Aviation, Tourism and Poverty Relief in Kenya: A Dynamic Computable General Equilibrium Model Analysis

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In memory of my father

In memory of my uncle

In memory of my sister

To my mother

ABSTRACT

The development challenge in Kenya is finding ways to increase growth and eliminate poverty. Almost half of the country's 44.35 (2014 estimated) million people are poor. The country faces trade-offs in deciding which sectors to invest in, how to boost domestic and foreign investment, how far to liberalise trade, and how to ensure that growth helps to achieve the millennium development goals. Tourism and aviation are two important sectors of the Kenyan economy. As the third highest contributor to gross domestic product, Kenya's tourism is being promoted by the government as a source of economic growth and poverty alleviation. It is also a cornerstone of the country's new development blueprint covering the period 2008 to 2030. The government of Kenya reports that the tourism sector, through its direct and multiplier effects, contributed 10 per cent of the GDP in 2014 and employed 9 per cent of the total workforce. Tourism is complex, cross-sectoral and highly dynamic. This is partly explained by its structure (that is, its mix of small and large businesses that draw upon domestic, regional and international markets) and components (especially natural and manmade attractions).

Air transport is a key enabler to achieving economic growth and development as well as integration into global economy. Whereas air access is crucial for the transport of international tourist, it is of paramount importance for Kenya's domestic tourism, where ground-transport infrastructure is less developed. In recent years, more attention has been given to the impact of aviation policies on tourism. It has been argued that further liberalisation of air services in developing countries is likely to lead to substantial growth in tourist arrivals. Tourism expansion would reduce poverty by generating additional employment for the poor or by increasing tax collection. However, no previous research has focused on investigating the relationship between air transport and tourism growth or quantifying tourism benefits in Kenya at a highly disaggregated level. It is also important to point out that forward and backward linkages between the Kenyan tourism industry and the local economy have seldom been a topic of research, and although several articles allude to the welfare effects of tourism, they rarely give rigorous proof of these allegations.

This research uses a dynamic micro-simulation Computable General Equilibrium (CGE) model to explore the link between tourism expansion and poverty reduction as reflected in the income distribution among household groups in Kenya. The methodology is designed to understand the full impact of changes in tourism spending on the whole economy. The CGE model comprises nineteen sectors, twenty household groups and five factors of production, making it particularly appropriate for welfare analyses. The construction of the micro household module relies on datasets from the Kenya Integrated Household Budget Survey (KIHBS) 2005/06. The KIHBS is based on a representative sample of 13,430 households.

The analysis shows that one key factor within the control of the Kenyan government that can significantly influence air traffic flows, costs and competitiveness is the decision on the relaxation of restrictions on air services. The analysis further indicates that, other things being equal, an open skies policy is likely to play a prominent role in strengthening the interdependence between air transport and tourism development in Kenya.

Additional tourism is found to be positive for the Kenyan economy. Tourism growth and the resulting economic growth principally trickle down to the poor through increases in labour demand and in income. On the whole, tourism expansion benefits urban households at the lowest expenditure decile more than it benefits rural lower income households. The drivers of labour demand are industries, mainly classed as urban, such as construction, hotel and restaurant. The higher returns to labour in these industries raise the income of urban. Increased incomes allow consumers to enjoy a higher level of aggregate real consumption. Tourism expansion leads to a decrease in agricultural output, a sector from which rural households receive most of their income. Results further indicate that tourism expansion leads to a slight redistribution of income between rural and urban regions and to an improvement of total welfare. This implies that tourism expansion is likely to contribute to the reduction of income disparities across regions.

Foster-Greer-Thorbecke poverty indices decline in the wake of the positive tourism shock, suggesting that tourism has the potential to reduce poverty, where the largest decline can be observed in urban areas.

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Finally, apologies are extended to those contributors whose names I have omitted.

