangible assets that are easier to determine in industries like manufacturing (Johns et al. 1997). In the hotel industry, various DEA models have been used to analyze the operational efficiency of hotels. Botti, Briec, and Cliquet's (2009) and Perrigot, Cliquet, and Piot-Lepetit's (2009) studies used DEA to measure efficiency between hotels in companies that are either completely franchised, completely company owned or a combination of both and found that the companies with mixed franchise and owner hotels performed better. Brown and Ragsdale (2002) used DEA to investigate market efficiency with results that showed that more efficient hotels had less customer complaints and higher perceived value than those less efficient. Hu and Cai (2008) used DEA to measure hotel labor productivity and established a set of benchmarking hotels for less efficient hotels to emulate. Johns, et al., 1997 also looked at productivity using DEA for 15 hotels and found that all of the hotels under study performed with similar efficiency.

Measuring efficiency and productivity are standard in hotel management activities. Productivity can be defined as the ratio of outputs over inputs that yield a measurement applicable to any factor of production (Barros, 2005; Johns et al.1997), and because of that ratio, productivity is a different concept than efficiency.

As with other service industries, the hotel industry finds productivity research with an emphasis on labor productivity useful and DEA of particular interest (Fuchs, 2004). This situation has not been surprising given that the industry continues to face high labor costs and the need to improve productivity (Brown and Ragsdale, 2002). While the hospitality and tourism industry face all the problems of productivity that other industries face, it was more pronounced because productivity directly impacts value, quality, and service, which are more central to hospitality's success than they are to other industries like manufacturing (Fuchs, 2004; Johns et al. 1997).

2.7.2.1.4 Profitability and DEA

Measuring the labor portion of productivity or the ratio of labor inputs and service outputs continues to be a priority regardless of the dynamic nature of the hospitality and tourism industry business cycles (Hu and Cai, 2008). The importance of labor productivity in the hotel industry and its impact on profit and loss can be readily illustrated by the dominance of labor costs, estimated by some at 33 percent of total revenues (Hu and Cai, 2008).

While productivity is a central focus, there are other applications – such as benchmarking and profitability – found throughout the hospitality and tourism literature that have examined various models of DEA. One reason that DEA has become more popular in the hotel industry, even beyond productivity, has been its ability to convert multiple inputs and outputs into a single performance measure which allows benchmarking capabilities between comparable units within a segment (Hu and Cai, 2008). While the number of studies using DEA in the hospitality industry has been increasing, it remains a relatively small number compared to other industries.

Overall performance measurement is critical to the hotel industry (Barros, 2005). Reliable measures are key to improvement efforts and strengthen competitive advantage (Luo, Yang, and Law, 2014). Many previous studies have used various ratio analysis to evaluate hotel and employee performance; however, these ratio models cannot deal with the multi input and output settings characteristic of the hotel industry (Botti, et al., 2009; Shang, Wang and Hung 2010). When the behavioral objective was profit maximization, both DEA models and other non-parametric methods can be applied to measure overall profit efficiency (Asmild, Paradi, Reese, and Tam, 2007).

In any DEA application, the outputs should reflect the business goals and the inputs should be the required resources for achieving those goals (Neves and Lourenco, 2009). A challenge of using DEA in the hospitality and tourism industry was that while output measures including room nights and restaurant covers are easy to measure, quality of output was extremely difficult to measure (Johns et al. 1997). This was primarily true because quality was often defined in the mind of the customer, and the industry must rely on intermediaries like questionnaires for measurement (Johns et al. 1997). Using financial and non-financial performance measures of effectiveness addresses these challenges.

2.8. Empirical Evidence

The hospitality management literature attracts consistently increasing research interest during the past two decades (Jang and Park, 2011), with emphasis on quantitative analyses for risk management, capital structure, financing and bankruptcy. Sainaghi (2010), reviewing 152 literature contributions measuring the performance of hotel business and its determinants in the last 20 years, identifies four main operational areas: strategy, production, marketing and

organization. Within this literature, the measurement of hotel efficiency using the DEA methodology constitutes a certain line of research as presented below

Barros (2005) estimates the overall efficiency and pure technical efficiency indices of hotels in the Portuguese state-owned chain of Pousadas de Portugal. He finds that the majority of hotels in the sample is efficient, identifies the input and output slacks of the inefficient hotels. Input was measured by three indicators: labor cost , the number of full-time-equivalent employees, and capital (measured by the book value of the assets) and Output was measured by using three indicators: sales, added value, and earnings

Hwang and Chang (2003) study the overall efficiency evolution in 45 hotels operating either as independent or belonging to international chain hotels in Taiwan. Their findings suggest that hotels belonging to international franchise-chains are more efficient than independent hotels. Input was measured by using four indicators: number of full-time employees, number of guest rooms, total dimension of meal department and operating expenses. The output was measured by using three indicators: room revenue, food and beverage revenue and other revenue

Chiang (2004) examine the relative pure technical efficiency of 25 hotels in Taipei, under three operational styles: independently owned and operated, franchise licensed, and managed by international hotel operators. They find that the franchised hotels and those managed by international operators perform more efficiently than the independently operating ones. The model considered four input (hotel rooms, food and beverage capacity, number of employees and total cost) and three output (yielding index, food and beverage revenue and miscellaneous revenue)

Wu (2011) use a non-radial DEA model to evaluate the operational efficiency of 23 four- and five-plum international tourist hotels in Taipei. He find that nearly one-third of the hotels (8 of 23) were inefficient; and suggest a strategic managerial direction to improve efficiency by focusing on increasing outputs while holding inputs steady. The model considered four inputs (total number of rooms, total number of employee, food and beverage capacity and total operating cost) and three outputs (guest room revenue, food and beverage revenue and other revenue)

Lee (2011), using DEA and Malmquist productivity indices, analyze the efficiency of international hotels in Taiwan during 2005-2009. They find that these hotels did not operate at the optimal scale and suggest specific input and output adjustments for their production efficiency enhance. The Model considered five input (number of full-time employees in the room service department, number of full-time employees in the food and beverage service department, number of rooms, total floor area in the food and beverage service department and total expenses for each service sector) and three output (total revenue generated from rooms, total revenue generated from food and beverages and other revenue)

Fu (2011) implement a cross-efficiency DEA methodology with 8 indices for measuring the performance of 57 Taiwan hotels and argue that this methodology can provide more accurate results about hotel efficiency.

Hokey (2008) develop balanced scorecard DEA models to measure the efficiency of six hotel chains in Korea during 2001-2003. They argue that DEA models are a useful tool, helping hotel management to evaluate business strategies for comparative advantages and suggesting managerial implications to increase hotel efficiency.

Neves and Lourenco (2009), in a worldwide sample of 83 hotels, investigate whether DEA can be used as a tool for strategic analysis in hotel management. Their main conclusion is that hotels perform better under a focus strategy rather than one focusing on a diversification strategy. They further argue that managers should concentrate on productivity improvements through changes in the input/output configuration and reductions in hotel size. Input used were 83 hotel companies not hotel units and output used total revenue and EBITDA (Earning Before Interest Tax Depreciation and Amortization)

Perrigot (2009) evaluate the relative technical efficiency among hotel chains in France and found that the predominantly company-owned chains and the plural form chains are both technically efficient, in contrast to the predominantly franchised hotel chains.

Manasakis, C., Apostolakis, A., and Datseris, G. (2013). Evaluate the relative technical efficiency among hotel chains in Crete, Greece and nationally branded hotels are relatively the most efficient; internationally branded are the least efficient, while those operating under a local brand and the independent ones lie in between. Input was measured by using three

indicators(number of employee, number of bed and total operational costs and output was measured by using total revenue and total number of night.

Researcher didn't come across any research paper done on efficiency of the hotel using DEA in Ethiopia to be include in this literature. However, the researcher found out the following thesis related efficiency on different industry.

