

Factors Influencing Hotel Room Supply and Demand in Kenya: A Simultaneous Equations Model

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Abstract

Accommodation is a key component of the tourism industry in Kenya, which has been recognized as a key sector in the economic pillar of the country's Vision 2030. Therefore, the envisaged growth of the tourism industry in Vision 2030 has implications on the hotel sub-sector. In order to ensure that the accommodation sub-sector contributes to the goals of Vision 2030, there is need for appropriate strategies to enhance hotel room nights' supply and demand in Kenya. This calls for re-orientation of the hotel room market with regard to capacity, quality and diversity. However, the hotel room market exists within the wider context that is influenced by factors nested in the political, economic, social, technological, environmental and legal realms. This study seeks to examine the factors that influenced hotel room nights' supply and demand in Kenya between 1988 and 2007, using the Simultaneous Equations econometric model. Based on the Instrumental Variable-Two Stage Least Squares methodology, the empirical results show that visitor arrivals, hotel room occupancy rates, exchange rates, and law and order risk index are the key variables that significantly influence demand for hotel room nights, while previous years' hotel room price, law and order risk index, length of stay, and the number of hotel room nights demanded, significantly influence hotel room price in the supply equation. On the basis of these findings, this study recommends policies that will focus on quality assurance in the hotel room market and tourism product development, strengthening tourism marketing and recovery strategy, maintaining law and order, developing and managing information and data in the hotel industry, and finalizing and implementing tourism legal and regulatory framework.

Abbreviations and Acronyms

2SLS	two-stage least squares
AHRN	Number of Hotel Rooms Nights Supplied
COMESA	Common Market for Eastern and Southern Africa
CPI	Consumer Price Index
DEA	Data Envelopment Analysis
EAC	East African Community
EPA	Economic Partnership Agreement
ERSWEC	Economic Recovery Strategy for Wealth and Employment Creation
ESA	Eastern and Southern African countries
EU	European Union
GDP	Gross Domestic Product
GoK	Government of Kenya
HK\$	Hong Kong Dollar
HRA	Hotels and Restaurants Act
ICT	Information and Communication Technology
KNBS	Kenya National Bureau of Statistics
KTB	Kenya Tourist Board
KTDC	Kenya Tourist Development Corporation
MICE	Meetings, Incentives, Conference, Exhibitions
MoT	Ministry of Tourism
MPND	Ministry of Planning, National Development and Vision 2030
MTP	Medium Term Plan (2008-2012)
NESC	National Economic and Social Council (of Kenya)
OHRN	Number of Hotel Rooms Occupied
TILA	Tourism Industry Licensing Act
UNCTAD	United Nations Conference on Trade and Development
WEF	World Economic Forum
WTO	World Trade Organization

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1. Introduction

Accommodation is one of the key components of the tourism industry in any destination (Cho, 2005; Lee, 2005; Holjevac, 2003; and Sharpley, 2000). Others components include attractions, accessibility and amenities. The hotel sub-sector has had an impressive contribution to Kenya's economic growth rate through wage employment and the multiplier effects resulting from the sub-sector's consumption of products and services from other sectors in the economy. Based on the above evidence, therefore, the development of the hotel sub-sector is crucial for the overall development of the tourism industry.

Since 2002, the growth of the tourism sector has led to sustained growth in wage employment, and earnings from hotels, rooming houses, camps and other lodging facilities (Table 1.1). Thus, it is important to sustain growth in employment opportunities in the hotel sub-sector.

To further develop the tourism industry, the Kenya Vision 2030 recognizes the importance of the tourism industry and envisages Kenya to be among the 10 long haul tourist destinations in the world, offering a high-end, diverse and distinctive visitor experience. The country targets to raise international visitors from 1.6 million in 2006 to 3 million by 2012, while raising the average amount spent per visitor from the present Ksh 40,000 to at least Ksh 70,000, and earn the country Ksh 200 billion (Government of Kenya, 2007). This anticipated growth rate has implications on the various components in the tourism sector. The need for re-orientation of various sub-sectors in the tourism industry, especially the hotel sub-sector, in order to meet demand for tourism products, facilities and services in future is, therefore, important.

Table 1.1: Wage employment, earnings and contribution to GDP growth by the hotel sub sector (2001-2007)

Year	Employees	Earnings (Ksh million)	Contribution to GDP growth (%)
2001	38,417	12,756.1	1.2
2002	37,332	14,756.9	1.2
2003	37,511	18,401.2	-8.4
2004	38,308	20,888.8	7.2
2005	39,582	27,181.6	2.8
2006	41,696	32,946.7	3.1
2007	43,909	38,022.9	3.4

Source: Kenya National Bureau of Statistics, 2006 and 2008

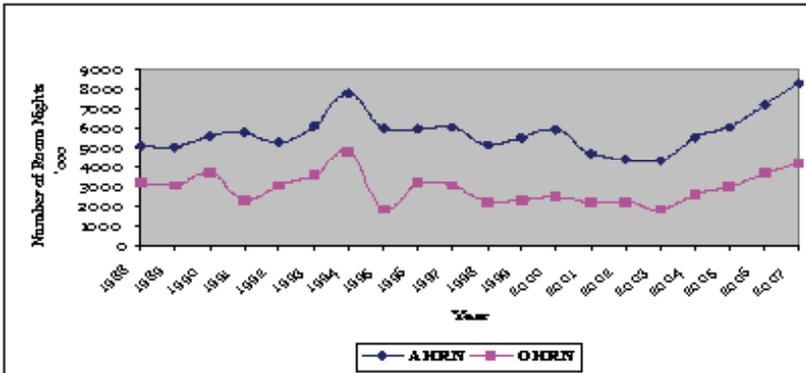
Despite the overall impressive growth in the tourism industry, with visitor arrivals growing by 161.5 per cent from 694,900 visitors in 1988 to 1,816,957 in 2007, the growth in demand for hotel rooms has not been commensurate with the rooms supplied, leading to under-utilization. Figure 1.1 gives an overview of the number of available and occupied hotel rooms in Kenya between 1988 and 2007. The number of hotel room nights' supplied (AHRN) increased by 62.65 per cent from 5,096,000 in 1988 to 8,289,000 in 2007, while the number of room nights' occupied (OHRN) increased by 31.67 per cent from 3,211,000 in 1988 to 4,228,000 in 2007. This implies that on average, Kenya's hotel rooms have always been under-utilized.

Since a wide range of actors, both internal and external to the hotel industry, have led to the unbalanced growth between the supply and demand for hotel room market in Kenya, the purpose of this paper is to analyze factors that influence the performance of hotel room nights' supply and demand in Kenya.

1.1 Problem Statement

Even though Kenya's tourism industry has experienced impressive growth in the last 20 years, there has been an imbalance in the supply and demand for hotel rooms. The imbalance between available and occupied hotel rooms is reflected in hotel room occupancy levels that have been oscillating between 63 per cent in 1988 and 51 per cent in 2007, with considerable declines experienced between 1997 and 2001, and slight increase between 2003 and 2007 (Figure 1.2). Even though visitor arrivals have been growing since 2001, the national room occupancy averages have been oscillating

Figure 1.1: National hotel room supply and demand



Source: Kenya National Bureau of Statistics, 1989-2008

between 46 per cent and 51 per cent of the existing hotel room night's capacity utilized.

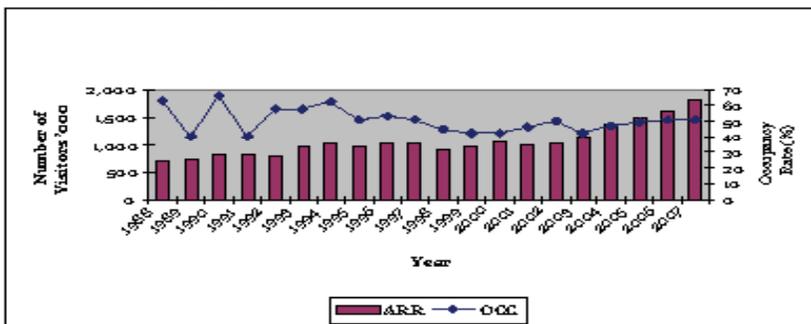
The imbalance between hotel rooms nights supply and demand could be attributed to the inter-relationship between many factors that are internal (hotel specific, e.g. high cost of business and quality of facilities) and external (local and global alike, e.g. political uncertainties during election years, seasonality, terrorism, diseases, economic crises, changing lifestyles, weak consumer confidence, rising unemployment rate, and inflationary pressures punctuated by a major rise in fuel prices).

Under-utilization of Kenya's hotel rooms has significant implications on room occupancy levels, profitability, longer-term ability of accommodation service providers to retain control over pricing levels, and on the entire economic performance, given its forward and backward linkages, and generation of direct and indirect employment.

Fluctuations in demand also affect investment decisions in the short term with regard to enhancing the quality of products and services offered, and in the long term with regard to targeted market segments, marketing strategies and expansion of hotels. Similarly, fluctuations in hotel room demand will influence the nature of employment in the hotels, whereby the ratio of permanent staff as opposed to temporary or casual basis will be low, impacting negatively on livelihoods of the employees. Furthermore, improved performance of Kenya's hotel room market will lead to competitiveness of Kenya's hotel rooms and will reduce the unbalanced growth between the supply and demand for hotel rooms and enable the sub-sector to contribute effectively to economic development.

The purpose of this study, therefore, is to identify the factors that influenced demand for Kenya's hotel room market between 1988 and

Figure 1.2: Comparison between visitor arrivals and hotel room occupancy rates



Source: Kenya National Bureau of Statistics, 1989-2008

2007, through descriptive and empirical analysis. The results of the study will enable the public and private sectors to formulate appropriate strategies to improve the utilization of existing hotel rooms effectively and efficiently.

1.2 Objectives

The overall objective of this paper is to analyze the factors that influence supply and demand for Kenya's hotel room nights. The specific study objectives are:

- (i) To evaluate trends of Kenya's hotel room occupancy performance.
- (ii) To identify and analyze factors that influence hotel room nights' supply and demand in Kenya.
- (iii) To identify vital policy recommendations towards improving performance of the hotel room market.

1.3 Study Questions

Three questions will guide this study:

- (i) How has the hotel room market performed over the last 20 years with regard to hotel room occupancy levels?
- (ii) What factors influence Kenya's hotel room supply and demand?
- (iii) What strategies can be put in place to improve performance of Kenya's hotel room market?

1.4 Justification

Kenya's tourism sector has been identified as one of the growth sectors that will contribute significantly towards poverty alleviation. Earlier documents such as the Economic Recovery Strategy for Wealth and Employment Creation, 2003-2007 (ERSWEC), the National Development Plans (NDPs), Poverty Reduction Strategy Paper (PRSP), and the current Kenya Vision 2030, have all emphasized the importance of tourism in economic development. Such analysis will inform future strategies towards improving the performance of the hotel sub-sector in the short and medium term (Government of Kenya, 2008), until the year 2030, and beyond.

Unfortunately, the developments in Kenya's hotel room market have not been matched by the provision or detailed analysis of its performance over time. A more accurate evaluation and analysis of the hotel room market provides a basis for developing a national framework for region and/or sector-specific hotel occupancy surveys in order to effectively monitor the performance of the industry.

The results of the study could be outlined by the government as a tool for development and policy making decisions for the hotel room market. The results would equip investors with information necessary for creating investments that meet hotel room demand effectively and efficiently. Hotel industry associations could use such information to lobby for incentives that would further improve the sub-sector. Effectiveness of marketing campaigns could be gauged from analysing demand for Kenya's hotel room nights.

In as much as the accommodation sector plays a vital role in the tourism industry in Kenya, few studies have analyzed the role of Kenya's hotel industry in sustainable tourism (Musau and Prideaux, 2003).

2. Background Information

2.1 Market Structure of the Hotel Industry

2.1.1 Ownership of hotels

Kenya's economy is liberalized, hence there are no restrictions in respect of entry into the hotel room market. The range of accommodation provided caters for all types of clients from exclusive luxurious hotels to budget hotels. These hotels vary with regard to scope, rating, ownership, management and affiliation. The hotels can be independently-owned and operated properties, properties that are independently-owned and operated with chain affiliation, chain-owned and operated properties, independently-owned chain-operated properties, franchised properties, and referral group properties, among others (Cho, 2005).

Ownership of Kenya's hotels can be categorized into several groups: those owned by government, those owned through joint ventures, those owned by companies, and those owned by individuals. Individuals own most of the hotels.

There are also a number of hotel brand names, incorporated or operating under franchises. These hotels have a high degree of visitor market concentration, as opposed to stand-alone units that are individually-owned. This makes Kenya's hotel room market exhibit an oligopolistic structure, given that a few large suppliers dominate the market.