GLOSSARY OF TERMS & ABBREVIATIONS

AFCAC:	African Civil Aviation Commission
AMU:	Arab Maghreb Union
ASK:	Available Seat Kilometre
AU:	African Union
BASAs:	Bilateral Air Services Agreements
CAPA:	Centre for Asia Pacific Aviation
CBA:	Cost Benefit Analysis
CEMAC:	Central African Economic and Monetary Community
CGE:	Computable General Equilibrium
CIF:	Cost Insurance and Freight
COMESA:	Common Market for Eastern and Southern Africa
DCs:	Developing Countries
EAC:	East African Community
EADCA:	East African Directorate of Civil Aviation
ECOWAS:	Central African Economic and Monetary Community
EDL:	Eldoret International Airport
EIA:	Economic Impact Analysis
EV:	Equivalent variation
FOB:	Free of Board
GDP:	Gross Domestic Product
GoK:	Government of Kenya
HHs:	Households
IATA:	International Air Transport Association
ICAO:	Civil Aviation Organisation
IFPRI:	International Food Policy Research Institute
IMF:	International Monetary Fund
I-O:	Input-Output
ITC:	International Trade Centre
JKIA:	Jomo Kenyatta International Airport
KAA:	Kenya Airport Authority
KIPPRA:	Kenya Institute for Public Policy Research and Analysis
KIS:	Kisumu Airport
KNBS:	Kenya National Bureau of Statistics
KSh:	Kenyan Shilling
LCCs:	Low Cost Carriers
LIC:	Least Developed Countries
MDGs:	Millennium Development Goals
MIA:	Mombasa's Moi International Airport
MIC:	Middle Income Countries
MoT:	Ministry of Transport
OAU:	Organisation of the African Union
RECs:	Regional Economic Communities
RPK:	Revenue Passenger Kilometre
SADC:	Southern African Development Cooperation
SAM:	Social Accounting Matrix
SSA:	Sub-Saharan Africa
T&T:	Travel & Tourism
TSA:	Tourism Satellite Account
TTCI:	Travel & Tourism Competitiveness Index
UNWTO:	United Nations World Tourism Organisation
WEF:	World Economic Forum
WLN:	Wilson Airport
WTO:	World Trade Organisation
WTTC:	World Travel and Tourism Council
YD:	Yamoussoukro Decision

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CHAPTER 1. INTRODUCTION

Tourism in least developed countries is increasingly being promoted as an important source of economic development. There has in recent years been in Kenya, and elsewhere in Africa, a growing interest in tourism's potential to contribute to economic growth and poverty reduction. Clearly, tourism can act as a facilitator in the diversification of the economy, which, in the presence of linkages with other domestic economic sectors can act as a stimulus for broadly based growth. While there are many elements that contribute to tourism growth, without an efficient air transport system, it is almost impossible for a number of landlocked and geographically isolated developing nations to expand and sustain domestic and international tourism.

This research seeks to explore the links between aviation, tourism and poverty relief in Kenya. In other words, it aims to analyse the impact of aviation policy on tourism growth, on the one hand, and, on the other hand, to explore the impact of tourism expansion on poverty. Moreover, it attempts to examine how broadly (across the industries) and widely (across the institutions) tourism benefits are distributed in Kenya. It was anticipated that knowledge generated from this research would afford new insights and so inform tourism planners. This research employed both qualitative and quantitative methodologies to illustrate the problem under examination. The current chapter begins with an overview of the background and context that frames the research. Following this are the specific objectives and accompanying research questions. Also included in this chapter is the discussion of the research approach and the research contribution. The chapter concludes with a presentation of the framework of the dissertation.

1.1. Background and context

Tourism[1] is one of the fastest growing-industries in countries around the world. International tourist arrivals worldwide increased by an annual average of 5 per cent between 1995 and 2013, and it is expected that growth will continue to accelerate

[1] Tourism is defined as the activities of persons travelling to and staying in places outside their usual environment for not more than one consecutive year for business, leisure and other purposes.

during the next decade (WTTC, 2014). Tourism is one of the top three exports of Kenya. Along with coffee and tea, tourism is one of the major growth and employment sectors in the Kenyan economy. The sector also represents considerable opportunities for growth with the World Travel and Tourism Council (WTTC), estimating that visitor exports will increase at a rate of 4.2 per cent per annum between 2014 and 2024 (WTTC, 2014).

The airline industry has also experienced rapid growth over the past decade, especially in emerging and developing countries. In Kenya, for instance, the airline industry grew at a robust rate of 5.8 per cent per year on average in the period 1996-2013 (as measured in passenger revenue per kilometre). Demand for air traffic to Kenya is expected to grow annually by 4.3 per cent on average between 2015 and 2019 (KCAA, 2014). It is worth mentioning that growth in the aviation industry has been accompanied by structural changes within the sector. Perhaps the most notable of these has been the emergence of low cost carriers and the formation of airline alliances. Furthermore, air transport policy, along with technological innovation, has been influential in shaping the industry. In fact, governments around the world have been lifting restrictions on air services, both domestically and internationally, to enhance competition.

Air transport and tourism play an important role in supporting economic growth and employment. Oxford Economics estimates that in 2009 the aviation sector contributed 1.1 per cent and 0.7 per cent to the Kenyan GDP and workforce, respectively. When one also considers aviation's contribution to the tourism industry, these figures rise to 3.7 per cent of the country's GDP and 3.0 per cent of the workforce (Oxford Economics, 2011). The potential for air transportation to become a driving force for the development process of a local economy by providing employment, contributing to regional and global integration, stimulating tourism and acting as a catalyst for investment in the development and the location of companies is well documented (e.g., Button and Taylor, 2005; Kasarda et al, 2004; Cooper and Smith, 2005; Brueckner, 2003; ATAG, 2000). It has also been gradually acknowledged that air transportation plays a specific role in the long-term economic growth of developing countries (UNCTAD, 1999). That is, without an efficient air transport system it would be virtually impossible for a number of low-density and land-locked African nations to develop and sustain international trade and tourism. Because of the non-existence of a good railway network and the low quality of surface transport, air transport is the most convenient mode of travel in sub-Saharan Africa (ECA, 2005).