Emishaw Beletew (2016) Determinants of Commercial Banks' Cost Efficiency in Ethiopia:- A Stochastic Frontier Analysis

Yitay Elema Boru(2011) Assessment Of Institutional Performance and Sustainability of the Selected Microfinance Institutions: A Data Envelopment Analysis Approach.

Abdu Kedir Seid(2006) Technical Efficiency of the selected Hospitals in Addis Ababa A Data Envelopment Analysis Approach

As compared to the relevant literature, this thesis is suggesting that the hotels operating under international brands perform efficiently than the local hotels, which is similar to the find of Hwang and Chang (2003) and Chiang (2004) in Taiwan, and in contract with the finding from Manasakis(2012) in Crete(Greece). This may happen because of lacks a sufficient number of 5, 4 and 3 star rated facilities compare to Crete.

All of these studies showed varying results. Hence, it is of high interest to examine hotel efficiency in Addis Ababa. Therefore, this study therefore intended to fill this gap evaluating hotel efficiency in Addis Ababa and more specifically to compare the independently operating hotels' efficiency with the respective for those operating under international brand in a local context through analyses of inputs and outputs and suggesting managerial implications for increasing hotel efficiency.

The following table illustrated summary of input and output studies in hospitality.

Table I Summary of Input and Output Studies In Hospitality

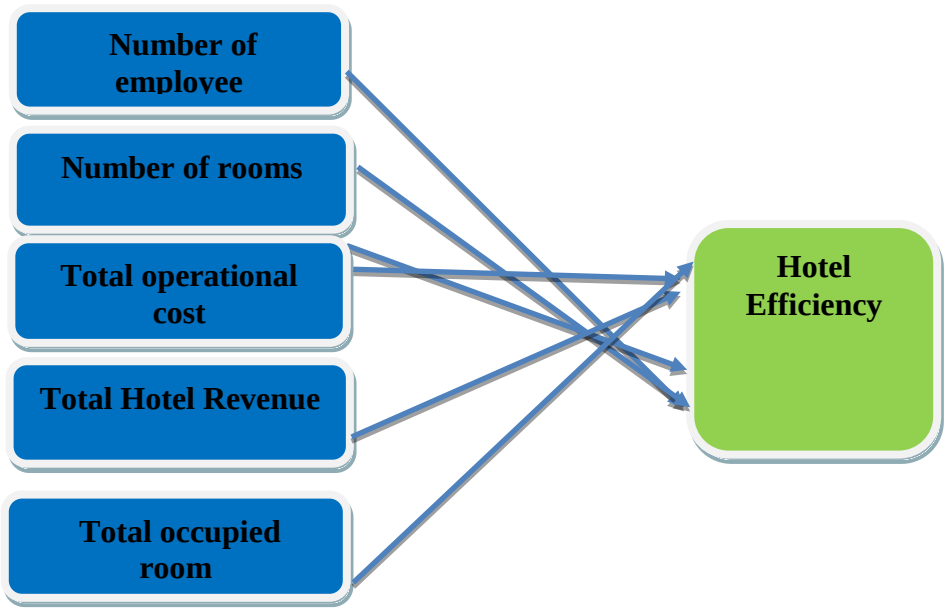
Study	units	Inputs	outputs
Banker and Morey (1986)	60 Restaurants	Supplies and materials expenditures; labor expenditures; advertising expenditures; age of the store; location of the store	Sales
Morey and Dittman(1995)	54 USA hotels	Room division expenditure; energy costs; salaries; non salary expenditure for property; salaries and related expenditure for advertising; non salary expenses for advertising; fixed expenditure for administrative	Total room revenue; level of service delivered; market share; rate of growth
Johns, Howcroft, and Drake (1997)	15 UK hotels	Number of room nights available; total labor hours; total food and beverage costs; total utilities cost	Number of room nights sold; total covers served; total beverage revenue
Anderson, Fish, Xia, and Michello(1999)	48 USA Hotels	Number of full-time equivalent employees; number of rooms; total gaming-related expenditure; total food and beverage expenses; other expenses	Total revenue
Anderson, Fok,and Scott (2000)	48 USA hotels	Number of full-time equivalent employees; the number of rooms, total gaming-related expenses; total food and beverage expenses; other expenses	Total revenue
Reynolds (2003)	38 Restaurants	Front-of-house hours worked per day during lunch time; front-of hours worked during dinner per day; average wages; uncontrollable input; number of competitors within a 2-mile radius; seating capacity	Sales; customer satisfaction
Hwang and Chang (2003)	45 Hotels in Taiwan	Number of full-time employees; number of guest rooms; total dimension of meal department; operating expenses	Room revenue; food and beverage revenue; other revenue
Chiang, Tsai, and Wang (2004)	25 Taipei hotels	Hotel rooms; food and beverage capacity; number of employees; total cost	Yielding index; food and beverage revenue; miscellaneous revenue
Sigala (2004)	93 UK hotels	Number of full-time employees for each service; number of part time employees; total expenses for each	Room occupancy; room rate; percentage of hotel revenue corresponding to

		service sector; management fees	the departments
Barros and Mascarenhas (2005)	43 Hotels in Portugal	Number of full-time employees; book value of the assets; number of rooms	Sales; number of guests; number of nights spent
Botti, Briec, and Cliquet (2009)	15 hotels chains in France	Costs; territory coverage; chain duration	Sales
Yu and Lee (2009)	57 Hotels in Taiwan	Number of full-time employees in the room service department; number of full-time employees in the food and beverage service department; number of rooms; total floor area in the food and beverage service department; total expenses for each service sector	Total revenue generated from rooms; total revenue generated from food and beverages; other revenue
Barros, Botti, Peypoch, and Solonandrasana (2011)	15 Hotels in Portugal	Number of full-time workers; book value of property; operational costs.	Sales; number of guests,

Source: Measuring efficiency in the hotel sector (Baros 2005)

2.9 Conceptual Framework

Based on the existing theories and ideas in the literature, the research formulated an inclusive research framework.



Source: self-extracted based on literature review

Figure 2. Conceptual Framework

CHAPTER THREE

METHODOLOGY

This chapter discusses the methodologies that have been used in this study: the research design, procedures of data collection, methods of data analysis and ethical considerations along with an appropriate justification associated with each approach

3.1 Research Design

Research Design refers to the framework into which the research fits depend on the theory and nature of the research problem. This is underpinning all the research activities (Walliman, 2016). This study explores issues and reports to measure efficiency of the hotels by combining financial and non-financial data disregarding the classical performance measurement tools.

According to Creswell (2003), there are three research designs. These are – Qualitative, Quantitative, and Mixed designs.

Quantitative approach uses statistical methods in describing patterns of behavior and generalizing findings from samples to population of interest. Quantitative research approach has two types of research design – Survey and Experimental (Creswell, 2003). A survey design provides a quantitative or numeric description of trends, attitudes, or opinions of a population by studying a sample of that population. From sample results, the researcher generalizes or makes claims about the population (Creswell, 2003). This study adopt a quantitative research approach by using a primary data source.

Research can be categorized into different types depending on the nature of the purpose or research problem. The purpose of the academic research can be exploratory (ambiguous problem), descriptive (aware of problem), or explanatory (clearly defined problem) (Yin, 1994; Zikmund, 2000).

Explanatory designs try to establish cause-and-effect relationships. The primary purpose of explanatory research design is to determine how events occur and which ones may influence particular outcomes (Dawson and Bob 2006). Explanatory studies are characterized by research

hypotheses that specify the nature and direction of the relationships between or among variables being studied. Hence, DEA cannot perform hypothesis testing alone, as compared to regression analysis that can find the relationship between variables. However, DEA can be utilized for hypothesis testing by connecting other analysis methods. For example, the efficiency evaluated by DEA can be considered as a dependent variable; the independent variables are then included in the model for further regression analysis. (Han-Shen Chen 2018)

Therefore, this study uses only explanatory method in order to measure efficiency of the hotels by combining financial and non-financial data disregarding the classical performance measurement tools.