Due to intense competition, hotels sell differentiated products (Appendix 1), which are branded to render a unique and separate identity. They invest heavily in product development, advertising and marketing, and constantly take into account the actions and likely reactions of their competitors in order to stay ahead in the volatile tourist market. Current trends, including changes in the way hotels are managed, increasing involvement of private equity in the hotel sector, brands and franchises, development of niche or lifestyle hotels, sophistication of the hotel market, range of facilities on offer and development of niche and luxurious hotels in exotic location have made hotel operators seek to diversify and differentiate their facilities (Lee, 2005).

These diverse forms of hotel ownership comprise those owned by locals and foreigners alone or in partnerships, thus negating the perceived notion that most hotels in Kenya are foreign-owned. The results of the study conducted by Ikiara *et al* (2007) in the main tourist circuits of

Nairobi, Coast, Nakuru and Machakos found that of the 168 classified hotels interviewed, 63.7 per cent had local ownership, while 36.3 per cent had some foreign ownership.

2.1.2 Type and quality of hotels and other accommodation facilities

Standardization and quality assurance in the hotel sub-sector plays a crucial role in satisfying the visitor, and contributing to targeting high yield tourists, whose increased expenditure is vital in the development of both the sub-sector and the country. Tourist satisfaction contributes immensely to the integral experience and is, therefore, a key component of the hotel sub-sector, which is reflected in the quality of visitor facilities and services offered. Vision 2030 has identified quality of the hotels as a key issue in order to enhance Kenya’s image as a destination that offers not only quality service, but also value for money.

The Ministry of Tourism has made efforts to improve the standards of visitor accommodation in the tourism industry through regulation of hotels, routine inspections and the classification exercises that were undertaken between 1988 to 1991 and 2002 to 2003. Of the establishments that were classified in 1991, 75 per cent of the number of classified hotels in Kenya ranged between three and five star categories (Table 2.1).

In 2003, about 60 per cent of the classified hotels were in the three to five star categories. The drop in standard was within the four to five star categories. The most significant drop was in vacation hotels in the four and five star category, that were re-classified as two star hotels in 2003, thus justifying the increase of 224 per cent in this category.

Table 2.1: Hotel star rating comparison (1991 and 2003)

Star Rating	Town hotels–beds			Vacation hotels–beds			Lodges and tented camps–beds		
	1991	2003	% change	1991	2003	% change	1991	2003	% change
Five	3,111	3,107	-0.1	2,480	869	-65.0	316	774	144.9
Four	197	167	-15.2	3,086	2,188	-29.1	1,316	715	-45.7
Three	1,673	2,483	48.4	6,275	3,673	-41.5	871	2,489	185.8
Two	1,785	1,557	-12.8	1,919	6,227	224.5	540	1,282	137.4
One	1,484	1,579	6.4	646	448	-30.7	154	0	-100.0
Total	8,250	8,893	7.8	14,406	13,405	-6.9	3,197	5,260	64.5

Source: Kenya Gazette, 1991, 2003 and 2004

Since the last national classification exercise was undertaken (2002-2003), most of the hotels have deteriorated in standards in respect of products and services offered. However, some new hotels have also come up while some have improved their products and facilities and are yet to be classified, which makes it difficult to track developments and improvements of facilities in the mainstream tourism markets.

Additional forms of accommodation and catering facilities such as private home stays, private game sanctuaries, villas and other providers of tourist accommodation have also not been classified. The total number of classified hotels is 140, supplying a total of 26,328 beds, which represents 39 per cent of the total number of licensed hotels (Table 2.2).

The inventory of hotel room supply indicates increases between 1989 and 1994, with a slight drop in 1992. Fluctuations in the number of hotels were experienced between 1995 and 2002, after which there has been a steady growth in number of hotels (Table 2.3). However, these statistics from the Ministry of Tourism vary from those in the Economic Surveys and Statistical Abstracts; hence, there is need to address these disparities.

Table 2.2: Comparison of licensed/classified beds and hotels per province in Kenya

Province	No. of licensed hotels	No. of classified hotels	Ratio of classified hotels to licensed hotels (%)	No. of beds in licensed hotels	No. of beds in classified hotels	Ratio of classified hotel beds to licensed hotel beds (%)
Rift Valley	374	24	6.42	11,655	4,214	36.16
Nairobi	378	26	6.88	14,534	6,200	42.66
Western	46	4	8.70	1,037	233	22.47
Central	123	8	6.50	3,548	982	27.68
Nyanza	135	4	2.96	2,852	380	13.32
Eastern	119	4	3.36	3,016	317	10.51
Coast	526	70	13.31	29,236	14,002	47.89
Totals	1701	140	8.23	65,878	26,328	39.96

Source: Ministry of Tourism, 2007; Kenya Gazette, 2003-2004; and Kenya Tourist Development Corporation, 2007

Table 2.3: Available room nights, ‘000 (1988-2007)

Year	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
No of hotels	287	287	272	320	250	294	420	496	496	496
No of room nights ‘000	5,096	5,071	5,595	5,815	5,274	6,154	7,801	6,020	6,014	6,039
Year	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
No of hotels	496	530	563	530	485	530	536	577	590	620
No of room nights ‘000	5,193	5,540	5,967	4,755	4,416	4,336	5,568	6,063	7,202	8,269

Source: Kenya National Bureau of Statistics, 1989 - 2008

2.2 Factors Influencing Trends in Kenya’s Hotel Room Market

2.2.1 Legal and regulatory framework

The Ministry of Tourism is responsible for the formulation, coordination and administration of policy in the tourism sector. This mandate is derived from Presidential Circular No. 1/2008 dated May 2008 and various Acts of Parliament. The Tourist Industry Licensing Act (TILA), Cap 381, and the Hotels and Restaurants Act (HRA), Cap 494, Laws of Kenya, are the main statutes governing the tourism industry. Other statutes that are crucial to the development of the tourism industry and the hotel sub-sector are summarized in Table 2.4. To further improve the business environment, some of the licences were scrapped vide the Kenya Gazette Notice No. 101 of 2nd January, 2007.

In order to develop the tourism industry, these statutes complement each other through regulatory, institutional and policy frameworks that offer proper guidelines of conduct of tourism-related businesses in the country. These statutes also offer incentives that could be accessed for effective performance of the various sub-sectors within the tourism industry.

Agreements at the regional level through the East African Community (EAC) have also contributed to enhancing standards in the hotel sub-sector by allowing duty exemptions on goods for use by individual hotels. Commitments made under trade in tourism services classifications at the World Trade Organization (WTO) also have an influence on employment, added value and tax revenue, and investment and foreign currency, since the sector boasts of strong multiplier and spillover effects (WTO, 2001). However, there are instances where different agencies pull in different ways thus leading to overburdening of investors with a myriad of regulatory conditions that at times hamper investments in the industry. Addressing weaknesses in the legal, institutional and policy aspects will

Table 2.4: Statutes that impact on the tourism industry

Statute	Agency
Wildlife Conservation and Management Act, Cap 376	Ministry of Forestry and Wildlife
Investment Promotion Act, 2004	Kenya Investment Authority
Trade Licensing Act, Cap 497	Ministry of Trade
Local Government Act, Cap 265	Ministry of Local Government
Public Health Act	Ministry of Health and Sanitation
Immigration Act, Cap 172	Ministry of Immigration and Registration of Persons
Public Procurement and Disposal Act 2005, and Regulations, 2006	Ministry of Finance
EAC resolutions	East African Community
World Trade Organization agreements	World Trade Organization
United Nations World Tourism Organization resolutions	UNWTO

Source: Ministry of Tourism, 2007; East African Community, 2005; and World Trade Organization, 2001

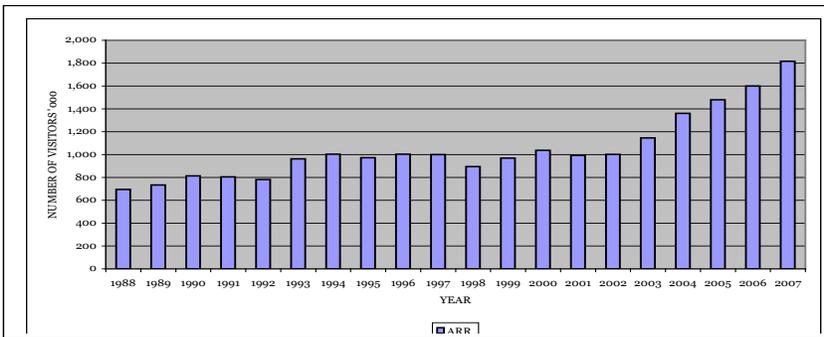
grant adequate guidance to players in the hotel industry.

2.2.2 Political risk factors

Various risks influence performance of the hotel sub-sector in Kenya. Between 1988 and 1992, the hotel room occupancy rates were erratic, rising and falling each subsequent year. This could be attributed to, among other issues, the first multiparty elections in Kenya and the accompanying violence especially in some parts of the Rift Valley, and the Gulf War I and economic recession during that time. However, since 1992, hotel rooms occupied grew from 58 per cent to peak in 1994, with room occupancy rates of 62 per cent before dropping to 51 per cent in 1995. Since 1996, Kenya has experienced average room occupancies below 60 per cent (Figure 2.1).

Political uncertainty after the clashes in Likoni at the coast just before the 1997 general elections, terrorism activities in 1998 and in 2002, and the post-election violence witnessed in January 2008 adversely affected the hotel industry. Such uncertainties impact on the risk index of a country, which affects rating by overseas travel agents. Their aftermath, especially the ensuing negative travel advisories, is catastrophic to the sub-sector given that during these periods very few visitors patronized the country's hospitality facilities. Some visitors also adopt a wait and see attitude, which influences hotel room supply and demand.

Figure 2.1: Effects of risks on visitor arrivals and hotel room occupancy trends (1988-2007)



Source: Kenya National Bureau of Statistics, 1989 - 2008

2.2.3 Natural resources

Room occupancy performance in the hotel room market shows that Kenya's tourism heavily relies on its natural resources, especially wildlife (Okello *et al.*, 2008; and Akama and Kieti, 2003) and beach tourism products. Areas that abound in these products, such as Maasai land and the coast, record comparatively high room occupancies compared to other regions where these resources are lacking or are yet to be fully utilized.

Sustainability of these natural resources is therefore key to the development of tourism products, facilities and amenities, and contributes to the competitiveness of Kenya as a leading tourist destination in Africa (WEF, 2008). Even though Kenya has not only protected wildlife, but also solidified the economic backbone for their nature based tourism industry (Okello *et al.*, 2008), the continued utilization of wildlife and beach resources has an impact on the viability of hotel projects in these locations, especially if such resources are not well utilized (Musau and Prideaux, 2003).

2.2.4 Seasonality

Due to seasonality, the hotel room market in Kenya follows the pattern of a highly seasonal resort. High occupancies are realized during the high season (December to February and July to August); average occupancies in the shoulder/mid-season (September to mid-December) and low occupancies in the low season (April to June). January and December are the most popular months, while June records the lowest bed occupancies.

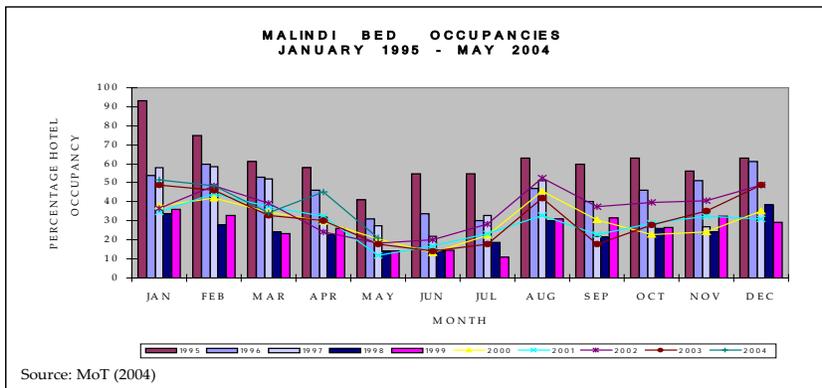
There are two principal reasons for seasonality; there is an institutionalized and a natural seasonality both of which affect tourism (Shaw and Williams, 2002). The case of bed occupancy rates in Malindi, one of the popular beach tourism destinations in Kenya's coastal area, further illustrates the seasonality patterns in Kenya (Figure 2.2).

2.2.5 Economic growth and infrastructural developments

Economic growth and development are a function of a multiplicity of multifaceted, complex and interlinked variables. Frequently, economic infrastructure is placed high on the hierarchy of importance. Improved economic infrastructure and specific output growth will enhance the competitiveness of Kenya's hotel sub-sector. Figure 2.3 illustrates the positive relationship between bed-nights occupied by domestic tourists and GDP in Kenya.