Although there are obvious links between air transport and tourism, they have hitherto been treated separately. However, in recent years, the investigation of the likely benefits of air services on tourism in the context of specific countries and regions has constituted a significant area of interest in both tourism and transport research. In most of the work carried out in this field, the focus has been placed upon the impact of air transport policy on tourism development. It has been argued that air transport policy affects passenger flow and plays an important role in strengthening the link between air transport and tourism (e.g. Forsyth, 2006a & 2006b; Papatheodorou, 2002; Warnock-Smith & Morrell, 2008; Graham et al., 2008; SH&E, 2010; Duval & Schiff, 2011; Dobruszkes & Mondou, 2013).

Similarly, developments in tourism also affect air transport by influencing demand. Beiger and Wittmer (2006) point out that the development of attractions, such as theme parks, have been important in creating large and regular traffic streams that are now supporting some low-cost carriers in Europe. Other factors likely to affect market accessibility, and with this the fare structure and the types of tourists who will travel, include the network structure of the airlines and in particular the positions of the destination airports within these networks, the timing and frequency of flights, and business models of the airlines (i.e. network/hub carriers, regional airlines, charter airlines and LCCs) (Beiger and Wittmer, 2006).

It has further been argued that air transport has a positive effect on poverty reduction in developing countries (ATAG, 2003). The traditional argument in favour of a positive link between air transport development and poverty reduction focuses on three linkages. Developing countries are often endowed with tourism-attraction potential, but many of these are located far away from the main origins of international tourism, namely, North America, Europe and Japan. Tourism is generally described as a labour-intensive, low skill and growth industry. Liberalizing air services will lead to substantial growth in tourist arrivals and revenue. Tourism expansion would reduce poverty by generating additional employment for the poor or by increasing tax collection (ILO, 2008).

As far as Kenya is concerned, air access is crucial for its tourism industry. Given the geographical position of the region and the under-development of crucial transport connections of the region with the rest of Africa, air transport in Kenya needs to be developed further to facilitate its economic integration and growth. In fact, air transport is the main transport mode for foreign tourism due to the relative isolation of the region from most origin regions, with almost 1.5 million visitors arriving by air (2007), or 75 per cent of total international visitors (UNWTO, 2009). As a predominantly long-haul destination, an efficient air transport system and adequate regulatory frameworks are vital for most inbound passengers to facilitate the development of tourism in Kenya. Against this background, this dissertation seeks to investigate and shed light on the impact of developments in air transport in Kenya on tourism performance, on the one hand, and, on the other hand, the impact of tourism expansion on welfare and poverty.

1.2. Aims and objectives

This dissertation addresses issues related to Kenya’s international air transport policy and its impact on tourism. As one of the most successful aviation industries in Africa, Kenya is an interesting case to study in terms of air transport liberalisation. It is anticipated that a better understanding of Kenya’s success and the challenges it still faces may help to provide lessons for other African countries. In fact, the government liberalized the aviation industry throughout the 1990s, predominantly by allowing private sector participation in developing the industry. The relatively efficient air transport services strongly support both tourism and the agriculture sectors. However, despite the progress made in liberalizing the air services, there are some restrictions that hinder its full development. Furthermore, despite the adoption of trade-related reforms in Kenya and the rapid growth of tourism in recent years, poverty remains rampant in urban and rural areas. It is the aim of this dissertation to investigate the relationship between air transport liberalisation, tourism growth and poverty reduction. To shed light on these issues, the following research questions are addressed:

(1) What is the state of air transport liberalisation in Kenya?
(2) How does the tourism sector perform in Kenya?
(3) To what extent has aviation policy affected the development of tourism in Kenya?
(4) What factors have impeded or continue to impede the development of air transport and tourism in Kenya?
(5) How can the mutual benefits of aviation and tourism industries be improved?
(6) Can additional tourism benefit Kenya by boosting growth and reducing poverty?

It is important to point out that the links between the tourism industry and other sectors of the local economy have seldom been a subject of research, although several articles allude to the welfare effects of tourism they rarely give evidence of these allegations. A visible disadvantage results from the fact that they do not use a widely tested and acceptable model such as the Computable General Equilibrium, which the present work will now attempt to do.

1.3. Research methods

The assessment of tourism benefits of air transport liberalisation on tourism is based on information from secondary literature and research, content and report analysis, and airline data obtained from the Centre for Asia Pacific Aviation and the German Aerospace Centre. The research reviews the literature on air transport liberalisation and its economic implications in Africa with a specific focus on Kenya. The use of econometrics is not considered due to limited data.