3.2 Population and Sampling

3.2.1 Target Population

In DEA, the data set used for any given study is the entire population. In this study, the entire population is hotels in Addis Ababa, Ethiopia. It has a quality supply of 78 hotels and a total of 5,167 keys currently in the market, giving an average number of 67 rooms per hotel. (Ministry of Culture and Tourism 2015) The elements of the population under investigation in a DEA study are referred to as Decision Making Units (DMUs).

3.2.2 Sample Design and Size

While there are no hard rules on the optimal number of DMUs appropriate for a DEA study, the popular guideline for the size of the data is that the number of DMUs should be at least twice the number of inputs and outputs combined (Zhu, 2014b). Therefore, at least 10 hotels were required for this study.

In order to conduct the survey out of hotels in Addis Ababa, purposive sampling was used to conduct the survey. As the study focused efficiency of hotel among international brand and local hotels, identifying which star rated hotels belongs to international brand and local hotel was crucial. As per the list of hotels in Addis Ababa, most of international hotel are five star-rated. However, the number of five-star hotels were not suffice as per the popular guideline for the size of the data. Therefore, four star rated hotels were included in this research.

From the 20 five- and four-star hotels, the respondent were only 15 hotels. This represents 75% of five- and four-star hotels in Addis Ababa which were rated by ministry of culture and tourism. However, this study has met the general guideline for size.

Because of a confidentiality agreement with the company that manages the hotels used for this study, the hotel's exact locations and specific brands cannot be disclosed.

3.3 Model Specification

There are several researches conducted using DEA techniques to evaluate the performance and / or efficiency of hotels, bank schools and utility facility institution based of Joe Zhu model. The DEA model employs mathematical programming to measure production, which in this study is efficiency of the hotels by combining financial and non-financial data disregarding the classical performance measurement tools.

DEA was chosen for this study because while traditional business models typically focus on one performance measurement like profit, DEA considers multiple metrics simultaneously (Zhu, 2014a). Using a more traditional linear or parametric method like regression analysis could generate a production function for a given data set but has three important disadvantages (Rickards, 2003).

First, it was assumed that all observations input their factors in the same way, but the business practice does not follow this expectation (Rickards, 2003).

Second, regression analysis can only determine an average which may not represent any individual unit result, prohibiting it from providing specific benchmarks (Rickards, 2003).

Third each equation can only analyze one output at a time, causing the researcher to repeat the regression analysis a number of times equal to the number of outputs required by the study (Rickards, 2003).

DEA has none of the disadvantages associated with a linear regression approach and it focuses on an efficiency frontier rather than a line fitted through the center of the data. Linear regression can also hide relationships that are discoverable with DEA (Zhu, 2014b). DEA methods focus on individual performance of each DMU integrating specific benchmarking measures (Sherman and

Zhu, 2013), generating a composite based on those measures and providing a benchmark set of DMUs (Zhu, 2014a).

If the DMUs input-output combination lies on the DEA frontier, it is considered efficient, and conversely if it lies off the frontier, it is considered inefficient. Thus, the ultimate objective of DEA is to determine which DMUs are operating on their efficiency frontier (i.e. achieve an efficiency of one) and which are not (Johns, et al., 1997).

The frontier was a series of points, a line, or a surface connecting the most productive units, determined from the comparison of inputs and outputs of all units under consideration. DEA then calculates a productivity score for all other units producing similar outputs that are not on the isoquant (Hu and Cai, 2015). A facet was considered the relevant part of the efficiency frontier and enables analysis to identify the efficient versus inefficient DMUs (Johns et al., 1997). Ultimately the model "floats a piece-wise linear surface to rest on the top of the observation," and efficiency is defined by the facets on the plane, and the degree of inefficiency was determined by measuring distances using a series of metrics (Barros, 2005) and shown in DEA output as sum lambda. DEA answers both the questions of "how well a unit is doing" and "which dimension and how much the unit could improve" (Sigala, 2008, p. 43). The measure of where an inefficient DMU was and the distance it must travel to become efficient was known as slack (Agarwal, Yadav, and Singh, 2011).

3.3.1 The measurement of efficiency through the CCR and the BCC index

Efficiency, in the DEA context, deals with the optimization of the resource allocations among alternative uses. DEA yields a linear production surface, which, in economic terms, represents the best production possibility frontier. By projecting a DMU to this frontier and comparing it with a single reference unit or a convex combination of other reference units, the DMU's efficiency is estimated.

In the context of the hospitality market, a DMU is a hotel which transforms multiple resources (e.g. number of Rooms; facilities; employees) into multiple hospitality services (e.g. Accommodation; food and beverage; leisure) in order to achieve its outputs (e.g. percentage of occupancy; revenues; profits). A DMU is rated as fully (100 percent) efficient, if and only if the performance of at least one other DMU does not show that some of the DMU's inputs or outputs

can be improved without worsening some of its other inputs or outputs. Then, DEA estimates the relative efficiency of each hotel, compared to those being fully (100 percent) efficient, which constitute the reference unit. (Manasakis, 2013)

The first DEA efficiency index measures technical efficiency, i.e. the productivity of a firm due to the input/output configuration and the size of its operations (Sathye,2001). CCR (Charnes-Cooper- Rhodes) index was developed by Charnes (1978) and assumes constant returns-to-scale (CRS) production technology, that is, an increase in the inputs is followed by the same proportional increase in the outputs for all DMUs. The CCR index is calculated by maximizing the ratio of the weighted sum of outputs over the weighted sum of inputs for all units, according to the below equation:

$$0 \leq \frac{\sum_{r=1}^{s} U_r Y_{rj}}{\sum_{i=1}^{m} N_i X_{ij}} \leq 1$$

$$Max\, h_0 = \frac{\sum_{r=1}^{s} U_r Y_{r0}}{\sum_{i=1}^{m} N_i X_{i0}}$$

Where h0 is the efficiency score of the DMU under study; i ¼ inputs (i ¼ 1, 2, . . . ,m); j ¼ DMUs (j ¼ 1, 2, . . . , n); r ¼ outputs (r ¼ 1, 2, . . . , s); 0 ¼ unit under consideration; Xij is the i input of j DMU; Yrj is the r output of j DMU. The weights Ur and Ni are calculated as the values which have to be matched to each input and output variable in order to maximize the efficiency ratio of a DMU.Given a set of DMUs, the model determines for each DMU the optimal set of input weights and output weights which maximize its technical efficiency ratio h0.

From a managerial point-of-view, technical efficiency's significance can be interpreted twofold: Input-oriented technical efficiency that focuses on the possibility of reducing inputs to produce given output levels. Output-oriented technical efficiency that considers the possible expansion in outputs for a given set of input quantities.