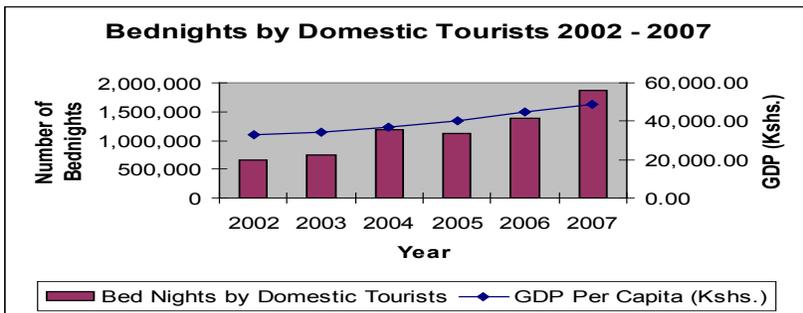
The good hotel room performance of Nairobi's high-class hotels could also be attributed to the nature of the city's vibrant economic base and the location of these hotels in prime areas that have accessibility to better support infrastructure. About 48 per cent of hotels interviewed in 2003 in Nairobi, Mombasa, Nakuru and Kisumu cited inadequate supply of infrastructure among the three biggest obstacles to doing business in the country (United Nations Conference on Trade and Development-UNCTAD, 2008). If the ability of visitors to travel to preferred destinations is inhibited by inefficiencies in the transport system, there is some likelihood that they will seek alternative destinations.

Figure 2.2: Monthly bed occupancies in Malindi: January 1995-May 2004



Ministry of Tourism (2004)

Figure 2.3: Domestic tourism bed-nights and GDP, 2002-2007



Source: Kenya National Bureau of Statistics, 2008

The global economic crisis that was triggered by the ‘credit crunch’, saw GDP slump, unemployment grow and consumer spending slow in virtually all tourist generating markets and destinations. The recessive GDP growth is likely to affect demand for Kenya’s hotel rooms. This is reflected in a reduction in visitor arrivals by 30.5 per cent in 2008 compared to 2007 (Table 2.5).

The economic crisis also had an impact on hotel room supply. Thus, few investors are willing to invest in more rooms or undertake renovations of existing rooms to offer quality products and services.

2.2.6 Regional disparities

The tourism industry in Kenya is dispersed, although the concentration varies widely. Despite the fact that tourist attractions abound all over Kenya, some regions are yet to fully develop their tourism potential, an issue that has led to stagnation in the accommodation sector (Musau and Prideaux, 2003).

Tourism has been touted as a tool that could be used to enhance economic development in various regions of the country. While all regions in Kenya have their own unique tourist products, the spread and quality of hotels is found wanting in some areas. In some of the tourism regions, the room occupancies are lower than the national averages, with room occupancies below 40% making it difficult for the hotel sub-sector in these regions to contribute meaningfully to economic development (Figure 2.4).

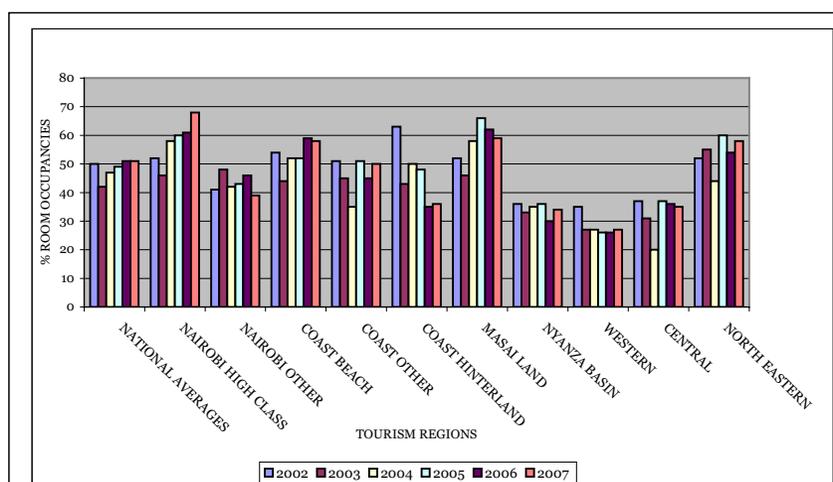
Table 2.5: Comparison of tourist arrivals between 2007 and 2008 for periods 1st January-31st December

Year	Jan	Feb	Mar	Apr	May	Jun
2007	99,602	88,450	85,857	66,993	61,934	74,844
2008	55,906	37,184	46,165	47,088	42,737	50,324
% change	-43.9	-58.0	-46.2	-29.7	-31.0	-32.8

Year	Jul	Aug	Sep	Oct	Nov	Dec	Total
2007	101,988	109,592	92,970	91,081	79,085	96,336	1,048,732
2008	73,519	75,971	67,162	69,292	65,503	98,149	729,000
% change	-27.9	-30.7	-27.8	-23.9	-17.2	1.9	-30.5

Source: Kenya Tourist Board, 2009

The hotel industry is characterized by a mixed production structure. Thus, combined private and public goods and sustained supply and demand for hotel room nights require public investment in tourism support infrastructure and affordable financing to support development and management of tourism facilities, products and markets. This, however, generates challenges in finding effective financing and resource management mechanisms to promote quality assurance and sustainability in the hotel room market.

Figure 2.4: Percentage (%) room occupancy by region (2002-2007)

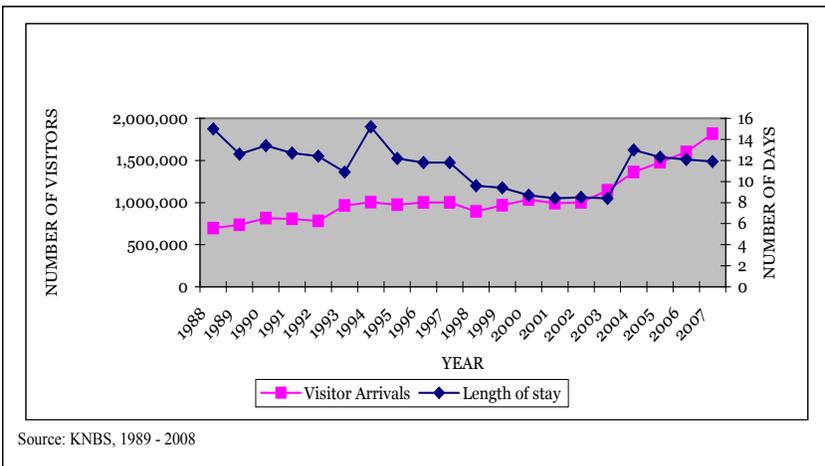
Source: Kenya National Bureau of Statistics, 2003-2008

2.2.7 Length of stay

More arrivals are expected to translate into higher demand for hotel rooms, hence tourist arrivals are expected to have a positive effect on hotel room demand and the length of stay in the destination. However, in Kenya, while the number of visitors has been increasing, the average length of stay has been fluctuating between 8.4 days in 2003 and 11.9 days in 2007 (Figure 2.5).

This could be attributed to the changing consumption patterns, where visitors not only prefer shorter trips due to time constraints, but also visit more destinations due to ease of travel between various tourist destinations as a result of technological advancements in the aviation industry. It could also be attributed to lower visitor satisfaction and lack of diversity in tourism products. Other factors such as diseases, especially the SARS Virus, Avian Influenza, Rift Valley Fever and Swine flu, also influence travel to and from destinations.

Figure 2.5: Comparison between visitor arrivals and average length of stay



Source: Kenya National Bureau of Statistics, 1989-2008

3. Literature Review

3.1 Theoretical Literature

3.1.1 Theory of demand and supply

The demand and supply model specifies that the price (P) of a commodity and quantity (Q) are determined by the intersection of the demand and supply curves for that commodity (Gujarati, 2004). However, demand and supply of commodities is also influenced by other factors (Z) such as tastes and preferences, crises, technology, and infrastructure. Given that the hotel sub-sector is shaped by economic characteristics that fall on both the demand and supply side, it is important to consider an approach that combines both aspects of economic theory.

3.1.2 Simultaneous equations models

Much of the theory in economics is built on sets or systems of relationships. The interaction of the variables in the model has important implications for both interpretation and estimation of the model's parameters (Greene, 2002). This inter-relationship among variables implies simultaneity.

Simultaneous equations occur in occasions where there is a two-way flow of influence among variables in an economic model. This implies that there is an explanatory variable jointly determined with the dependent variable, leading to endogeneity. Endogenous variables are determined within the system, on both sides of the model equation.

Models of the macro economy, sets of factor or commodity demand equations and market equilibrium (e.g demand and supply models), where price and quantity are labelled jointly as dependent or endogenous variables (Gujarati, 2004; Greene, 2002). In such situations, the estimator is biased, inefficient and inconsistent, hence the need for an appropriate methodology to analyze such models.

The two-stage least squares (2SLS) method is the most commonly used for estimating simultaneous equations models. Two-stage least squares is a special case of instrumental variables regression with two distinct stages. In the first stage, 2SLS finds the portions of the endogenous and exogenous variables that can be attributed to the instruments. This stage involves estimating an OLS regression of each variable in the model on the set of instruments. The second stage is a regression of the original

equation, with all the variables replaced by fitted values from the first stage regressions. The coefficients of the regression of the two equations are the 2SLS estimates (Gujarati, 2004; and Greene, 2002).

3.1.3 Factors influencing hotel room supply and demand

The internal and external environment in the hotel sub-sector is tremendously complex and dynamic. Elements such as factor conditions, demand conditions, related and supporting industries, firm strategy, structure and rivalry, chance events and government, are identified as crucial factors in the development of destinations (Cracolici and Nijkamp, 2005). These elements are interconnected and influence performance in the hotel room market in various ways.

Pricing of hotel rooms influences hotel room supply and demand. The costing of hotel rooms, however, depends on various factors including hotel tier (luxury, quality, moderate, economy, extended-stay), type of hotel (business, resort, all-suite, extended-stay, spa, etc), season (peak, shoulder, low), day of the week (weekend vs weekdays), length of stay (sometimes, the longer the stay, the better a rate the client gets), the time of booking (far in advance and, sometimes, last-minute bookings yield better rates), location of the hotel (mid-city, suburbs, etc), location in the hotel (high floor, concierge or club level, view, etc), size of the room (oversized rooms are usually more expensive), number of people in the room (some hotels charge the same for a room, no matter how many people are in it), special discounts (corporate, association membership, frequent guest programme), refundability/changeability, special rate or promotion (like one tied to a holiday or special event), meal plan (some, all or no meals included), rate of exchange, if the hotel is in a country other than the client's home country, and whether the client is part of a group (conference, tour, etc) (Christie and Crompton, 2001).

Development of niche products has an influence on performance of hotels. Firms that cannot attain volume may survive by specializing in a particular market niche. The "field of dreams" theory, "If you build it, they will come" (Culligan, 1990), states that growth in demand occurred in remarkably close relationship to growth in supply, especially in the case of new niche hotels. This shows the crucial role that innovations and market segmentation play in the hotel sub-sector.

Visitor attractions are fundamental to the very existence of tourism given that they tend to draw discretionary travellers away from their

homes or customary environment (Botti *et al.*, 2008; Lew, 1987). Hotels, especially those located in beach resorts, experienced higher demand on the weekends while those in business areas or with meeting facilities had higher demand during the week (Jeffrey and Barden, 2000). Given that different regions have unique attractions, facilities and amenities, they experience diverse room occupancy levels. This has implications on tourism development in these regions and what measures could be put in place to ensure that the hotels sub-sector plays a crucial role in regional development.

Hotel rooms demanded are assumed to be dependent on macroeconomic factors, especially the tourist destination and world GDP (Qu *et al.*, 2002). Hotel room demand in the United States of America was also found to move with GDP (Wheaton and Rossof, 1998). The structural balance of an economy and the economic policies that influence its development are shown to be determinants of the volume and structure of hotel supply (Slattery, 2009).

Increasing income and wealth, emerging new motives and changing lifestyles are important factors in explaining the nature of globalization in tourism demand. Tourists are more experienced and knowledgeable, for example, in languages, use of transportation and booking (Cho, 2005). The changing lifestyles influence tastes and preferences that the supply side always seeks to offer. Age distribution, income distribution, occupation and gender were also found to be statistically significant in determining hotel room demand (Ratz, 2007; and Palakurthi and Parks, 2000).

Visitor arrivals form an important aspect of hotel room supply and demand. Changes in number of arrivals may shift demand for hotel room nights in a positive or negative way (Qu *et al.*, 2002; Law, 1998). Closely related to visitor arrivals is length of stay, which is also a crucial aspect in the hotel room market. Longer stays lead to better performance of hotel room market.