The economic impact of tourism expansion is captured by using a CGE model. Until recently, measurement of the economic impact of tourism has relied on input-output modelling. Input-output models can be used to assess the value-added and inter-industrial relationship attributable to tourism. However, due to their assumptions, input-output models may give misleading results. To address this shortcoming, CGE models have been widely used in recent years to estimate the economic effects of increases or decreases in tourism demand (Adams & Parmenter, 1995; Zhou et al, 1997; Dwyer et al., 2003; Blake et al. 2008; Wattanakuljarus & Coxhead, 2008).

Moreover, CGE models have proven to be an adequate tool for understanding the strengths, direction and channels of the impact of tourism on a specific sector or on the economy as a whole. Most importantly, there is a need to move beyond economic multiplier type analyses and instead to concentrate, in the first instance, on local economic growth and then to establish who benefits and potentially loses. The distributional impact of tourism upon poverty in Kenya and the channels through which tourism expansion affects poverty have not been given enough attention so far in the literature. Thus, government development strategy relating to tourism should be concerned with these issues. The present research is set out to generate insights that can have practical policy relevance.

This analysis underwent three stages. Firstly, a tourism-based Social Accounting Matrix for Kenya was set up using information from the Kenya Tourism Board and the World Bank as well as data from the standard Social Accounting Matrix for Kenya. Secondly, a dynamic CGE model reflecting the characteristics of the Kenyan economy and the tourism industry was developed. This was then used to simulate the overall macroeconomic and sectoral effects as well as welfare effects of increased inbound tourism in Kenya. Finally, the results of the CGE simulation were linked to micro data from a household survey to determine the household poverty and distributional effects of changes in tourism expenditure.

1.4. Research contribution

The relationship between aviation and tourism in the context of Africa in general and Kenya in particular has received little attention in the literature. This research will contribute to the literature by exploring the impact of liberalisation of air services on tourism growth in Kenya.

CGE models have been extremely popular for more than forty years because of their estimations of the economic impact of a wide range of policy issues. The application of CGE to tourism is most recent and, regarding tourism studies in developing countries, its application is very limited. The tourism CGE model developed in this dissertation may make it possible for policy makers, businesses, destinations managers and planners to better understand the impact on the tourism industry and the wider economy resulting from different shocks to tourism demand.

Some of the previous studies that are relevant for this research include Kweka (2004), Blake et al. (2008), Wattanakuljarus and Coxhead (2008) and Blake (2009). While the literature on the economy-wide effect of tourism towards poverty reduction is starting to receive prominence in the literature, the preferred approach has been static modelling techniques which analyse the contribution of the tourism industry, but ignore the effects of changes in policy on this contribution. In order to analyse changes in contribution and therefore the impact of tourism, dynamic modelling techniques are required. Blake (2009) points out that more detailed household modelling using a micro-simulation approach provides a more comprehensive assessment of the impact of tourism on economic development. Hence this approach is more suitable for the assessment of the impact of tourism on households at the destination. The technique is, however, yet to be implemented in the tourism context.

This dissertation fills this gap by developing a dynamic general equilibrium model of the economy of Kenya which integrates the micro-simulation approach of Cockburn and Decaluwé (2006) in order to analyse the extent to which the Kenyan tourism industry benefits poor households. To the author's knowledge, this is the first research applying a dynamic micro-simulation CGE model to investigate the economic and social impact of tourism spending in Kenya. The research investigates previously unexplored areas and is therefore practical for policy makers and government officials. Moreover, it contributes to the current body of knowledge both methodologically and in an applied sense. Poverty analysis is based on the Foster-Greer-Thorbecke (FGT) index, which is widely used to measure poverty in the literature of economic development, but is yet to be applied in the analysis of tourism development on poverty reduction. This is partly due to the simplicity of its structure and the quality of the information that it provides. It incorporates the poverty head-count index, which measures the incidence of poverty as a proportion of total population below the poverty line; the poverty gap index, measuring how far the poor are from the poverty line and the poverty severity index, which indicates the degree of inequality among the poor. Since this research takes into account these three dimensions of poverty, it makes it possible for the research to provide a comprehensive analysis of poverty reduction in Kenya.

1.5. Structure of the dissertation

The remainder of this dissertation is organized as follows: Chapter 2 investigates the development of air transport and tourism in Kenya. It further examines the relationship between air transport policy and tourism growth. Chapter 3 reviews the empirical literature on tourism-led economic growth. It also provides an overview of tourism-based CGE literature and a rationale for using CGE approach for tourism impact analyses in Kenya. Chapter 4 documents the process of constructing the Social Accounting Matrix for Kenya for the year 2003. Detailed explanations of tourism data compilation as well as the decomposition of the household sector and labour categories are also presented. Chapter 5 highlights the main features of the CGE model developed in this research and gives a detailed explanation of each component of the model. It further documents the construction of the micro-simulation model. Chapter 6 presents the results of model simulation, indicating the macroeconomic, sectoral, distributional, welfare and poverty effects of tourism expansion. Chapter 7 summarizes the major findings of the research, recommends appropriate policy responses, acknowledges the limitations of the research and highlights some suggestions for further research.