Focusing on hotel management practices, the above argument implies that a hotel operates under technical efficiency if it is impossible to produce, with given managerial practices, a larger output from the same inputs or the same output with less of one or more inputs. Equivalently, a hotel operates under technical inefficiency if it is possible to produce, with given managerial practices, a larger output from the same inputs or the same output with less of one or more inputs

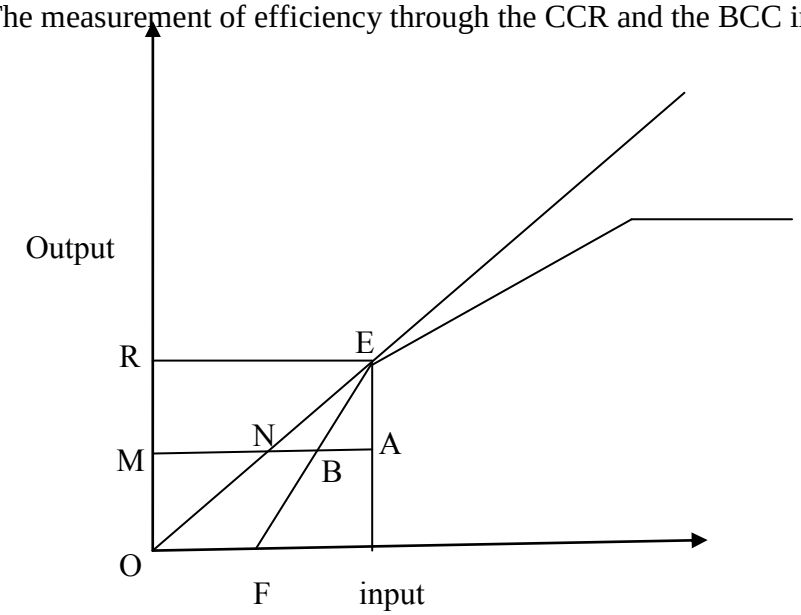
In DEA, the technical efficiency measure is decomposed into two parts: pure technical efficiency and scale efficiency. This decomposition allows an insight into the source of inefficiencies (Kumar and Gulati, 2008). A DMU is considered both scale and pure technically efficient, if its ratio h0 is equal to one. A score of less than one means that the DMU is inefficient and implies that a linear combination of other units from the sample could produce the vector of outputs using a smaller vector of inputs.

The second DEA efficiency index measures pure technical efficiency, that is, the managerial performance to organize the inputs in the production process. Hence, the pure technical efficiency measure is used as an index to capture inefficiencies due to managerial underperformance solely. BCC (Banker-Charnes-Cooper index) was developed by Banker (1984) and assumes variable returns-to-scale (VRS) production technology, that is an increase in the inputs is not followed by the same proportional increase in the outputs for all DMUs. Following Garcia Sanchez (2009), the main distinction between the BCC and the CCR models is the introduction of a parameter which relaxes the constant returns-to-scale condition by not restricting hyperplanes, defining the envelopment surface to go through the origin.

Dividing the CCR index with the BCC index gives the scale efficiency index, which measures the managerial ability in choosing the optimal resource size, which help to decide on hotels' size or in other words, to choose the scale of production that will attain the expected output level. Hence, this index reveals whether the production process is characterized by constant, increasing or decreasing returns to scale. For the one-input and one-output case, the derivation of technical, pure technical, and scale efficiency under DEA is illustrated in Figure 1 (Banker 1984). This Figure provides two efficient frontiers: one assumes constant returns-to-scale (technical efficiency index), shown by the line OO, and the second assumes variable returns-to-scale (pure technical efficiency index), shown by the line FBECD. Point A represents the DMU under study. The CCR index measures this DMU's overall technical and scale efficiency, by the ratio MN/MA, comparing point A to point N, which reflects the average productivity attainable at the most productive scale size represented by point E. The BCC index measures the same DMU's pure technical efficiency, by the ratio MB/MA, by comparing it with point B on the efficient production frontier with the same scale size as A. Finally, the scale efficiency of A is measured

by the ratio MN/MB, so that the overall technical and scale efficiency MN/MA is equal to the production of the technical efficiency MB/MA and the scale efficiency MN/MB.

Figure 3: The measurement of efficiency through the CCR and the BCC indexes



Source: Manasakis, (2013)

3.4 Data Collection Method

In the effort to address the stated problems then propose appropriate academic recommendation and conclusion, both primary and secondary data types have been used serving as the basic sources of information and knowledge required during the research/study.

3.4.1 Primary Data Collection

Primary data or raw data is a data collected on source which has not been subjected to processing or any other manipulation and are collected by the investigator conducting the research. The research obtained primary data from Hotels' financial statements.

3.4.2 Secondary Data Collection

Secondary data is data that has been previously prepared for a specific study or purpose by someone other than the researcher and being repurposed (Smith, 2008) for other uses including additional research. The rationales for using secondary data are the access to data at a much larger scale than may be possible by the researcher and access to data not easily replicable by the

researcher (Smith, 2008). All of the data related to star rating are secondary data from ministry culture and tourism.

3.5 Model inputs and outputs

The input and output variables were selected according to literature review, but also according to the accessibility of the data. Input variables are the ones that are used to produce services and output variables are seen as an outcome from the production process. According to the Uniform System of Accounts for the Lodging Industry (USALI), hotels are segmented into operating departments. Three main profit departments are recognized and include rooms, Food and beverage and other operated departments (American Hotel and Lodging Educational Institute, 2014). Hotel financial and non-financial information is used, and the variables include the following

The input variables used in the present study are the number of employees (measures the human resources in a hotel), the number of rooms and the total operational cost of a hotel (measure the capital inputs used), reflecting the required resources to achieve managerial goals.

The relevant output variables used are total revenues comprising of room revenue, food and beverage revenue and other sources of revenue (Anderson et al., 1999; Chiang et al., 2004; Barros, 2005; Barros and Mascarenhas, 2005; Neves and Lourenco, 2009; Pulina et al., 2010; Lee et al., 2011) The second output variable chosen was the total number of nights spent which is a fullness indicator (Barros, 2005; Barros and Mascarenhas, 2005; Sigala et al., 2005). Finally, the chosen variables were based on two criteria which were the literature survey and the data available.

CHAPTER FOUR

DATA ANALYSIS AND INTERPRETATION

4.1 Introduction

The selection of the sample for the purposes of this paper is based on a primary data collected from the hotels financial and non-financial figures. The year of study is 2017. The construction of the database followed certain criteria:

- Hotels facing similar seasonality patterns over the year
- Hotels belonging to the same quality classification (Five and Four stars)

The above criteria were selected in order to ensure a homogeneous sample and avoid erroneous findings about the efficiency of hotels. Note that the homogeneity of the hotels under analysis is based on the following, t

- ✓ They compete in the same market;
- ✓ have common operational periods
- ✓ homogenous quality of services

The analysis considered 4 hotels operating international brand hotels and 11 ones operating under local brand hotels. The sample of 15 hotels is an adequate size to apply the DEA, based on the literature reviewed above.

Regarding the input and output variables used in the present study, these were chosen to make this study's results comparable with the relevant literature. The variables which were chosen as inputs in the study reflect the required resources to achieve managerial goals. The number of employees measures the human resources in a hotel, number of beds and the total operational cost of a hotel measure the capital inputs used.

The variables which were chosen as outputs in the present study reflect broad managerial goals and objectives. The first output variable is total revenues, comprising of room revenue, food and beverage revenue and other sources of revenue. The second output variable chosen was the total number of nights spent which is a fullness indicator. Note that these two output variables are consistent since total revenues depend on the total number of nights spent.

4.2 Efficiency results

The relevant efficiency computations have been carried out using the "DEA-solver" software package. Technical, pure technical and scale efficiency scores for each hotel in the sample are presented in Table III below.

Table II Efficiency Score

Hotel	Operational Style	Technical Efficiency CCR Index	Pure Technical Efficiency BCC Index	Scale Efficiency	Rank
H1	International Brand	1	1	1	1
H2	International Brand	1	1	1	1
H3	Local Hotel	1	1	1	1
H4	Local Hotel	0.8597	0.9980	0.8615	3
H5	Local Hotel	1	1	1	1
H6	Local Hotel	0.7109	0.7320	0.9712	5
H7	International Brand	1	1	1	1
H8	International Brand	1	1	1	1
H9	Local Hotel	0.6557	0.6660	0.9845	7
H10	Local Hotel	1	1	1	1
H11	Local Hotel	0.8682	1	0.8682	2
H12	Local Hotel	1	1	1	1
H13	Local Hotel	0.7519	0.7564	0.9941	4
H14	Local Hotel	0.6416	0.7824	0.8201	8
H15	Local Hotel	0.6564	0.8854	0.7413	6

4.2.1 CCR Index

The third column illustrates the technical efficiency (CCR) index results. As mentioned earlier, this index measures the productivity of a firm due to the input/output configuration and the size of its operations. This index focuses on the possibility of reducing inputs to produce a given output level or equivalently, on the possible expansion in outputs for a given set of input quantities. This efficiency index is equal to 1 for eight hotels, all four international brand hotel and four local hotels, implying that they operate with relative 100% efficiency, as compared to the overall sample. All international brand hotels are efficient and partly local hotel are efficient. Local hotel number four, six, nine, eleven, thirteen, fourteen and fifteen have an efficiency of

86%, 71%, 66%, 87%, 75%,64% and 65% respectively. Hotels are identified as number in order to keep the confidentiality of the information.