Seasonality is widely recognized both as a phenomenon and an issue in the tourism industry, and is one of the factors that influence the hotel room market, with many destinations having peak seasons and low seasons based on various factors such as weather conditions and events (Capo *et al.*, 2007; Koenig and Bischoff, 2004; and Rosello *et al.*, 2004).

As the hotel room market becomes more sophisticated, there are greater attempts to differentiate (Lee, 2005). Each hotel has its own

unique features, which vary depending on management and star rating on various facilities and services within the hotel. The resource based view of the firm points to the firm’s unique resources, core competencies and dynamic capabilities in a rapidly changing market as the real justifications of the differences results in the same activity. While resources are the source of a firm’s capabilities, they are the main source of its competitive advantage. Core competencies evolve over time as the firm adapts to new circumstances and opportunities (Turunen, 2006; Lopez *et al.*, 2004). This capacity to offer and increase value for the customer is a critical factor, which is accentuated more within the hotel sector where customer loyalty shows dynamic and volatile characteristics.

Tourism regions are not created equal and reveal significant spatial differences in terms of resource availability and actual perception of these resources (Sandro and Uysal, 2006). These factors play an important role in informing supply and demand. Tourists treat all destinations differently (Zhang and Jensen, 2007). This applies to hotels as well, given that each hotel offers a range of heterogeneous products and services that vary in appeal. The criterion of market demand characteristics (Table 3.1) indicates that there are dissimilarities that influence a customer’s selection of a particular destination. This criterion could be used to establish the basis for predicting Kenya’s hotel industry’s position within the market (Government of Kenya, 2007).

Not all visitors to the country stay in hotels. Some stay in alternative accommodation facilities such as hostels, villas, holiday homes, private houses for family and friends, rental apartments and guest houses. The percentage of visitors who stay in hotels and those who patronize other alternative accommodation is, therefore, important in analyzing hotel

Table 3.1: Market demand characteristics based on customer preference

Market	Budget	Budget–luxury	Luxury–high end
Most important	Price	Travel time	Image
	Travel time	Quality	Quality
	Quality	Price	Management
	Management	Image	Travel time
	Amenities	Management	Amenities
Least important	Image	Amenities	Price

Source: Ministry of Tourism, 2007

room supply and demand. Commercial hotels thus face considerable competition from supplementary (alternative) tourist accommodation (Tisdell, 1998).

If more visitors stay in other forms of accommodation, there will be less demand for hotel rooms and in the long run investors will pull out of investing in the hotel sub-sector as it will no longer be lucrative. Destination factors (such as government policies, weather conditions national wealth, incentives, favourable tax regimes, and provision of public utilities) thus play an important role in altering the comparative advantage of tourism exporting countries through subsequent shifts in these factors of endowments, and Kenya's hotel room supply and demand is no exception (Zhang and Jensen, 2007; Law, 1998).

The impact of occupancy taxes on lodging demand implies that taxation of such facilities may have an influence on developments in the hotel sub-sector (Tisdell, 1998). The general level of development of a country will also determine visitation and participation in tourism related activities (Khadaroo and Boopen, 2006, 2007; Palhares, 2003; and Prideaux, 2000). Provision of public goods and services such as infrastructure, taxes, security, policies and procedures, standards and tourist attractions play a vital role in the hotel room supply and demand. These destination aspects will help determine entry or exit from the hotel room market in a particular country.

The changing international and regional trading in services arrangements will significantly influence various sectors within nations (Anastasiadou and Sausmarez, 2006). The multilateral trading in services arrangements under the World Trade Organization (WTO) and the regional trading arrangement under the Economic Partnership Agreement (EPA) between Eastern and Southern African (ESA) countries and European Union (EU) will be critical determinants of the opportunities for tourism development as well as the potential for adopting various economic strategies to enhance the hotel sub-sector. It is expected that both the Common Market for Eastern and Southern Africa (COMESA) and the East Africa Community (EAC) will increasingly become important markets for Kenya's hotel rooms.

While these developments provide opportunities that Kenya could exploit, the country is likely to face severe competition from other more competitive countries. It is critical that Kenya finds strategies of enhancing its hotel room market by putting in place various incentives that could spur developments in this sub-sector.

Tourism is often considered volatile. As a global industry, all destinations face the heightened risk of terrorist attacks which, together with civil strife, diseases, war and natural disasters, can terminate demand for the product for a prolonged period (Christie and Crompton, 2001). Crime and poor public health standards in a specific destination can greatly reduce demand for an indefinite period after it is proven. Fluctuations due to various risks and crises could impact on the hotel sub-sector, hence the need to ensure conducive country conditions so as to develop the hotel industry.

Internationalization of tourism activities is one of the results of globalization of international investment, which encourages hotel companies to search for new destinations in an effort to diversify and have a more flexible service (Rodriguez, 2002). Foreign-owned hotel chains are usually more efficient in production than individual-owned hotels and may be easier to protect their competitive advantage by easier access to new technology, registered brand names and superior connections with particular airlines, and other transport operators. Many travellers, especially the international tourists, will prefer to use a chain which ensures a relatively standardized product of known quality, especially when visiting the Least Developed Countries (Ikiara *et al.*, 2007; Tisdell, 1998).

Technological innovations influence demand and supply in the hotel room market (Orfila-Sintes *et al.*, 2005). Many argue that ICT can 'level the playing field' for smaller enterprises that have difficulty in accessing traditional tourist distribution channels (Milne *et al.*, 2004). These channels of communication thus influence enterprise, owing to the increased use of ICTs among potential clients, which makes more and more visitors to by-pass travel agents. Through use of ICTs, hotels owned by local individuals could enhance their market presence.

3.2 Empirical Literature

Various studies have attempted to analyze hotel room supply and demand. The study by Tsai *et al* (2006) analyzed hotel room supply and demand in Las Vegas during 1992-1999 using the simultaneous equations model and the two-stage least squares methodology. The results indicate that room rate (price) for the current month, the 3 months Treasury bill rate, and gaming revenue per room for the 12 months prior, are the three determinants of the room nights supplied, while consumer price

index for the current month was found to be the only determinant of the room nights sold.

Qu *et al* (2002) used the simultaneous equations model and the two-stage least squares methodology to identify factors that influenced imbalance in hotel room demand and supply, and their overall influence on the Hong Kong hotel industry between 1980 and 1998. They found that hotel room price and tourist arrivals are significant factors driving demand for hotel rooms. In addition, the 1990-1991 economic recessions and the 1997-1998 Asian financial crisis had a significant negative impact on the demand for hotel rooms in Hong Kong. The study further indicates that room price (denoting the supply function) is affected by hotel room quantity demanded, room occupancy rate, last periods room price, labour cost and other factors in the destination such as price of private office converted from hotel room space (Grade A offices), the Asian financial crisis and recession during the period under study. The exchange rate between the local and foreign currencies of generating markets, income, consumer price index, and labour costs are also important determinants of performance of hotels.

Hotel room occupancy in Hong Kong between 1973 and 1995 was forecasted using the Neural Network approach (Law, 1998). The study used the number of tourist arrivals, number of hotel rooms and the percentage of hotel accommodation utilized by visitors as demand side factors, while the supply side factors included the number of hotels and number of hotel rooms. The number of tourists per room variable was used as a measure of demand-to-supply ration that has a direct relationship with room occupancy rates. The experimental results indicate that using neural networks to forecast room occupancy rates outperforms multiple regressions and naïve extrapolation, two commonly used forecasting approaches.

The Otus theory of hotel demand and supply predicts that the structural balance of an economy and the economic policies that influence its development are determinants of the volume and structure of hotel supply. Features of an economy are also determinants of the volumes of domestic hotel business and leisure demand (Slattery, 2009).

Using the concept of occupancy performance, Jeffrey and Barden (2000) conducted a Time Series Factor analysis and identified four temporal dimensions of occupancy performance in 279 English hotels between January 1992 and December 1994. They state that overall occupancy levels, seasonality, long-term room occupancy performance

and length of season, influence performance of hotels and could be used in monitoring their performance.

The study on technical efficiency of African hotels over the years 2000-2006 analyzed the critical issues associated with the management of hotels in Africa (Barros and Dieke, 2008). The study appreciates the importance of tourism as a crucial activity in the economic development of the African continent, and states that efficiency may derive from a host of contributory factors, including intensity of market competition, firm organization and market concentration. Using Data Envelopment Analysis (DEA), the study analyzed the technical efficiency of Luanda hotels in Angola and noted that market share and international growth orientation strategies contribute to efficiency. The study also notes that differences in structural characteristics of firms within an industry cause differences in performance.

Perceptions of overseas visitors to Kenya towards the impact of the hotel sector on the environment indicate that less than half of the respondents believed that Kenya's wildlife parks were managed on a sustainable basis, while two-thirds felt that hotels exercised some impact on the environment. The results showed consciousness among clients on effects of investments on the environment, with 66.5 per cent of the respondents willing to pay a higher rate for an environmentally-friendly hotel (Musau and Prideaux, 2003).

International expansion into the hotel industry influences hotel room supply and demand. The study to determine factors in entry choice of international expansion in the Spanish hotel industry (Rodriguez, 2002) indicates that the development level of the destination, its risk level, the existence of FDI in the country, the company's degree of internationalization and the perception that its executives have of size, the image of its trade name and its quality control are the variables that best explain the different choices of entry modes made by Spanish hotel companies to enter foreign markets.

Economic indicators are important in gauging turning points in the hotel industry. In order to develop an economic indicator system for the US hotel industry to project the industry's growth and turning points, Choi (2003) conducted a comprehensive literature review. Using the National Bureau of Economic Research turning point criteria and statistical correlation method, 12 leading, 10 coincident, and 10 lagging indicators were identified. The performances of the indicator system demonstrated that the system has great potential as a forecasting method.

The final indicators for forming composite indices and cross-correlation of the component series of the hotel indicators, 1966-1993, were as follows: *Leading indicators series* were American stock exchange index, business failures, CPI for motor fuels, hotel dividends per share, GDP of service, hotel stock index, money supply (M2) in constant dollars, New York stock exchange index, prime interest rate charged by banks, S&P 500 stock price index, savings percentage of disposable income, wages and salaries. *Coincident indicators series* were: average weekly initial claims for unemployment insurance, consumer confidence, consumer expenditures in service industry, GDP, hotel failure liabilities, manufacturers' unfilled orders in non-durable goods industries, hotel occupancy percentage, the value of new construction in general business, total square feet of hotel construction and value of hotel construction. *Lagging indicators series* were: discount rate on new issues of 91-day treasury bill, federal funds rate, GNP, hours of all persons in business sector, percentage change, interest rate in hotel industry, net new room openings, new housing units, value put in place, total employment, unemployment rate, persons unemployed 15 weeks and over, and unit labour costs in business sector percentage change.

Optimal choice of quality in hotel services has implications on hotel room supply and demand. While the need for sustainability of mass tourist destinations calls for reorientation towards the high quality segment, using a vertical differentiation duopoly model in which hotels compete in both quality and prices, Garcia and Tugores (2006) found that efficient solutions allow for the coexistence of both the high and low quality segments, and that an expansion of the former does not necessarily improve welfare.

3.3 Synopsis

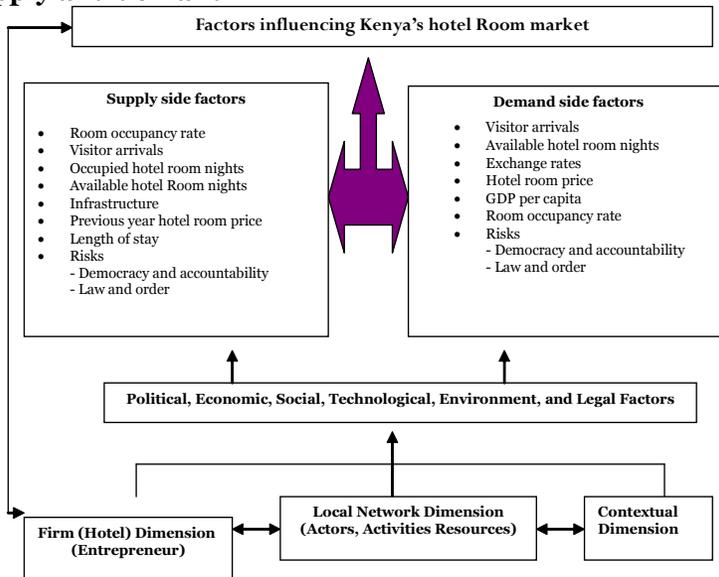
The literature review shows that there are many other factors that influence hotel room supply and demand. Changes in these factors could present opportunities and threats to the hotel sub-sector. Due to the two-way influence among the variables, the simultaneous equations model and the instrumental variables/two stage least squares were found to be appropriate in this study.