CHAPTER 2. AIR TRANSPORT AND TOURISM IN KENYA: TRENDS, CHALLENGES AND OPPORTUNITIES

2.1. Introduction

Aviation and tourism in Kenya are sectors with considerable growth opportunities, with the World Travel and Tourism Council (WTTC) estimating that visitor exports will increase at a rate of 4.2 per cent per annum between 2014 and 2024 (WTTC, 2014). Boeing, IATA and Airbus also forecast an increase in air transport demand in Africa of 5 per cent on average for the next two decades. The Kenyan government has also recognized that tourism and air transport provide an enormous opportunity to promote growth and development in Kenya (KPPRA, 2009).

Tourism is generally described as a labour-intensive, low skill and dynamic industry, implying that its expansion would reduce poverty by generating additional employment for the poor (Bolwell and Wolfgang, 2008; UNDP, 2011). Air transport, on the other hand, has the potential to stimulate economic growth. Generally speaking, the benefits emanating from efficient air transport include the following: (1) At the macroeconomic level, air transport liberalisation and the resulting improved accessibility of tourism services affect the level of output, employment and income within a national economy. (2) At the microeconomic level, it is acknowledged that air liberalisation results in enhanced consumer choice (airlines, routes, schedules, frequencies and airports), lower fares and consequently greater consumer surplus (Button &Taylor, 2000). Moreover, efficient air transport has the potential to facilitate the development of more diversified export-based industries, away from over-reliance on natural resources, which in the presence of linkages with other domestic economic sectors can act as a stimulus for broadly based growth.

The chapter provides a critical analysis of the synergies between the Kenyan tourism and air transport sectors and identifies obstacles and growth opportunities. Firstly, it attempts to provide an overview of passenger air traffic and tourism markets in Kenya, as well as an analysis of the potential for future growth opportunities. This is by no means an exhaustive assessment, but serves as an overall indicator of trends in the market. Secondly, it aims at investigating ways to strengthen the synergies between the tourism and air transport sectors. The analysis relies on information from secondary literature and research, content and reports analysis and airline data obtained from the Centre for Asia Pacific Aviation and Routesonline.

This chapter is organised as follows. Following the introduction (Section 2.1), Section 2.2 briefly provides an overview of the macroeconomic environment of Kenya. Section 2.3 describes the air transport market and policy in Kenya. It further investigates the current economic and demographic profile of Kenya with the focus being on the elements that determine the demand for air transport. Section 2.4 undertakes a literature review of the link between air transport and tourism. Section 2.5 presents the state of air transport reform in Kenya, the progress so far and the challenges that remain. It further examines problems that need to be solved before Kenya can significantly increase its share of tourism and air transport flows, to which end steps must be taken to strengthen the synergies of tourism and air transport development (Section 2.6). The final Section 2.7 summarises the main points.

2.2. Country overview

2.2.1. Population

Located in East Africa, the Republic of Kenya has a surface area of 586,650 square kilometres. Kenya's population was estimated at 44.35 million, up from 8.1 million in 1960 (WDI, 2014). According to the World Bank, 75.2 per cent of Kenya's population lived in rural areas in 2013. The proportion of the population of Kenya below the age of 15 years is relatively high (42 per cent in 2013). The proportion of working age population (15 to 65 years) constituted 55 per cent, while the proportion of population aged 65 years and over made up 3 per cent of the total population (WDI, 2014).

2.2.2. Political background

Kenya gained its independence from United Kingdom in 1963 and since then had been led by one party. The one-party regime prevailed until the late 1980s and early 1990s, when a combination of international and domestic forces led to the establishment of multiparty elections in Kenya (Patel, 2001). Moreover, the international community has played an important role in the promotion of good governance[2] in Kenya and other developing countries by attaching political as well as economic conditions to aid to Kenya. Furthermore, Kenyan opposition parties have exercised pressure on the government for greater accountability (Patel, 2001).

With respect to governance, the country has experienced significant progress in recent years. Kenya is ranked 17th out of 52 African nations in the 2014 Ibrahim Index of African Governance[3] (IIAG). The index gives national, regional and continental scores from 0 to 100, related to four governance indicators, whereby a higher score means better performance. Overall, Kenya scored 57.4 points out of a possible 100, a slight growth from 53.6 in 2013 when it ranked position 21st. It was ranked 25th in 2012. This ascendency in ranking was mainly driven by the country's performance in the category of human development (IIAG, 2014). Despite improvement in human development and economic opportunity, when comparing with its African counterparts, the country still faces a number of challenges. For instance, safety and rule of law as well as participation and human rights are still lagging behind. All these challenges pose a threat to Kenya's success and potential transformation in the long-term.