4.2.2 BCC Index

The fourth column illustrates the pure technical efficiency (BCC) index results. As explained earlier, this index measures the productivity of a firm due to the managerial performance to organize the inputs in the production process. According to this index, nine hotels operate with 100%(including five local hotels) relative efficiency, in transforming their inputs to outputs, as compared to the overall sample. However, Local hotel number four, six, nine, thirteen, fourteen and fifteen have 99.7%, 73%, 66%, 76%, 78% and 86% efficiency in transforming their inputs and out puts respectively.

4.2.3 Scale Index

The last efficiency index illustrated in Table III is the scale efficiency index. The evidence on hand indicates that nine hotels of each operational management structure are 100% scale efficient. This index is the ratio of CCR with the BCC index. Hence, the empirical results tend to suggest that the main source of hotels' inefficiency is the input/output configuration.

4.3 Average efficiency result

The average technical efficiency, pure technical efficiency and scale efficiency results are presented in Table IV. According to the overall technical efficiency estimates (CCR index), international branded hotels operate at 100% efficiency level, holding the leading position in the relevant efficiency ranking. This is mainly due to brand name advantage and due to lack of sufficient five and four star rated hotels in the city. From a managerial perspective, this result implies that international branded hotels could maintain their inputs, while producing the given output levels.

The locally branded hotels follow closely by with an average of 83.13% overall efficiency level. Hence, local branded hotels are likely to sustain in the hotel market due to shortage of supply against the current demand, which will take five to seven years according to the assessment made by Calibra Hospitality and the plan of Ethiopian Tourism Organization. From a managerial

point-of-view, this suggests that these hotels could still produce the given output levels while reducing their inputs by 16.87% on average.

Qualitatively speaking, similar findings are reached when considering pure technical efficiency estimates (BCC index). More specifically, international branded hotels operate at a 100% efficiency level while the corresponding index for the locally branded hotels is 89.27%. The fact that for each hotel type, the overall technical efficiency index is lower than its pure technical efficiency index suggests that hotels' inefficiency cause is mainly due to the input/output configuration and not due to their management teams' performance to organize the inputs in the production process.

Regarding scale efficiency scores international branded hotels operate at 100% efficiency level. The Locally hotels operate 93.1%. The evidence above can be rationalized as follows: International branded hotels operate under high efficiency levels because they combine the advantages of international branding jointly with shortage of supply against current demand. However, hotels operating under local hotels seem to exhibit relatively low efficiency scores compare to international brand hotels because they have no branding potentials to exploit.

Table III Efficiency Score Statistic

Efficiency	Technical Efficiency CCR Index	Pure Technical Efficiency BCC Index	Scale Efficiency
International Brand			
Average	100%	100%	100%
Median	100%	100%	100%
Standard Deviation	100%	100%	100%
Local Brand			
Average	83.13%	89.27%	93.10%
Median	85.97%	99.80%	98.45%
Standard Deviation	15.30%	13.29%	9.20%

4.4 Slack Analysis

One of the most useful insights provided by the DEA is the set of target values for the DMUs' improvement through specific recommendations. Barros (2005) Said, "adjustments for the inefficient hotels can be identified for outputs and inputs in order for them to join the efficient

frontier". Input and output slacks are identified only for the hotels characterized by technical inefficiency. In this respect, slack analysis provides valuable information, to hotel owners and managers, regarding their respective hotels' efficiency decision-making process. The examination of input and output slacks, in Table V, provides the input and output slacks derived from the technical efficiency index (CCR), for the hotels in the sample. As it is mentioned earlier, the slack analysis didn't mention the name of the hotel due to confidentiality agreement the researcher made with hotels. Summary of slack analysis is as follow

- H6, which should make two adjustments from in input terms, in order to operate at 100% technically efficiency. From input term, it would have to reduce its human resource capacity by 5 employees (from 230 to 225) and it would have to reduce its total expense by 6,463,160 (from 89,112,564 to 82,649,404).
- H9, which should make one adjustment from in input terms, in order to operate at 100% technically efficiency. From input term, it would have to reduce its human resource capacity by 18 employees (from 190 to 172)
- H13, which should make three adjustments from in input terms and in output terms, in order to operate at 100% technically efficiency. From input term, it would have to reduce its human resource capacity by 16 employees (from 250 to 234) and it would have to reduce its total expense by 9,998,245 (from 81,891,291 to 71,893,046). From output term, it would have to try to increase its total revenue by 8,629,143 (from 88,681,912 to 97,311,055).
- H14, which should make one adjustment from in input terms, in order to operate at 100% technically efficiency. From input term, it would have to reduce its human resource capacity by 23 employees (from 142 to 119)
- H9, which should make one adjustment from in input terms, in order to operate at 100% technically efficiency. From input term, it would have to reduce its human resource capacity by 9 employees (from 108 to 99)

As far as the input variables are concerned, the analysis suggests that five local brand hotels have non-zero slacks regarding the number of employee and two hotels for total expense. With regards to non-zero slacks for the output variables, the analysis suggests that one local brand

hotel has non-zero slacks for total revenues. The relative severity of the input variables' non-zero slacks suggests that hotels can increase their efficiency and project themselves onto the efficient frontier, mainly through reductions in the inputs they use.

Table IV Slack Analysis

Input-Oriented						
CRS Model Slacks						
		Input Slacks			Output Slacks	
DMU No.	DMU Name	# of rooms	# Employee	Total Expense	Total Revenue	Occupancy
1	H1	-	-	-	-	-
2	H2	-	-	-	-	-
3	H3	-	-	-	-	-
4	H4	-	-	-	-	-
5	H5	-	-	-	0.00	-
6	H6	-	5.19	6,463,159.57	-	-
7	H7	-	-	-	-	-
8	H8	-	-	-	0.00	-
9	H9	-	17.90	-	-	-
10	H10	-	-	-	-	-
11	H11	-	-	-	-	-
12	H12	-	-	-	-	-
13	H13	-	15.81	9,998,244.93	8,629,143.24	-
14	H14	-	23.18	-	-	-
15	H15	-	8.80	-	-	-

4.4.1 Slack/input(output) ratio

The classified levels of input and output slacks for the international brand and local hotels. The column titled "slack/input(out) ratio" indicates each slack's relative importance. From a managerial point-of-view, a high slack/input(out) ratio score indicates a large potential for a nonproportional input reduction. Furthermore, it reflects an extravagance in the use of the

corresponding input. Correspondingly, the lower the ratio score is, the fewer adjustments are required for efficiency improvements. Based on the results presented in Table VI, the following conclusions are in order.

- As far as bed capacity is concerned, the ratio of 0% for both international brand and local hotels implies no need for decrease in their operational capacity. This suggests both branded and local hotels appear to be more capable in handling their operational capacity. This reflects branded and local hotels' relatively enjoying the shortage of hotel room supply in Addis.

- As far as employees are concerned, the relevant ratio for local hotels (3.2 percent) is higher than the respective one for international branded hotels (O%). This piece of

  evidence suggests that local hotels are relatively overstaffed, they could produce the same level of outputs with less staff on average, as compared to branded hotels. This further implies that branded hotels seem to have better human resource management as compared to independent hotels in Addis.