4. Methodology

4.1 Conceptual Framework

The analytical methodology in this study is based on the theory of supply and demand and the simultaneous equations model given that there are situations where there is a two-way flow of influence among the variables. Many factors in the internal dimension (firm) and external dimension (local and global network) influence the hotel room nights' market. These factors could be categorized under political, economic, social, technological, environment and legal influences. The hotel room supply function (denoted by price) is thus deemed to be influenced by room occupancy rate, visitor arrivals, occupied hotel room nights, available hotel room nights, hotel room price of the previous year, length of stay, infrastructure, democracy and accountability risk index, and law and order risk index, while the demand function (denoted by occupied hotel room nights) is seen to be influenced by democracy and accountability risk index, and law and order risk index, in addition to visitor arrivals, number of available hotel room nights, exchange rates, hotel room price, GDP per capita, and room occupancy rate. Figure 4.1 thus conceptualizes the framework for examining hotel room supply and demand in Kenya.

Figure 4.1: Conceptual framework for analyzing hotel room supply and demand



Source: Adopted from Ministry of Tourism (Government of Kenya, 2008); Qu et al (2002); and Rossiter (2003)

Apart from the listed variables used to estimate the demand and supply equations, there are many other factors that influence the performance of the hotel room market in Kenya. However, due to unavailability and difficulty in providing an acceptable form of measuring some of the data on variables that could influence hotel room supply and demand, some hotel-specific factors and destination specific factors were not specified in the estimation of the supply and demand equations, yet they could have a positive or negative influence on hotel room supply and demand.

4.2 Data Sets and Sources

There is a huge number of potential factors explaining tourism demand. The specification of the demand function varies according to the countries or regions used, the time period of the study, the type of the data (time series or panel data) and the nature of tourism (holidays, business trips, visits to family or friends, etc). In order to undertake the study, annual data was preferable due to its availability and also in order to avoid seasonality problems, which are dominant in the tourism sector (Proença and Soukiazis, 2005).

Data used in the study comprised time series observations from 1988 to 2007 for the variables (Table 4.1). Each variable has 20 observations. In economic models, price is an important determinant of the demand for a commodity. However, in the case of international tourism, it is difficult to decide how best to represent the tourists' cost of living in a destination country. In this regard, the consumer/retail price index in the host country and the exchange rate (either alone or together with the exchange rate), is considered a reasonable proxy (Tisdell, 1998). Owing to lack of sufficient credible data to represent Kenya's hotel room price, and due to the diverse pricing strategies used by hoteliers, the CPI was used as a proxy for hotel room price.

The risk and environment factors of democracy and accountability, and that of law and order, as computed by the World Bank and Transparency International, were used as proxies for various risks such as terrorism, diseases, war and violence that have affected the hotel sub-sector. The level of risk ranges from 0 to 6, with 0 being rated lowly and 6 being the best index.¹ The GDP for United Kingdom² was used as

Table 4.1: Variable definitions

Variable	Symbols	Source
Dependent variable for the supply equation– Hotel room price	dlmpr2	KNBS (1988-2008)
Number of hotel room nights available in Kenya	dlnahrn	KNBS (1988-2008)
Is the average room price lagged one year (CPI for Kenya was used as the price variable)	Lagpr	KNBS (1988-2008)
Length of stay (Number of days)	dlnls	KNBS (1988-2008)
Average number of hotel room nights occupied	dlnochrn	KNBS (1988-2008)
Room occupancy rates (%)	lnocc	KNBS (1988-2008)
Democracy and accountability	dlnda	World Bank and International Risk Rating Organization
Law and order	dlnlo	World Bank and International Risk Rating Organization
Visitor arrivals in Kenya (in thousands)	dlnarr	KNBS (1988-2008)
Infrastructure for Kenya (Number of kilometres of bitumen roads)	lninfra	KNBS (1988-2008)
Dependent variable for the demand equation– Occupied Hotel Room Nights' (1988-2007)	dlnochrn	KNBS (1988-2008)
Is the average room price (CPI for Kenya was used as proxy for the price variable)	dlmpr2	KNBS (1988-2008)
Room occupancy rates (%)	lnocc	KNBS (1988-2008)
Number of hotel rooms nights available in Kenya	dlnahrn	KNBS (1988-2008)
Visitor arrivals in Kenya (in thousands)	dlnarr	KNBS (1988-2008)
Exchange rate between Ksh and the USD	dlner	KNBS (1988-2008)
Gross Domestic Product for (UK) Leading visitor source market was used as a proxy for world GDP	dlngdp	IMF Website
Democracy and accountability	dlnda	World Bank and International Risk Rating Organization
Law and order	dlnlo	World Bank and International Risk Rating Organization

the proxy GDP for visitors generating countries for Kenya's hotel room nights, while kilometres of bitumen roads were used as a proxy for infrastructure variable (INFRA).

4.3 Empirical Framework

Both descriptive and econometric techniques are used in the analysis of hotel room nights supplied and hotel room nights demanded.

4.3.1 Descriptive analysis

Summary statistics of the various variables in the supply and demand for hotel room nights' equations are highlighted using various descriptive measures.

4.3.2 Econometric analysis: Econometric tests

The choice of the explanatory variables to be included in the models is sensitive to problems; hence the importance of conducting various econometric tests before estimation of the equations.

- (i) *The identification problem*: Tests for identification are undertaken in order to determine the identity of the equations leading to the conclusions as to whether the equations are identified or not, and whether the identification is exactly identified or over-identified. These tests of identification ensure that an appropriate and consistent estimation procedure is outlined (Gujarati, 2004).
- (ii) *Unit root tests*: A main assumption of the regression model that guarantees the validity of all tests (p, t and f) is that residuals behave 'normal'. Stationarity tests were performed for each variable using the Augmented Dickey-Fuller Test and the Phillips-Perron Test.
- (iii) *Multicollinearity tests*: An important assumption for the multiple regression model is that independent variables are not perfectly multicollinear. The Pairwise Correlation test for multicollinearity was undertaken to test for correlation among variables.

¹ Data is sourced from the International Risk Rating Organization and the World Bank.

² International Monetary Fund <http://www.econstats.com/weo/CGBR.htm>, accessed on 18/11/2008.

- (iv) *Heteroskedasticity tests*: An important assumption is that the variance in the residuals has to be homoskedastic, meaning constant variance. The Breusch-Pagan test for heteroskedasticity was undertaken.
- (v) *Tests of simultaneity and endogeneity*: It is important to test for simultaneity and specify which variables are endogenous and which are exogenous. The Hausman’s specification error test was undertaken to ensure that consistent and efficient estimators are produced.

4.4 Model Specification

The supply and demand model for the Hong Kong and Las Vegas hotel room market by Qu *et al.* (2002) and Tsai *et al.* (2006) respectively, form the theoretical basis for this study. Because of the simultaneous dependence between hotel room demand and supply aspects, the empirical demand-and-supply function may be written as:

$$\begin{aligned}
 Demand (Q_d) &= f [P_r Z_1] \dots\dots\dots [1] \\
 Supply (Q_s) &= f [P_r Z_2] \dots\dots\dots [2]
 \end{aligned}$$

Apart from price (P_t), there are other variables (Z_t) stemming from various influences that also affect the hotel room market [(Demand (Q_d) and Supply (Q_s)). The econometric implementation of the full theoretical model involves estimating the structural equations (1-2), where the occupied hotel room nights’ ($OHRN_t$) is the dependent variable for the demand model, while the independent variables are price (PR_t), visitor arrivals (ARR_t), which is instrumented using number of available hotel room nights’ in Kenya ($AHRN_t$), exchange rate (ER_t), GDP per capita (GDP_t), room occupancy rates (OCC_t), democracy and accountability (DA_t), and law and order (LO_t).

Hotel room price (PR_t) is the dependent variable for the supply model, while the independent variables are price of hotel room lagged one year ($LAGPR_t$), available hotel room nights ($AHRN_t$), which is instrumented using visitor arrivals (ARR_t), length of stay (LS_t), infrastructure ($INFRA$), quantity of rooms demanded ($OHRN_t$), room occupancy rates (OCC_t), democracy and accountability (DA_t), and law and order (LO_t).

The simultaneous equation system of Kenya's hotel room demand and short-run supply is specified as follows:

$$\text{Supply}[PR_t] = f[\beta_{10} + \beta_{11}OCC_t + \beta_{12}AHRN_t + \beta_{13}ARR_t + \beta_{14}OHRN_t + \beta_{15}INFRA_t + \beta_{16}LAGPR_t + \beta_{17}LS_t + \beta_{18}DA_t + \beta_{19}LO_t + v_t] \dots \dots \dots [3]$$

$$\text{Demand}[OHRN_t] = f[\alpha_{10} + \alpha_{11}AHRN_t + \alpha_{12}ARR_t + \alpha_{13}OCC_t + \alpha_{14}PR_t + \alpha_{15}ER_t + \alpha_{16}GDP_t + \alpha_{17}DA_t + \alpha_{18}LO_t + u_t] \dots \dots \dots [4]$$

4.5 Estimation Method

Since one or more of the explanatory variables in hotel room supply and demand are correlated, the simultaneous equation model forms a basis for analysis in such situations. The 2SLS is the appropriate technique when the fundamental assumption of regression analysis that some of the right-hand side variables are uncorrelated with the error terms is violated.

5. Results and Discussions

5.1 Data Description

The profile of the various variables used in the demand equation is outlined in Table (5.1), which presents their mean, standard deviation, and minimum and maximum values. Each variable had 20 observations. The time series data was obtained for the period 1988 to 2007.

From the data, it is noted that on average, Kenya received 1,053,615 visitors each year, while the demand for hotel room nights ranged between 1,822,000 and 4,837,000. On average, half of Kenya's hotel room nights have been utilized, with the average room occupancy rate being 50.35 per cent over the last 20 years.

During the 1988-2007 period, the Kenya shilling fluctuated against major world currencies in the range of Ksh. 18.6-78.6 against the US\$ on average. GDP per capita in major world economies has been growing, an aspect that is reflected in the upward trend in a number of Kenya's hotel room nights demanded. GDP for visitors who form the bulk of patrons for Kenya's hotel room nights fluctuated between US\$ 14,733.5 and 45,574.74, with a mean of US\$ 24,862.5.

Table 5.1: Profile of variables used in the demand equation

Variable	Obs	Mean	Std. Dev.	Min	Max
Occupied hotel room nights (ohrn) '000	20	2932.65	794.0829	1822	4837
Available hotel room nights (ahrn) '000	20	5810.4	1013.667	4336	8289
Visitor arrivals (arr) '000	20	1053.615	2947.7528	694.9	1816.9
Hotel room nights occupancy rate (%) (occ)	20	50.35	7.781726	40	66
Exchange rate-Ksh vs US\$ (er)	20	57.0795	20.75662	18.6	78.6
Price of hotel room (pr)	20	93.693	62.4732	19.08	226.9
GDP per capita (GDP) USD	20	24862.5	8790.83	14733.5	45574.74
Democracy and accountability risk index (da)	20	3.4	0.753937	2	5
Law and order risk index (Lo)	20	2.925	0.7304469	1.5	4
Visitors per hotel room (vphr)	20	66.4916	15.14021	46.94328	96.47751
Length of stay (ls)	20	11.515	2.071428	8.4	15.2
Infrastructure (infra)	20	8238.539	1989.122	8.672	9273.3

Source: Authors computations from variables used in the equations

The democracy and accountability index shows that Kenya's rating fluctuated in the range of 2 to 5, while the law and order index shows low ratings over the same period ranging from 1.5-4. The two indexes show that Kenya has been performing well, especially during the 2003-2007 period, in matters of democracy and accountability, and law and order, which is in tandem with the impressive visitor arrivals during the period.

Kenya recorded the lowest number of visitors per hotel room in 1994 (46.9), while the highest number (96.5) was recorded in 2003. However, since then, the number of visitors per hotel room has been declining. On average, overseas visitors spend 11.5 days in Kenya. The highest length of stay was 15.2 days experienced in 1994, with the lowest being 8.4 experienced in 2001 and 2003. Over the period, infrastructure developments, represented by number of bitumen roads, ranged between 8.672 and 9,273.3km, with an average of 8,238.539km.

It was noted that data from some hotels and other forms of accommodation such as villas, private houses, youth hostels and motels, that are patronized by visitors, is not recorded in the annual Economic Surveys and Statistical Abstracts. This calls for harmonization of data from the public and private stakeholders by developing and maintaining an up to date database for the hotel room market.