Since the early 1990s, Kenya has had a multi-party political system whose hallmark is parliamentary democracy. Its parliament is a bicameral house consisting of the National Assembly and the Senate. Parliamentary politics is open, free, fair and

[2] Ibrahim Index of African Governance distinguishes between four components of good governance: sound economic policies, that is, adherence to market principles and economic openness; competent public administration; open and accountable government; and respect for the rule of law and human rights.

[3] Established in 2007, the IIAG is the most comprehensive collection of quantitative data on governance in Africa. The Foundation defines governance as the provision of the political, social and economic goods that a citizen has the right to expect from his or her state, and that a state has the responsibility to deliver to its citizens. Compiled by combining over 100 variables from more than 30 independent African institutions, it provides an annual assessment of governance in every African country. It can be summarised by four over-arching categories (made up of constituent sub-categories): (1) Safety & Rule of Law (Rule of Law, Accountability, Personal Safety, National Security); (2) Participation & Human Rights (Participation, Rights, Gender); (3) Sustainable Economic Opportunity (Public Management, Business Environment, Infrastructure, Rural Sector); (4) Human Development (Welfare, Education, Health).

highly competitive. General elections - presidential, parliamentary, and local - are held every 5 years (GoK, 2014). However, democratic transition has not always been peaceful in Kenya. Moreover, the country's history has been marked by ethnic conflicts and political violence including the coup d'état of 1982, and the 2007 post-election violence.[4]

The history of Kenya's external sector policy since independence can be divided into three phases: 1963 – 1979, when Kenya attempted in the 1960's and 1970's to establish an industrial base through a policy of import-substitution; 1980 – 1994, the structural adjustment era, when Kenya replaced the import-substitution with a liberalized trading regime; and from 1995 onward, when deeper liberalisation and an export-led growth strategy were undertaken (Gertz, 2009). For instance, Kenya reduced the maximum tariff rate from 45 per cent in June 1994 to 25 per cent in June 1997. Kenya has been a WTO member since 1995.

2.2.3. Economic overview

In 2012, the country had an estimated real GDP per capita[5] (current $US) of US$ 2,795 up from US$ 1,537 in 1990, an increase of 82 per cent over a period of the two or so decades (World Bank, 2014).

Compared with some of the economies of Sub-Saharan Africa (SSA), Kenya has a relatively diversified economy with good financial services. Estimates of the year 2012 show that the service sector accounted for 54.8 per cent of nominal GDP (down from 60 per cent in 2004), whereas agriculture, forestry and fishing accounted for 27.8 per cent and industry for 17.4 per cent (up from 11 per cent in 2004). The financial sector is one of the most sophisticated on the continent with deep and developed domestic debt markets (KPMG, 2013).

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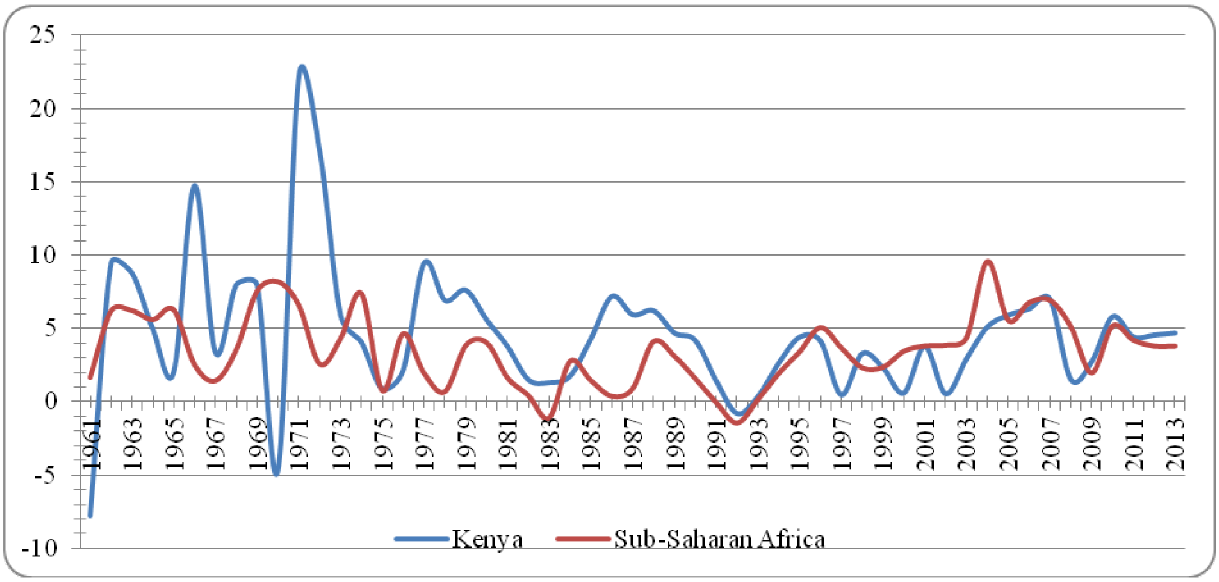
[4]From December 2007 to February 2008, Kenya experienced ethnic violence triggered by a disputed presidential election held on 27 December 2007.