- The slack/input ratio of operational cost is also higher for the local brand hotels (3.47 percent) as compared to international brand hotels (0%). Therefore, local hotels are able to produce the same level of outputs as compared to international brand hotels at a lower operational cost of ETB1.5M on average. This may be the case either due to poor operational management among local hotels, or through branded hotels' continuous efforts for higher quality services coupled with lower prices. As a result, one could argue that local operating hotels need to adopt relatively more slack movements with respect to their inputs for improvements in their efficiency scores.

- The slack/output ratio column shows the relative importance of each slack on the outputs produced. Total revenue's output ratio is higher again for local hotels (1.09 percent) as compared to international branded ones (0 percent). This suggests that local(H13) hotel should place more emphasis on increasing its total revenues in order to improve its efficiency.

The above analysis indicates that local hotels should make adjustments mainly in their corresponding inputs configurations.

Table V Slack/input(out) ratio

	Average		Input/output average			
	International Brand	Local Hotel	International Brand	Local Hotel	International Brand	Local Hotel
Inputs	CCR input Slack				Slack input ratio %	
Rooms	0	0	176.25	103.45	0%	0%
Employee	0	6.44	246	201	0%	3.20%
Operational Cost(ETB)	0	1,496,491.32	147,127,083.16	43,119,607.85	0%	3.47%
Output						
Total revenue(ETB)	0	784,467.57	265,567,506.07	72,255,240.63	0%	1.09%
Occupied rooms	0	0	39,093.50	20,690.64	0%	0.00%

CHAPTER FIVE

CONCLUSION AND RECOMMENDATION

5.1 Conclusion

The role of the tourism industry in Ethiopia's socio-economic development has always been recognized in the country. Such economic prominence of the industry is illustrated by its direct contribution to the country's GDP which in 2013 was 4.2%, translating to ETB 35,766.6M and 9.4% of total economy in 2018 which contributed ETB 214,600M.

Addis Ababa is a fast-growing regional economic center and the capital of Ethiopia. It is home to the African Union, the UN Economic Commission for Africa, foreign missions, regional NGO's and the UN Conference Centre. Due to its regional political status Addis Ababa is well gifted with the potential to tap in to the MICE.

The aim of this research paper was to study the relative efficiency between hotels operating under a international brand and hotels operating as totally independent(local) in Addis Ababa as well as to identify the relevant inefficiency causes and provide suggestions and implications to relevant business experts and managers in order to increase hotel efficiency.

Using the DEA methodology, the present paper studied a sample of 15 hotels of operating in Addis Ababa in 2018. The main finding the analysis was that local hotels' inefficiency was due their respective input/output configuration. This finding confirmed the existing reality of shortage of hotels rooms, which was stated by MoCT as lack of sufficient five and four star, rated hotel rooms. However, this may not stay longer more than five to seven year as per the existing hotel room construction boom of which most of them international brand hotels.

The finding clearly stated most of local hotel are overstaffed and operational costs are little bit higher than the industry average in Addis Ababa. However, international branded hotels are efficient in all accept of input and output. It is because of they combine the advantages of international branding jointly with shortage of supply against current demand. Overall, the contribution of this research paper to the relevant literature is that it confirmed the view that internationally branded hotels operate relatively more efficiently than local hotels. It supported

that the DEA results can provide implications to hotel owners and managers in order to increase the efficiency of their business and operations.

5.2 Recommendation

This part of the paper builds on the results of the empirical analysis. It provides possible implications for practitioners and managers in the hotel industry in Addis Ababa in order to increase hotel efficiency.

The slack analysis provides directions on hotel efficiency improvements. The slack/input ratio scores for the local hotels suggested that they could keep producing their output levels while at the same time reducing their inputs. One has to note that local hotels are relatively overstaffed, and the allocation of their resources results at higher operational costs. The slack/output ratio scores further implied that local hotel managers should find ways to increase total revenue. The combination of the above observations exhibited the importance brand affiliation, lack of cooperation with leading tour operators, addressing international travel agents, and a highly seasonal demand pattern as stated in the literature review. This composite weakness may be overcome through the following recommended strategies.

- ✓ Local hotel may review applied human resource planning, efficiency of employee through difference performance managements, assigned job descriptions and technology applications.
- ✓ Every department manager may turn over every stone to figure out where is excessive cost comes from. Identify high consumable items in term of quantity and value and set strategy to minimize those consumption either from sourcing or consumptions.
- ✓ Local hotels could associate themselves with new international hotel brand. This initiative could allow them to exploit branding advantages with managerial practices flexible to the local market's conditions like which were done in Addis Ababa and Bahirdar.
- ✓ hotel managers should find ways to increase total revenue. This could be overcome through strategies combining clever pricing strategies to attract low budgeted Non-Government organization who organize conferences in the city and aggressive sale promotions.

5.3 Future study

The following are areas that could be considered for future research:

Future research could be to enrich input and output variables and compare the results with the present ones. Inputs such as expenses for Food and beverage and the wages for the relevant staff could also be used. Regarding the output variables, these could also be enriched with measures such as earnings before interest, taxes, depreciation and amortization.

This research could be extended through a larger sample of hotels which are going to be open in couple of years of time and an enriched data set covering more variables for more than one year, as the first year of operation could not give the actual position of hotel in the industry.

References

Addis fortune (Dec 3 2017). Chain Hotels chaining in Ethiopia. Volume 18 number 918

Agarwal, S., Yadav, S. P., and Singh, S. (2011). A new slack DEA model to estimate the impact of slacks on the efficiencies. International Journal of Operational Research, 12 (3), 241-256.

Amado, C. A., Santos, S. P., and Marques, P. M. (2012). Integrating the data envelopment analysis and the balanced scorecard approaches for enhanced performance assessment. Omega, 40, 390-403.

American Hotel and Lodging Educational Institute. (2014). Uniform system of accounts for the lodging industry (11th ed.). Lansing, Michigan: American Hotel and Lodging Educational Institute.

Angulo-Meza, L., and Lins, M. P. (2002). Review of methods for increasing discrimination in data envelopment analysis. Annals of Operations Research, 116, 225-242

Amiry, H., and Kumaraswamy, M. (2012). Feasibility and implementation of the balanced scorecard approach in the hotel industry. Radix International Journal of Banking, Finance, and Accounting, 1 (11), 1-16.

Ashrafi, A., Seowb, H. V., Lee, L. S., and Lee, C. G. (2013). The efficiency of the hotel industry in Singapore. Tourism Management, 37, 31–34.

Asmild, M., Paradi, J. C., Reese, D. N., and Tam, F. (2007). Measuring overall efficiency and effectiveness using DEA. European Journal of Operational Research, 178, 305-321.

Assaf, A., and Knežević, C. L. (2010). The performance of the Slovenian hotel industry: evaluation post-privatization. International Journal of Tourism Research, 12, 462–471.

Aw,b, Chung, Y. and Roberts,M(2003). Productivity, output and failure: a comparison of Taiwanese and Korean manufacturers. Economic Journal, 113, 485-510.

Anderson, R., Lewsie, D.r, and Parker, M. (1999). Another look at the efficiency in the hotel industry: A stocinastic frontier approach. Hospitality Management, 18, 45-93.

Baker, M., and Riley, M. (1994). New perspectives on productivity in hotels: some advances and new directions. International Journal of Hospitality Management, 13, 297–311.

Banker, R. D., Cooper, W. W., Seiford, L. M., Thrall, R. M., and Zhu, J. (2004). Returns to scale in different DEA models. European Journal of Operational Research, 154, 345362

Barros, C. P. (2005). Measuring efficiency in the hotel sector. Annals of Tourism Research, 32 (2), 456-477.

Barros, C. A. P., and Santos, C. A. (2006). The measurement of efficiency in Portuguese hotels using data envelopment analysis. Journal of Hospitality and Tourism Research, 30, 378–400.

Blundell, R., Griffith, R., and Van Reenen, J. (1995). Dynamic count data models of technological innovation. Economic Journal, 105, 333-344.