5.2 Time Series Properties of the Quantitative Data

5.2.1 Identification problem

Identification of an equation in a model of simultaneous equations is possible if that equation excludes one or more variables present elsewhere in the model. Following the exclusion (of variables) criterion, the supply function is over-identified as it excludes three variables in the demand equation, while the demand function is over identified as it excludes four variables in the demand equation. The order condition of identification is thus satisfied (Gujarati, 2004).

5.2.2 Unit root tests

The results of Augmented Dickey-Fuller (ADF) test and Phillips-Perron (PP) test for Unit Root, together with the critical values $z(t)$ and Mackinon p -values $z(t)$, are presented in Table 5.2 and Appendix 2, respectively. Apart from hotel room occupancy rate ($\ln occ$) and infrastructure ($\ln infra$), the hypothesis for non-stationarity could not be rejected at

Table 5.2: Augmented Dickey-Fuller test

Variable	ADF Tests at Level		ADF test at 1 st or 2 nd difference		Order of integration
	Adf Z (t)	MacKinnon approx. p-value for Z(t)	Adf Z (t)	MacKinnon approx. p-value for Z(t)	
Occupied hotel room nights (lnohrn)	-3.139	0.0238	-6.626	0.0000	1
Available hotel room nights (lnahrn)	-1.365	0.5990	-3.909	0.0020	1
Visitor arrivals (lnarr)	-0.524	0.9856	-3.498	0.0080	1
Room occupancy rate (%) (lnocc)	-5.291	0.0000	-	-	-
Exchange rate (lner)	-2.498	0.1159	-5.218	0.0000	1
Price of hotel room (lnpr)	-1.190	0.6779	-2.954	0.0394	2
			-4.888		
GDP per capita (lngdp)	-0.795	0.9916	-3.541	0.0070	1
Democracy and accountability risk index (lnda)	-2.643	0.084	-4.824	0.0000	1
Law and order risk index (lno)	-2.071	0.2563	-4.784	0.0001	1
Length of stay (lnls)	-2.312	0.1682	-5.763	0.0000	1
Infrastructure (lninfra)	-4.349	0.0004	-	-	-
Visitors per hotel room (lnvphr)	-1.108	0.7117	-5.172	0.0000	1
1% critical value (-3.750); 5% critical value (-3.000); 10% critical value (-2.630)					

level. However, the other variables in the estimation attain stationarity when differenced at either the 1st or 2nd order of integration.

The Multicollinearity tests showed that there was correlation among some variables in the supply and demand equations. The Pairwise correlation test results are given in Appendix 3 and 4. Heteroskedasticity tests were carried out and the null hypothesis that the residuals are homoskedastic was rejected, hence the conclusion that the residuals are heteroskedastic (Appendix 5). This was corrected using the robust standard error.

Simultaneity and endogeneity tests indicate that the demand equation exhibited both simultaneity and endogeneity. The residuals in the supply and demand functions were found to be statistically significant (Appendix 6). The supply equation did not exhibit endogeneity, but simultaneity was present. The residuals in the simultaneity test were significant while those of the endogeneity test were not found to be statistically significant (Appendix 7).

Given that there are endogenously determined variables on the right hand side of the equation, possibility of some right hand variables measured with error, and since the tests for identification show that

equations (3) and (4) are over-identified, the instrumental variables/two-stage least squares (2SLS) was found to be the most appropriate and consistent estimation procedure compared to OLS. The idea behind instrumental variables is to find a set of variables that are both correlated with the explanatory variables in the equation, and uncorrelated with the disturbances. The coefficients produced will also be consistent when applying 2SLS (Gujarati, 2004). The statistical software STATA Version 10.0 was used to estimate both stages of the equations.

5.3 Empirical Results

The parameter estimates are summarized in Appendix 8 and 9 for the demand and supply equation, respectively.

5.3.1 Estimation of the demand equation

Visitor arrivals (dlnarr), hotel room occupancy rates (lnocc), exchange rates (dlner) and law and order risk index (dlnlo) are the key variables that significantly influence demand for hotel room nights in Kenya (Table 5.3). Price of hotel rooms (dlnpr2), per capita GDP (dlnngdp), and democracy and accountability risk index (dlnnda) were found not to be significant in determining demand for hotel room nights.

The R^2 of 0.63 for the demand equation indicates that the explanatory variables could account for 63 per cent of the variation in the dependent variable (number of rooms occupied). The high goodness of fit implies that these determinants could be used to analyze factors that influence demand for hotel room nights in Kenya. The d-statistic = 2.66 suggests lack of serial correlation among the variables.

- (a) *Visitor arrivals*: The number of visitor arrivals (dlnarr) 2.99 ($p < 0.1$) was found to significantly influence the estimated short-run hotel room demand, with a 1 per cent increase in visitor arrivals leading to a 2.99 per cent increase in room demand. This result is similar to that of Qu *et al* (2002) who found visitor arrivals to be significant in driving demand for hotel rooms. The coefficient for arrivals indicated that for an increase of 1,000 tourist arrivals in Hong Kong per year, a daily demand of about 1.7 rooms is generated.

This reaffirms the need to encourage more visitors to come to Kenya. However, sustained visitation to Kenya has implications on mechanisms to promote Kenya as a tourist destination of choice,

Table 5.3: 2SLS estimates of structural parameters for the demand equation

Variable	Coefficients	Robust standard error	t	p>(t)
_cons	-3.957197	1.961288	-2.02	0.071
dlnarr	2.994022*	1.357549	2.21	0.052
lnocc	1.013083*	.5165292	1.96	0.078
dlner	-1.013835**	.3913419	-2.59	0.027
dlnpr2	1.072817	.8041206	1.33	0.212
dlngdp	-1.141821	.9038967	-1.26	0.235
dlnda	-.2078337	.2430686	-0.86	0.413
dlnlo	-.6101612*	.2988103	-2.04	0.068
Prob > F = 0.0146		R-squared = 0.6270	Root MSE = 0.2736	
Durbin-Watson d-statistic (8, 18) = 2.662349				

*90% level of significance; **95% level of significance; ***99% level of significance

$$[OHRN_t] = -3.95 + 2.99ARR_t + 1.01OCC_t + 1.07PR_t - 1.01ER_t - 1.14GDP_t - 0.20DA_t - 0.61LO_t + u_t$$

given that visitor arrivals are crucial to the success of Kenya's hospitality industry. The public and private sector in tourism needs to understand the visitor source markets well, with the aim of linking up potential clients to products that appeal to their tastes and preferences.

- (b) *Room occupancy rate*: Room occupancy rate (lnocc) 1.01 ($P < 0.1$) was found to be significant and its positive coefficient was per expectation. A 1 per cent increase in room occupancy rate would lead to 1.01 per cent increase in demand for hotel room nights. This result is similar to the conclusion of Jeffrey and Barden (2000), who found that room occupancy performance, influenced performance of hotels. Hotel room occupancy offers greater credence from a managerial point of view since once a room is occupied even by one person, it is no longer available for sale, thus it is the selling of room spaces rather than bed spaces that is the main focus (Jeffrey and Barden, 2000). As a rule, a hotel needs to sustain about two-thirds of utilization of its rooms if it is to break even; below this level of capacity utilization, the hotel is likely to operate at a loss and above this level of utilization, it will be operating profitably (Law, 1998; and Tisdell, 1998).

- (c) *Exchange rate*: Exchange rate (dlner) -1.01 ($p < 0.05$) was also found to be significant in the demand equation. The negative coefficients of exchange rate implies that with a 1 per cent appreciation of the Kenya shilling against major world currencies, there will be a decrease in demand for hotel rooms by 1.01 rooms, given that it will be more expensive to travel to Kenya. This result is per expectation.
- (d) *Law and order*: Law and order risk index (dlno) -0.61 ($p < 0.1$) was found to be significant in the influence of both risks on hotel room demand equation. The negative coefficients of the law and order ranking index shows that whenever there is a 1 per cent escalation in incidents related to crime and lawlessness, demand for hotel room nights will be influenced in a negative manner as per expectation and hotel rooms demanded will fall by 0.61 rooms.

5.3.2 Estimation of the supply equation

Previous year's hotel room price (Lagpr), law and order risk index (dlno), length of stay (dlns) and the number of hotel room nights demanded (dlnohrn), were found to significantly influence hotel room price in the supply equation (Table 5.4). Number of available hotel rooms (dlnahrn), room occupancy rate (lnocc), democracy and accountability risk index (dlnda) and infrastructure (lninfra) were not significant in the supply analysis.

From the empirical analysis, the estimated supply equation has an R^2 of 0.79, indicating that the explanatory variables could account for 79.93 per cent of the variation in the dependent variable (number of rooms supplied). The goodness of fit in the supply equation implies that these determinants could be used to analyze factors that influence hotel room nights demanded in Kenya. The d-statistic = 1.34 suggests serial correlation.

- (a) *Previous year's hotel room price*: Interest rates (Lapr) play a significant role in the supply equation. The positive coefficient of interest rates 0.37 ($p < 0.1$) is per expectation. This shows that a 1 per cent increase in previous year's hotel room price will attract new investments in the hotel sub-sector, in anticipation of higher returns on investments due to favourable prices by 0.37 per cent. This result is similar to that of Qu *et al.* (2002) who found that HK\$ 1.00 increase in the previous year's price is associated with about HK\$ 1.6 hike in current price. While sustained prices of hotel rooms

Table 5.4: 2SLS estimates of structural parameters for the supply equation

Variable	Coefficients	Robust standard error	t	p>(t)
_cons	1.234535	0.626915	1.97	0.084
dlnahrn	-0.0546776	0.2115016	-0.26	0.803
lnocc	-0.2636378	0.1576668	-1.67	0.133
Lagpr	0.3728987*	0.186777	2.00	0.081
dlnlo	0.4214864**	0.1519792	2.77	0.024
dlnnda	-0.0737028	0.064551	-1.14	0.287
dlnls	-0.8534192***	0.2077833	-4.11	0.003
lninfra	-0.0249818	0.0177489	-1.41	0.197
dlnohrn	0.300907***	0.0898489	3.35	0.010
Prob. > F = 0.0003		R-squared = 0.7993	Root MSE = 0.07727	
Durbin-Watson d-statistic (9, 17) = 1.342656				

*90% level of significance; **95% level of significance; ***99% level of significance

$$[PR_t] = 1.23 - 0.26OCC_t - 0.05AHRN_t + 0.30OHRN_t - 0.02INFRA_t + 0.37LAGPR_t - 0.85LS_t - 0.07DA_t + 0.42LO_t + v_t$$

are important, other factors to support such prices, especially value for money paid and quality services offered, are important.

- (b) *Law and order risk index*: Law and order risk index (dlnlo) 0.42 ($p < 0.05$), was found to be significant in influencing the supply equation. The positive coefficient of the law and order risk index shows that whenever there is a 1 per cent increase in law and order, ranking index and price of hotel room will be influenced positively by 0.42 per cent. The hotel industry can deteriorate quickly if important elements in the overall tourism product such as physical security are absent (Christie and Crompton, 2001). The results show that law and order play an important role in determining hotel room price.
- (c) *Length of stay*: The analysis shows that the average length of stay is a crucial determinant of hotel room supply. The negative coefficient of length of stay (dlnlos) 0.85 ($p < 0.01$) indicates that a 1 per cent increase in average length of stay will decrease hotel room prices by 0.85 per cent. This implies that the longer the stay, the better the hotel room price a client gets. Length of stay is one of the key

elements in a visitor's decision-making process and is of fundamental importance for the hotel industry. Awareness of tourists' length of stay and the factors that determine the stay is an essential element for good planning and management at tourist destinations (Martinez-Garcia and Raya, 2008; Gokavalia *et al*, 2007). The price of the tourist product, in its broadest sense, must therefore adapt itself to influence the amount of time the tourist was available at destination.

- (d) *Average number of rooms demanded*: The average number of rooms (lnochrn) demanded 0.30 $P < 0.01$ was found to be significant in hotel room supply denoted by price. The positive coefficient implies that a 1 per cent increase in the number of hotel rooms occupied will influence hotel room price by 0.30 per cent. The positive coefficient shows that Kenya's hotel room price moves in the same direction with the number of rooms demanded. This result, though similar to that of Qu *et al* (2002) in terms of significance, the positive coefficient in this study deviates in terms of direction. Qu *et al* (2002), found that price and quantity demanded were inversely related, with the negative coefficient of demand for hotel rooms being -0.0532, which implies a price flexibility of -1.6 at the sample means. The movement in the same direction in this study, however, has an implication on meeting clients expectations and ensuring value for money if such a trend is to be sustained, as opposed to lowering prices in an effort to raise room occupancy.

6. Conclusions and Policy Recommendations

6.1 Conclusions

This study set out to identify and analyze the factors influencing demand for Kenya's hotel room market. The empirical analyses shows that various factors at the firm level (characteristics of hotels and the environment "local and global" in which they operate and events around the world) have potential effect on hotel room performance. These characteristics yield insights into the size and geography of tourist flows and how they impact and influence Kenya's hotel room market.