[5]GDP per capita based on purchasing power parity (PPP). PPP GDP is gross domestic product converted to international dollars using purchasing power parity rates.

In 2014, the Kenyan economy grew by an estimate of 2.7 per cent. This growth is much lower than the 4.7 per cent growth in 2013. The poor performance in the first quarter was driven by inadequate rainfall in parts of Kenya's eastern, northern and southern areas. This also affected electricity generation and led to an increase in electricity prices. The 2013 growth was driven by domestic consumption (KNBS, 2014). As a result of increased insecurity and drought[6] Kenya lost 3 billion KSh in 2013 (World Bank, 2014).

As illustrated in Figure 1, Kenya's real GDP growth performance has been fairly volatile over the past five decades. Between 1961 and 1969, Kenya's GDP grew on average by 8 per cent.

Figure 1: Annual percentage growth rate of GDP (1961-2013)



Source: Based on data from KNBS

The strong performance of the 1960's was disrupted by the first oil crisis in the early 1970s, leading to a negative growth of almost 5 per cent. The relatively rapid real growth in the late 1970s was mainly due to sharp increases in international prices of

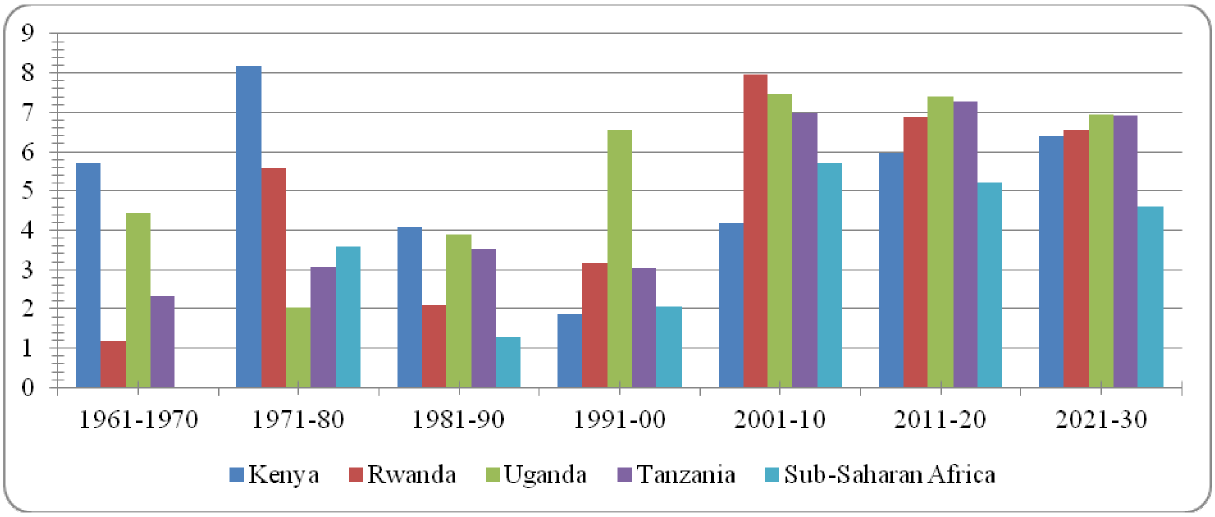
[6] The World Bank country report (2014) points out that due to the insecurity caused by terrorist activity and inadequate rainfall, economic growth slowed in the fourth quarter of 2013 as well as in the first quarter of 2014, growing just 2.7 per cent. Security threats hurt the tourism sector, while drought caused a reduction in agricultural production leading to high food prices.

tea and coffee. According to (Ng and Yeats, 2005), a loss of European market share to Brazil and Vietnam in recent years has reduced the value of the country's coffee exports. From 1983 onwards, GDP growth has remained at positive levels, except in 1991, which experienced a decline in GDP growth of 0.8, due partly to poor agricultural production. GDP in Kenya compared to SSA as a whole grew on average faster over the 1961 -1995 period. However, over the last two decades, the rate GDP growth in Kenya has been lower as compared with the average growth in sub-Saharan Africa.

A comparison at the regional level shows a similar picture (Figure 2). Moreover, Kenya has the largest economy amongst the East African Community (EAC), the regional intergovernmental organisation of the Republics of Burundi, Kenya, Rwanda, the United Republic of Tanzania, and the Republic of Uganda. Figure 2 shows that Kenya grew faster than its East African counterparts in the 1970-1991 periods, but this trend has been reversed since 1992.