Botti, L., Briec, W., and Cliquet, G. (2009). Plural forms versus franchise and company-owned systems: A DEA approach of hotel chain performance. Omega: The International Journal of Management Science 37, 566-578.

Bradley, F. (2002), International Marketing Strategy, Pearson Education Limited, London.

Brown, J. and Ragsdale, C. (2002), "The competitive market efficiency of hotel brands: an application of data envelopment analysis", Journal of Hospitality and Tourism Research, Vol. 26 No. 4, pp. 260-332.

Brown, J., and Dave, C. (1999). Productivity consequences of hotel strategies. Cornell Hotel and Restaurant Administration Quarterly, 40, 23-33.

Caves, R. (1992). Determinants of technical efficiency in Australia. In R. Caves (Ed.), Industrial efficiency in six nations (pp. 241–272). Cambridge: MIT Press.

Caves, R., & Barton, D. (1990). Efficiency in US: Manufacturing industries. Cambridge: MIT Press.

Carlsson, B. (1972). The measurement of efficiency in production: An application to Swedish manufacturing industries, 1968. Swedish Journal of Economics, 74, 468–485.

Charnes, A., Cooper, W., and Rhodes, E. (1978). Measuring the efficiency of decision making units. European Journal of Operational Research, 2, 429-444.

Chen, T. H. (2011). Performance measurement in a small Taiwanese hotel chain. Cornell Hospitality Quarterly, 52, 354–362.

Chiang, W. E., Tsai, M. H., and Wang, L. S. M. (2004). A DEA evaluation of Taipei hotels. Annals of Tourism Research, 31, 712–715.

Coelli, T., Rao, D., O'Donnell, C., and Battese, G. (2005). An introduction to efficiency and productivity analysis. New York: Springer International

Cook, W. D., and Seiford, L. M. (2009). Data enevelopment analysis (DEA) - Thirty years on. European Journal of Operational Research, 192, 1-17.

Cook, W. D., and Zhu. (2013). Data envelopment analysis: Balance benchmarking. Lexington, KY: Cook and Zhu.

Creswell, W 2003, Research Design: Qualitative, Quantitative and Mixed Approaches, 2nd edition. Sage publication, California.

Czinkota, M. and Ronkainen, I. (2004), International Marketing, Thomson South Western, Mason, OH.

Davutyan, N. (2007). Measuring the quality of hospitality at Antalya. International Journal of Tourism Research, 9, 51–57

Dawson R. Hancock and Bob Algozzine (2006), Doing case study research: A practical guide for beginning researchers: Teachers college, Colombia University New York.

Dolasinski, Mary Jo,(2016) "Identifying the Optimal Combination of Hotel Room Distribution Channels: A DEA Analysis with a Balanced Scorecard Approach" Graduate Theses and Dissertations.

Fay, C. T., Rhoads, R. C., and Rosenblatt, R. L. (1971). Managerial accounting for hospitality service industries. Bubuque, Iowa: William C. Brown Publishers

Farrell, M. (1957). The measurement of productive efficiency. Journal of the Royal Statistical Society. Series A (General), 120 (3), 253-290.

Francesco Porcelli (2009). Measurement of Technical Efficiency. A brief survey on parametric and non-parametric techniques

Fuchs, M. (2004). Strategy development in tourism destinations: A DEA approach. Poznan University Economics Review, 4 (1), 52-73.

Fukuyama, H., and Weber, W. L. (2009). A directional slacks-based measure of technical inefficiency. Socio-Economic Planning Sciences, 43 (4), 274-287.

Gumbau, M., & Maudos, J. (2002). The determinants of efficiency: The case of the Spanish industry. Applied Economics, 34, 1941–1948.

Greene, W. H. (1997). Frontier production functions. In Pesaran, M. H. and Shmidt, P., editors, Handbook of Applied Econometrics, volume II: Microeconometrics. Blackwell Publishers Ltd.

Guo, P., and Tanaka, H. (2001). Fuzzy DEA: A perceptual evaluation method. Fuzzy Sets and Systems, 119, 149-160.

Haugland, S. A., Myrtveit, I., and Nygaard, A. (2007). Market orientation and performance in the service industry: A data envelopment analaysis. Jounal of Business Research, 60, 1191-1197.

Hernaus, T., Bach, M. P., and Vukšic, V. B. (2012). Influence of strategic approach to BPM on financial and non-financial performance. Baltic Journal of Management, 7, 376–396.

Hsieh, L. F., and Lin, L. H. (2010). A performance evaluation model for international tourist hotels in Taiwan – an application of the relational network DEA. International Journal of Hospitality Management, 29, 14–24

Hu, B. A., and Cai, L. A. (2008). Hotel labor productivity assessment: A data envelopment analysis. Journal of Travel and Toursim Marketing, 16 (2/3), 27-38.

Hwang, S.N. and Chang, T.Y. (2003), "Using data envelopment analysis to measure hotel managerial efficiency change in Taiwan", Tourism Management, Vol. 24 No. 4, pp. 357-369.

Ismail, J., Dalbor, M. and Mills, J. (1991). Using RevPar to analyse lodging- segment variability. Cornell Hotel and Restaurant Administration Quarterly, 43, 73–80.

Israeli, A. A. (2002). Star rating and corporate affiliation: their influence on room price and performance of hotels in Israel. International Journal of Hospitality Management, 21, 405–424.

Johns, N., Howcroft, B., and Drake, L. (1997). The use of data envelopment analysis to monitor hotel productivity. Progress in Tourism and Hospitality Research, 3, 119–127.

Justo De Jorge and Cristina Suarez (2012) Productivity, efficiency and its determinant factors in hotels, The Service Industries Journal, 2013, 7-8

Justyna Kulik(2017) Technical efficiency and the methods of its measurement, Wrocław University of Economics

Katarina Poldrugovaca, Metka Tekavcicb and Sandra Jankovica. Efficiency in the hotel industry: an empirical examination of the most influential factors. Economic Research- 2016 voL. 29, no. 1, 583–597

Kothari C.R., 2004, Research Methodology: Methods and Techniques, 2nd ed., New age international limited publishers, New Delhi,

Lee, C.C. (2012). The causal correlations among market structure, conduct, and performance of the CPA industry. Service Industries Journal, 32(3), 431–450.

Liu, J. S., Lu, L. Y., Lu, W.-M., and Lin, B. J. (2013). A survey of DEA applications. Omega, 41, 893-902.

Lovell, C. K. (1993). Production frontiers and productive efficiency. In Fried, A. O., Lovell, A. K., and Schmidt, S. S., editors, The Measurement of Productive Efficiency, chapter 1, pages 3 – 67. Oxford University Press.

Luo, H., Yang, Y., and Law, R. (2014). How to achieve a high efficiency level of the hotel industry? International Journal of Contemporary Hospitality Management 26 (8), 1140-1161.

Manasakis, C., Apostolakis, A., and Datseris, G. (2013). Using data envelopment analysis to measure hotel efficiency in Crete. International Journal of Contemporary Hospitality Management, 25, 510–535.

Min, H., and Min, H. (1997). Benchmarking the quality of hotel services: managerial perspectives. The International Journal of Quality and Reliability Management, 14, 582–597.

Ministry of Culture and Tourism(2015). Sustainable Tourism Master Plan 2015-2025. United Nations Economic Commission for Africa P 32-66.

Mohamad, N. H., and Said, F. (2012). Using super-efficient DEA model to evaluate the business performance in Malaysia. World Applied Sciences Journal, 17 (9), 11671177

Neves, J. C., and Lourenco, S. (2009). Using data envelopment analysis to select strategies that improve the performance of hotel companies. International Journal of Contemporary Hospitality Management 21 (6), 698-712.

Nickell, S. (1996). Competition and corporate performance. Journal of Political economy, 724-746.

Osman, I., Anouze, A. L., and Emrouznejad, A. (2014). Handbook of research on strategic peformance management and measurement using data envelopment analysis. Hershey, PA: IGI Global.