Visitor arrivals, hotel room occupancy rates, exchange rates and law and order risk index are the key variables that significantly influence demand for hotel room nights in Kenya.

Kenya's business environment and events in the global context such as terrorism also influence demand and supply for Kenya's hotel room market. These are reflected in law and order risk index.

Previous year's hotel room price, law and order risk index, length of stay and the number of hotel room nights demanded were found to significantly influence hotel room price in the supply equation. This implies that in the short run, previous year's hotel room price could boost confidence to invest in more hotel rooms and charge more in anticipation of favourable returns. Extended length of stay means high turnover of hotel room sales, which in turn could lead to favourable prices to the clients. However, this has implications on the quantity and quality of products and services on offer.

The hotel sub-sector generates data that is important for gauging various turning points within the sub-sector. However, the inadequacy and inconsistency in hotel data sets between key public agencies makes it difficult to make timely and informed decisions that is vital to planners, investors, customers and marketers.

Addressing opportunities and challenges related to factors that influence hotel room supply and demand will enable the public and private sector in the hotel sub-sector make operational, tactical and strategic decisions, which will improve supply and demand for hotel room nights.

6.2 Policy Recommendations

6.2.1 Quality assurance in the hotel sub-sector

Quality is not merely an end, it has become a way of life. Quality assurance in the hotel room market will lead to sustained visitor arrivals, improved hotel room occupancy and increased visitor's length of stay. In this regard, there is need to undertake the following:

- (a) Regulation and monitoring: In order to promote Kenya as a high quality tourist destination and also offer value for money spent by visitors, adequate regulation and setting of standards is paramount. In this regard, the Licensing Unit of the Ministry of Tourism needs to upscale regulation and inspection of hotels.
- (b) Constituting a grading council: Grading of hotels is important in benchmarking Kenya's hotels and other accommodation facilities in terms of service provision and for marketing purposes. In this regard, it is recommended that a grading council comprising the public and private sector be established under the Hotels and Restaurants Authority. The council should conduct at least one national classification exercise after every four years.
- (c) Financing hotel developments and improvements: Since the hotel industry is capital intensive, there is need for a sustainable source of affordable long-term financing. The role of Kenya Tourist Development Corporation (KTDC) in disbursing capital necessary for improving quality in the hotel industry should be enhanced through increased budgetary allocation from Treasury.

6.2.2 Tourism product development

Tourism products should be developed, packaged and marketed to potential visitors. These initiatives will contribute to increased visitor arrivals, improved hotel room occupancy and increased visitor's length of stay. In this regard, the following should be done:

- (a) Developing MICE products: In order to increase demand for Kenya's hotel room nights, there is need to support the Meetings, Incentives, Conference, Exhibitions (MICE) segment by developing convention centres and bidding for high profile MICE activities. This will ensure that seasonality is reduced while hotels will be open throughout the year.

- (b) Developing cultural tourism: Kenya abounds in a rich and diverse cultural heritage and accompanying events, which are yet to be well packaged, hence the need to develop these products with a view of attracting visitors in various regions of the country. This will in turn lead to demand for these products and thus regional improvement and development of hotel capacity.
- (c) Ensuring sustainability of wildlife and beach tourism: Wildlife and beach tourism offers the greatest motivation for visiting Kenya. However, the over-use and over-development in areas that abound in these resources brings to the fore issues of sustainability. Optimum use of these resources is crucial in the development of the hotel room market.

6.2.3 Strengthen tourism marketing and recovery strategy

Visitor arrivals are key to demand for Kenya's hotel room capacity. To sustain visitor arrivals and length of stay, there is need to consider:

- (a) Regional tourism promotion: Since each of Kenya's provinces is unique, there is need for re-orientation of marketing strategies to adopt the concept of regional marketing and promotion to ensure spread of hospitality and tourism in all regions of Kenya.
- (b) Domestic tourism: There is need to improve on existing efforts to promote domestic tourism. This will promote intra-regional visits and improve the hotel room market.
- (c) Increased funding for marketing tourism: In order to sustain visitor arrivals, it is important to increase the funding budget to strengthen tourism marketing and recovery strategy. This will help improve Kenya's tourist market share during this period of tourism recession in order to guarantee future return on investment.

6.2.4 Maintainance of law and order

A peaceful and secure environment is a necessary condition for sustained and equitable growth of the hotel room market in Kenya. Various risks inhibit optimal supply and demand for Kenya's hotel room market. Crises emanating from lawlessness and crime impact negatively on Kenya's business risk index ratings. The efforts to ensure safety and security of Kenyans and visitors alike will enhance developments in the hotel

room market. Efforts of the Kenya Tourism Federation, and Safety and Communications Centre to enhance tourist's safety and security should be augmented through sustained budgetary support and facilitation.

6.2.5 Data on the hotel room market

- (a) Hotel information data bank: Consistent and reliable data is key to gauging various turning points within the hotel sub-sector. In order to improve the sector, there is need to undertake periodic inventory of hotel data in Kenya, and develop a databank that will be updated continuously.
- (b) Tourism satellite account: The Tourism Satellite Account programme needs to be entrenched within the activities of the Ministry of Tourism and the Kenya National Bureau of Statistics. This will provide an avenue to collect and analyze data in the hotel room market and the entire tourism industry.

6.2.6 Legal framework

The finalization and implementation of the Tourism Policy, taking into consideration bilateral and multilateral obligations, is crucial in reviewing some of the weaknesses in the legal, institutional and policy issues that are central and necessary in improving the performance of the hotel sub-sector.

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Appendix

Appendix 1: Glossary of terms

Term	Definition
Boarding and lodging	A modest establishment offering accommodation services usually located in urban areas. Meals may be provided, if required.
Caravan/camp site	An area set aside for camping and providing appropriate basic facilities and services.
Cottage/villa	An establishment characterized by a cluster of lettable units for holiday accommodation with or without self-catering facilities. These include residential premises used for holiday making by owners, friends or relatives.
Eco-lodge	A facility located in an ecologically rich area in terms of biodiversity, in an environment little disturbed by human activity. Particular attention is given to the sensitivity of the environment during design, construction and operation.
Farm stay	An arrangement whereby guests are accommodated on a farm or ranch premises, and catered for either within the family unit or in separate self-contained accommodation.
Guest house	An establishment offering modest and limited accommodation and/or catering facilities.
Home stay	An arrangement whereby guests are accommodated on family premises, usually sharing same facilities with the host.
Hostel	An establishment offering simple catering and accommodation facilities, usually in a single or multiple bed arrangement and catering for the lower end of the market.
Lodge	An accommodation establishment located within or near natural habitat rich in fauna and flora, in which the majority of clients are leisure seekers.
Motel	An accommodation establishment located along a highway or motor way, catering mainly for motorists.
Restaurant	A commercial catering establishment offering an extensive range of specialized cuisine, where meals are served, usually on a flexible time arrangement, and includes such variations as café, coffee shop and similar outlets.
Tented camp	Accommodation establishment mainly comprising semi-permanent and/or mobile tented accommodation facilities usually located close to or within popular areas such as beaches, rivers, lakes, national parks, game reserves or forests.
Serviced apartments	Commercial establishments offering accommodation in self-contained units, with or without self-catering facilities.
Town hotel	An accommodation establishment located within or near an urban centre, where the majority of clients are business travellers.
Vacation hotel	An accommodation establishment located within or near a holiday attraction area and in which the majority of clients are holiday makers.

Source: East African Community, Standards criteria for classification of hotels, restaurants and other tourist facilities (2008)

Appendix 2: Phillips-Perron tests for unit root tests

Variable	Phillips-Perron test at level		Phillips-Perron test at 1 st , 2 nd or 3 rd difference		Order of integration
	PP test Statistic Z (t)	MacKinnon approx. p-value for Z(t)	PP test Statistic Z (t)	MacKinnon approx. p-value for Z(t)	
Occupied hotel room nights (lnohrn)	-3.144	0.0235	-7.366	0.0000	1
Available hotel room nights (lnahrn)	-1.492	0.5373	-3.892	0.0021	1
Visitor arrivals (lnarr)	0.691	0.9897	-3.434	0.0098	1
Room occupancy rate (%) (lnocc)	-5.134	0.0000	-	-	-
Exchange rate (lner)	-2.890	0.0466	-5.157	0.0000	1
Price of hotel room (lnpr)			-2.935	0.0414	2
			-5.177	0.0000	
GDP per capita (lngdp)	0.864	0.9926	-3.554	0.0067	1
Democracy and accountability risk index (lnda)	-2.638	0.0854	-4.981	0.0000	1
Law and order risk index (lnlo)	-2.127	0.2338	-4.793	0.0001	1
Length of stay (lnls)	-2.306	0.1699	5.650	0.0000	1
Infrastructure (lninfra)	-4.350	0.000	-	-	-
Visitors per hotel room (lnvphr)	-1.032	0.7415	-5.187	0.0000	1
	1% Critical value (-3.750)		1% Critical value (-3.750)		
	5% Critical value (-3.000)		5% Critical value (-3.000)		
	10% Critical value (-2.630)		10% Critical value (-2.630)		

Appendix 3: Multicollinearity test for the demand equation

Pairwise correlation of the supply equation (pwcrr dlnohrn lnocc dlner dlpr2 dlngdp dlnda dlno dlnarr, sig)

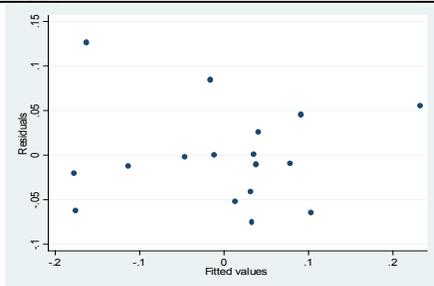
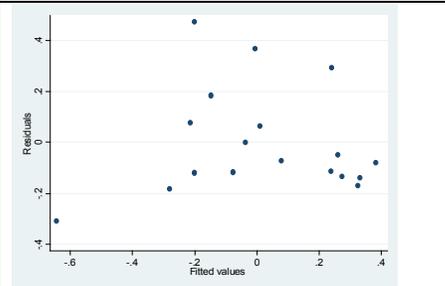
	dlnohrn	lnocc	dlner	dlpr2	dlngdp	dlnda	dlno	dlnarr
dlnohrn	1.0000							
lnocc	0.4055 0.0850	1.0000						
dlner	-0.2221 0.3608	-0.0213 0.9310	1.0000					
dlpr2	0.1941 0.4403	-0.1337 0.5970	0.2816 0.2575	1.0000				
dlngdp	0.0141 0.9542	0.1445 0.5550	-0.5132 0.0246	-0.2365 0.3447	1.0000			
dlnda	-0.0978 0.6905	0.1210 0.6217	0.1654 0.4986	0.0259 0.9187	-0.1471 0.5479	1.0000		
dlno	0.1151 0.6390	0.0215 0.9304	-0.1259 0.6074	0.4001 0.0999	0.1444 0.5553	-0.0692 0.7782	1.0000	
dlnarr	0.4583 0.0485	0.1387 0.5712	0.1865 0.4447	0.2550 0.3071	0.0269 0.9131	0.0540 0.8263	0.5010 0.0289	1.0000

Appendix 4: Multicollinearity test for the supply equation

Pairwise correlation of the supply equation (pwcorr dlmpr2 lnocc Lagpr dlno dlnda dlpls lninfra dlnohrn dl nahrn, sig)

	dlmpr2	lnocc	Lagpr	dlno	dlnda	dlpls	lninfra	dlnohrn	dl nahrn
dlmpr2	1.0000								
lnocc	-0.1337 0.5970	1.0000							
Lagpr	-0.2301 0.3742	0.1041 0.6910	1.0000						
dlno	0.4001 0.0999	0.0215 0.9304	0.0111 0.9662	1.0000					
dlnda	0.0259 0.9187	0.1210 0.6217	0.0198 0.9400	-0.0692 0.7782	1.0000				
dlpls	-0.2926 0.2386	0.2978 0.2157	0.6314 0.0066	0.3167 0.1864	-0.2001 0.4113	1.0000			
lninfra	0.0985 0.6975	0.1502 0.5274	-0.0499 0.8492	0.6724 0.0016	-0.3579 0.1324	0.3036 0.2064	1.0000		
dlnohrn	0.1941 0.4403	0.4055 0.0850	0.1701 0.5141	0.1151 0.6390	-0.0978 0.6905	0.5503 0.0146	0.2468 0.3084	1.0000	
dl nahrn	0.0595 0.8146	0.2281 0.3477	0.3910 0.1207	0.2832 0.2401	-0.2164 0.3736	0.6369 0.0034	0.3048 0.2045	0.6508 0.0025	1.0000

Appendix 5: Homoskedasticity/heteroskedasticity test for the supply and demand function

Supply Function	Demand Function
	
<pre>. hettest Breusch-Pagan/Cook-Weisberg test for heteroskedasticity Ho: Constant variance Variables: fitted values of dlmpr2 chi²(1)= 1.10 Prob. > chi2 = 0.2949</pre>	<pre>. hettest Breusch-Pagan/Cook-Weisberg test for heteroskedasticity Ho: Constant variance Variables: fitted values of dlnohrn chi²(1)=2.00 Prob. > chi²=0.1576</pre>

Appendix 6: Tests for simultaneity and endogeneity in the demand equation

Step 1: Residuals and fitted values						
reg dlnohrn lnocc dlner dlmpr2 dlngdp dlnda dlno dlarr						
Source	SS	df	MS		Number of obs	18
Model	1.269	7.181	283794.000		F(7,10)	2.46
Residual	0.738	10.07	380033.000		Prob > F	0.096
					R-squared	0.632
					Adj R-squared	0.375
Total	2.007	17.118	58227.000		Root MSE	0.272
dlnohrn	Coef.	Std. Err.	t	P> t	[95% Conf.	Interval]
lnocc	1.040	0.488	2.130	0.059	-0.047	2.127
dlner	-0.971	0.402	-2.410	0.036	-1.867	-0.074
dlmpr2	1.073	0.670	1.600	0.141	-0.421	2.567
dlngdp	-1.099	1.130	-0.970	0.353	-3.617	1.418
dlnda	-0.203	0.252	-0.810	0.438	-0.764	0.357
dlno	-0.548	0.339	-1.620	0.137	-1.302	0.207
dlarr	2.622	0.984	2.670	0.024	0.430	4.813
_cons	-4.049	1.895	-2.140	0.058	-8.272	0.174
predict res22, residuals (2 missing values generated)						
predict z22 option xb assumed; fitted values (2 missing values generated)						
Step 2: Test for simultaneity						
reg dlnohrn res22 lnocc dlner dlmpr2 dlngdp dlnda dlno						
Source	SS	df	MS		Number of obs	18
Model	1.483	7.211	803835.000		F(7,10)	4.04
Residual	0.524	10.052	436302.000		Prob > F	0.023
					R-squared	0.739
					Adj R-squared	0.556
Total	2.007	17.118	58227.000		Root MSE	0.229
dlnohrn	Coef.	Std. Err.	t	P> t	[95% Conf.	Interval]
res22	1	0.267	3.750	0.004	0.406	1.594
lnocc	1.231	0.407	3.020	0.013	0.324	2.137
dlner	-0.666	0.325	-2.050	0.068	-1.390	0.059
dlmpr2	1.077	0.565	1.910	0.086	-0.183	2.336
dlngdp	-0.801	0.948	-0.850	0.418	-2.912	1.310
dlnda	-0.170	0.212	-0.800	0.440	-0.642	0.302
dlno	-0.108	0.249	-0.430	0.674	-0.664	0.447
_cons	-4.699	1.584	-2.970	0.014	-8.229	-1.169
Step 3: Test for endogeneity						
reg dlnohrn z22 lnocc dlner dlmpr2 dlngdp dlnda dlno						
Source	SS	df	MS		Number of obs	18
Model	1.269	7.181	283796.000		F(7,10)	2.46
Residual	0.738	10.073	800329.000		Prob > F	0.096
					R-squared	0.632
					Adj R-squared	0.375
Total	2.007	17.118	58227.000		Root MSE	0.272
dlnohrn	Coef.	Std. Err.	t	P> t	[95% Conf.	Interval]
z22	1	0.375	2.670	0.024	0.164	1.836
lnocc	-1.80E-08	0.668	0.000	1.000	-1.488	1.488
dlner	-1.78E-09	0.459	0.000	1.000	-1.024	1.024
dlmpr2	-1.37E-08	0.783	0.000	1.000	-1.744	1.744
dlngdp	3.67E-08	1.164	0.000	1.000	-2.593	2.593
dlnda	2.09E-09	0.259	0.000	1.000	-0.578	0.578
dlno	-3.23E-09	0.299	0.000	1.000	-0.665	0.665
_cons	6.78E-08	2.577	0.000	1.000	-5.742	5.742

Appendix 7: Tests for simultaneity and endogeneity in the supply equation

Step 1: Residuals and fitted values						
Reg dlnpr2 dlnahrn inocc Lagpr dlnlo dlnda dlpls lninfra dlnohrn						
Source	SS	df	MS		Number of obs	17
Model	0.190	8.023	779155.000		Prob > F	0.034
Residual	0.048	8.005	969709.000		R-squared	0.799
Total	0.238	16.014	874432.000		Root MSE	0.077
dlnpr2	Coef.	Std. Err.	t	P> t	[95% Conf.	Interval]
dlnahrn	-0.050	0.199	-0.250	0.809	-0.507	0.408
inocc	-0.263	0.179	-1.470	0.180	-0.677	0.150
Lagpr	0.372	0.236	1.570	0.155	-0.173	0.917
dlnlo	0.421	0.111	3.800	0.005	0.166	0.676
dlnda	-0.073	0.084	-0.880	0.407	-0.267	0.120
dlpls	-0.854	0.219	-3.900	0.005	-1.359	-0.350
lninfra	-0.025	0.018	-1.370	0.208	-0.067	0.017
dlnohrn	0.300	0.086	3.470	0.008	0.100	0.499
_cons	1.233	0.676	1.820	0.106	-0.326	2.792
predict res24, residuals (3 missing values generated) predict						
z24 option xb assumed; fitted values (3 missing values generated)						
Step 2: Test for simultaneity						
Reg dlnpr2 resid24 inocc Lagpr dlnlo dlnda dlpls lninfra dlnohrn						
Source	SS	df	MS		Number of obs	17
Model	0.238	8.02	970245.000		F(8, 8)	639.94
Residual	0.000	8.000	46414.000		Prob > F 0.000	
Total	0.238	16.014	874432.000		R-squared 0.998	
					Adj R-squared	0.997
					Root MSE 0.007	
dlnpr2	Coef.	Std. Err.	t	P> t	[95% Conf.	Interval]
resid24	1	0.031	32.080	0.000	0.928	1.072
inocc	-0.260	0.016	-16.470	0.000	-0.296	-0.223
Lagpr	0.359	0.020	17.640	0.000	0.312	0.406
dlnlo	0.416	0.010	43.300	0.000	0.394	0.438
dlnda	-0.070	0.007	-9.610	0.000	-0.087	-0.053
dlpls	-0.861	0.019	-45.040	0.000	-0.905	-0.817
lninfra	-0.025	0.002	-15.490	0.000	-0.029	-0.021
dlnohrn	0.289	0.007	43.940	0.000	0.274	0.304
_cons	1.217	0.059	20.500	0.000	1.080	1.354
Step 3: Test for endogeneity						
Reg dlnpr2 z24 inocc Lagpr dlnlo dlnda dlpls lninfra dlnohrn						
Source	SS	df	MS		Number of obs	17
Model	0.190	8 .023	779155.000		F(8, 8)	3.98
Residual	0.048	8 .005	969709.000		Prob > F 0.034	
Total	0.238	16 .014	874432.000		R-squared 0.799	
					Adj R-squared	0.599
					Root MSE 0.077	
dlnpr2	Coef.	Std. Err.	t	P> t	[95% Conf.	Interval]
z24	1.000	4.010	0.250	0.809	-8.246	10.246
inocc	-3.50e-07	1.056	0.000	1.000	-2.436	2.436
Lagpr	4.81e-07	1.457	0.000	1.000	-3.360	3.360
dlnlo	5.59e-07	1.672	0.000	1.000	-3.856	3.856
dlnda	-9.16e-08	0.293	0.000	1.000	-0.676	0.676
dlpls	-1.16e-06	3.461	0.000	1.000	-7.980	7.980
lninfra	-3.29e-08	0.102	0.000	1.000	-0.234	0.234
dlnohrn	3.86e-07	1.161	0.000	1.000	-2.676	2.676
_cons	1.63e-06	4.927	0.000	1.000	-11.362	11.362

Appendix 8: 2SLS estimates of structural parameters for the demand equation

ivreg dlnohrn lnocc dlnr dlnpr2 dlngdp dlnda dlnlo(dlnarr=dlnahrn), first robust						
First-stage regressions						
Source	SS	df	MS		Number of obs = 18	
Model	0.096	7.000	0.0137		Prob > F = 0.004	
Residual	0.020	10.000	0.002		R-squared = 0.827	
Total	0.116	17.000	0.007		Adj R-squared = 0.706	
					Root MSE = 0.045	
dlnohrn	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
lnocc	-0.046	0.083	-0.560	0.589	-0.230	0.138
dlnr	0.171	0.064	2.660	0.024	0.028	0.315
dlnpr2	-0.023	0.110	-0.200	0.842	-0.269	0.223
dlngdp	0.165	0.185	0.890	0.395	-0.248	0.578
dlnda	0.063	0.042	1.500	0.166	-0.031	0.158
dlnlo	0.110	0.050	2.200	0.052	-0.001	0.221
dlnahrn	0.440	0.083	5.310	0.000	0.255	0.625
_cons	0.197	0.320	0.610	0.553	-0.517	0.911
Instrumental variables (2SLS) regression						
					Number of obs = 18.000	
					F(7, 10) = 4.650	
					Prob > F = 0.015	
					R-squared = 0.627	
					Root MSE = 0.274	
dlnohrn	Coef.	Robust Std. Err.	t	P> t	[95% Conf. Interval]	
dlnarr	2.994	1.358	2.210	0.052	-0.031	6.019
lnocc	1.013	0.517	1.960	0.078	-0.138	2.164
dlnr	-1.014	0.391	-2.590	0.027	-1.886	-0.142
dlnpr2	1.073	0.804	1.330	0.212	-0.719	2.865
dlngdp	-1.142	0.904	-1.260	0.235	-3.156	0.872
dlnda	-0.208	0.243	-0.860	0.413	-0.749	0.334
dlnlo	-0.610	0.299	-2.040	0.068	-1.276	0.056
_cons	-3.957	1.961	-2.020	0.071	-8.327	0.413

Appendix 9: 2SLS estimates of structural parameters for the supply equation

ivreg dlmpr2 lnocc Lagpr dlno dlnda dlnds lninfra dlnohrn (dlnahrn=dlnarr),first robust						
First-stage regressions						
Source	SS	df	MS		Number of obs = 18	
Model	0.293	8.000	0.037		F (8, 8) = 4.480	
Residual	0.065	8.000	0.008		Prob > F = 0.024	
Total	0.358	16.000	0.022		R-squared = 0.817	
					Adj R-squared = 0.635	
					Root MSE = 0.090	
dlnohrn	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
lnocc	0.113	0.217	0.520	0.616	-0.387	0.613
Lagpr	0.030	0.279	0.110	0.918	-0.614	0.673
dlno	-0.007	0.132	-0.050	0.960	-0.310	0.296
dlnda	-0.165	0.102	-1.620	0.144	-0.399	0.070
dlnds	0.253	0.256	0.990	0.351	-0.337	0.844
lninfra	-0.026	0.023	-1.160	0.279	-0.079	0.026
dlnohrn	0.074	0.098	0.750	0.474	-0.153	0.300
dlnarr	1.275	0.393	3.240	0.012	0.369	2.182
_cons	-0.244	0.807	-0.300	0.770	-2.104	1.616
Instrumental variables (2SLS) regression						
					Number of obs = 17.000	
					F(8, 8) = 16.630	
					Prob > F = 0.000	
					R-squared = 0.799	
					Root MSE = 0.077	
dlnohrn	Coef.	Robust Std. Err.	t	P> t	[95% Conf. Interval]	
dlnahrn	-0.055	0.212	-0.260	0.803	-0.542	0.433
lnocc	-0.264	0.158	-1.670	0.133	-0.627	0.100
Lagpr	0.373	0.187	2.000	0.081	-0.058	0.804
dlno	0.421	0.152	2.770	0.024	0.071	0.772
dlnda	-0.074	0.065	-1.140	0.287	-0.223	0.075
dlnds	-0.853	0.208	-4.110	0.003	-1.333	-0.374
lninfra	-0.025	0.018	-1.410	0.197	-0.066	0.016
dlnohrn	0.301	0.090	3.350	0.010	0.094	0.508
_cons	1.235	0.627	1.970	0.084	-0.211	2.680

Instrumented: dlnahrn Instruments: lnocc Lagpr dlno dlnda dlnds lninfra dlnohrn dlnarr

dwstat Durbin-Watson d-statistic (9, 17) = 1.343