Orthodox Tefera, (2018): Ethiopia's hotel industry needs help to encourage tourism. The Conversation Academic Journal, University of KwaZulu-Natal

Palumbo, F. and Herbig, P. (2000), "The multicultural context of brand loyalty", European Journal of Innovation Management, Vol. 3 No. 3, pp. 116-124.

Paradi, J. C., and Sherman, H. D. (2014). Seeking greater practitioner and managerial use of DEA for benchmarking. Data Envelopment Analysis Journal, 1, 29-55.

Perrigot, R., Cliquet, G., and Piot-Lepetit, I. (2009). Plural form chain and efficiency: Insights from the French hotel chains and the DEA methodology. European Management Journal 27, 268-280.

Rickards, R. C. (2003). Setting benchmarks and evaluating balanced scorecards with data envelopment analysis. Benchmarking: An International Journal, 10 (3), 226-245

Sainaghi, R., Phillips, P., and Corti, V. (2013). Measuring hotel performance: Using a balanced scorecard perspectives' approach. International Journal of Hospitality Management 34, 150-159

Shang, J.-K., Wang, F.-C., and Hung, W.-T. (2010). A stochastic DEA study of hotel efficiency. Applied Economics, 42 (19), 2505-2518.

Sherman, H. D., and Zhu, J. (2013). Analyzing performance in service organizations. MIT Sloan Management Review, 54 (4), 37-42

Sigala, M. (2002). Assessing the impact of information and communication technologies on productivity in the hotel sector; an operations management approach (Unpublished PhD thesis). University of Surrey, United Kingdom.

Sigala, M. (2008). Using data envelopment analysis for measuring and benchmarking productivity in the hotel sector. Journal of Travel and Tourism Marketing, 16 (2-3), 3960.

Smith, E. (2008). Pitfalls and promises: The use of secondary data analysis in educational research. British Journal of Educational Studies, 56 (3), 323-339.

Tavitiyaman, P., Qiu Zhang, H. and Qu, H. (2012), "The effect of competitive strategies and organizational structure on hotel performance", International Journal of Contemporary Hospitality Management, Vol. 24 No. 1, pp. 140-159.

Thanassoulis, E., Boussofiane, A. and Dyson, R.G. (1996), "A comparison of data envelopment analysis and ratios as tools for performance assessment", Omega: The International Journal of Management Science, Vol. 24 No. 3, pp. 229-244.

Thomas, R., & Long, J. (2001). Tourism and economic regeneration: The role of skill development. International Journal of Tourism Research, 3, 229–240.

ul-Arifeen, N., Hussain, M., Kazmi, S., Mubin, M., Latif, S., and Qadri, W. (2014). Measuring business performance: Comparison of financial, non-financial and qualitative indicators. European Journal of Business and Management, 6 (4), 38-45.

Van Doren, C. S., and Gustke, L. D. (1982). Spatial Analysis of the US. Annals of Tourism Research, 9, 543–563

Verma, R., Plaschka, G. and Louviere, J. (2002), "Understanding customer choices: a key to successful management of hospitality services", Cornell Hotel and Restaurant Administration Quarterly, Vol. 43 No. 6, pp. 15-24.

Wassenaar, K., and Stafford, E. R. (1991). The lodging index: an economic indicator for the hotel/motel industry. Journal of Travel Research, 30, 18–21.

Wöber, K. W. (2002). Benchmarking in tourism and hospitality industries: the selection of benchmarking partners. Oxon: CABI Publishing

Worthington, A. C. and Dollery, B. (2000). An empirical survey of frontier efficiency measurement techniques in local government. Local Government Studies, 26(2):23–52.

Xander Nijnens , Mark Dunford JIL : Addis Ababa Hotel Market Outlook

Xiao, Q., O'Neill, J. and Mattila, A. (2012), "The role of hotel owners: the influence of corporate strategies on hotel performance", International Journal of Contemporary Hospitality Management, Vol. 24 No. 1, pp. 122-139.

Yu, M.M., and Lee, B.C.Y. (2009). Efficiency and effectiveness of service business: Evidence from international tourist hotels in Taiwan. Tourism Management, 30, 571-580.

Zhu, J. (2000). Multi-factor performance measure model with an application to Fortune 500 companies. European Journal of Operational Researcy, 123, 105-124.

Zhu, J. (2014a). Data envelopment analysis. Lexington, KY: Joe Zhu.

Appendix

List of star -rated Hotels in Addis Ababa

No	NAME OF HOTEL	STAR	*No.of Rooms*	*No.of Beds*
1	Sheraton Addis Hotel	5	294	323
2	Capital hotel	5	114	114
3	Ellele international hotel	5	155	163
4	Marriott Executive Hotel	5	108	128
5	Radison Blue hotel	5	204	235
6	Golden Tulip Hotel	5	90	90
7	Gatefam Hotel	5	115	115
8	Debredamo hotel	4	102	102
9	Dreamliner Hotel	4	96	110
10	Friendship hotel	4	104	104
11	Harmony Hotel	4	150	176
12	Intercontinental Hotel	4	151	190
13	Jupiter int. Hotel (kazanchis)	4	102	112
14	Jupiter Int. Hotel (Bole)	4	40	52
15	Momona Hotel	4	60	80
16	Nazra hotel	4	24	27
17	Nexus hotel	4	66	66
18	Saromaria hotel	4	87	87
19	Sarem International Hotel	4	43	62
20	Washington hotel	4	70	85
21	Tegen Guest Accommodation Hotel	4	32	64
22	Addis Regency Hotel	3	33	41
23	Addis View Hotel	3	18	23
24	Addissinia Hotel	3	60	60
25	Caravan hotel	3	37	37

26	Aphrodite hotel	3	52	52
27	Ararat Hotel	3	94	116
28	Beer Garden Inn	3	32	36
29	Beshale Hotel	3	64	80
30	Ambassador Hotel	3	52	60
31	Crown Hotel	3	71	110
32	Cyan city hotel	3	40	45
33	Embilta Hotel	3	39	49
34	Global Hotel	3	50	70
35	Hilton Addis Ababa	3	400	705
36	Kaleb Hotel	3	64	84
37	King's Hotel	3	34	54
38	Monarch hotel	3	80	80
39	Panorama Hotel	3	65	85
40	Sidra hotel	3	26	31
41	Relience hotel	3	31	38
42	Seyonat hotel	3	40	50
43	Solo Te hotel	3	35	45
44	The residence hotel	3	18	21
45	Wassamar Hotel	3	66	71
46	Umma Hotel	3	33	45
47	Top Ten hotel	3	48	56
48	Southern Addis Hotel	3	38	38
49	Zola international hotel	3	24	32
50	Adotina Hotel	2	32	32
51	Astara Hotel	2	45	51
52	Axum Hotel	2	60	72
53	Churchill Hotel	2	53	53
54	Damu Hotel	2	20	20

55	Desalegne Hotel No.2	2	28	25
56	Destiny Addis Hotel	2	33	40
57	Edna Addis Hotel	2	33	37
58	Empire Addis inter. hotel	2	39	39
59	Lobelia Hotel	2	31	35
60	Ghion Hotel	2	190	298
61	Haimi Apartment hotel	2	28	28
62	Homage hotel	2	20	25
63	Louvera Hotel	2	12	16
64	KZ Hotel	2	32	42
65	Kenenisa Hotel	2	51	51
66	Pacific Hotel	2	45	55
67	Queen of Sheba	2	32	56
68	Ras Amba Hotel	2	25	25
69	Trinity Hotel	2	21	27
70	Soramba Hotel	2	87	87
71	AG palace hotel	1	19	19
72	Ethiopia Hotel	1	110	151
73	Fil wuha hotel enterprise	1	57	57
74	M.N Int. Hotel	1	91	124
75	Paramount Hotel	1	27	27
76	Semien Hotel	1	60	65
77	Three days hotel	1	30	34
78	TDS Hotel	1	25	29