The World Bank (2014) projects that Kenya's GDP will grow at a rate of about 6 per cent a year between 2014 and 2030. This will be powered by strong domestic consumption and investment. The World Bank outlines that the medium and long term outlook for growth remains relatively robust, even if some seasonal factors in terms of agricultural output and price fluctuations can be observed.

Figure 2: Average annual growth rates of GDP (comparison Kenya with EAC countries and average SSA)



Source: Based on data from KNBS

Despite rapid economic growth in recent years, inequality issues still remain. In other words, the benefits of the economic resurgence have not been broadly shared. The World Bank (2014) argues that one of the major barriers standing in the way of economic breakthrough in Kenya has been the high level of inequality. According to the African Development Bank (2012), the GINI coefficient for Kenya is particularly high, at 0.51 in 2005/06 (up from 0.46 in 1994). Another measure indicative of the levels of inequality is income share distribution. In Kenya, the top 20 per cent of the population owns over 50 per cent of the country's income.

In 2005, 47 per cent of population was estimated to be poor (i.e. lived on up to US$ 1.25 a day[7]) representing about 16 million people. 2005 was the last time Kenya did a household survey that measures poverty and there has been none since then. This puts air transport, even at a lower fare, out of reach of the majority of the population. Kenya's health sector also faces many challenges. The health outcomes are inconsistent with its aspiration to become a middle income country. The high level of maternal mortality (360 per 100,000 live births in 2010) and starvation among children (16.4 per cent of children under age 5 in 2011) have more or less remained unchanged over the past two decades. Life expectancy at birth in 2014 at 61 years is

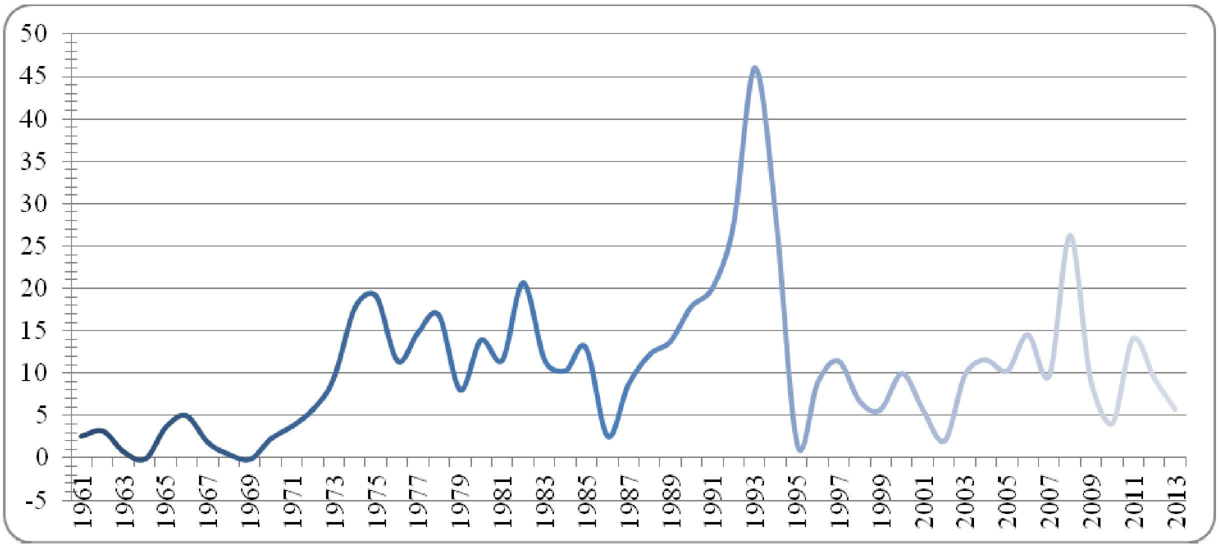
[7] International poverty line in national currency.

comparable to that of China in the late 1960s, while the total fertility rate (3.54 children) is comparable to that of Brazil in the early 1970s (WDI, 2014). Health outcomes are weak and public spending too low. There is an imbalance between rural and urban areas with respect to access to health infrastructure. This implies that the countries will have to focus on reducing poverty and inequality in order to establish a middle class that can afford tourism and air transport.

2.2.4. Monetary policy and inflation

The key monetary objective policy in Kenya is to maintain price stability, defined as an overall inflation of the target range of 5 per cent +/- 2 per cent (KIPPRA, 2013). Figure 3 provides an overview of the long term inflation performance of Kenya since its independence in 1963. The inflation rate is based upon the consumer price index.

Figure 3: Inflation rate trend (1961-2013)



Source: Based on data from KNBS

Looking at the trend, four identified periods can be distinguished, namely, 1961-1969, 1970-1985, 1987-1993, 1996-2008. For instance, in the early 1960's the inflation rate was relatively stable, below 5 per cent, before it went up to almost 20 per cent in the period 1970-1985. Inflation increased at a faster rate beginning in 1987 and reaching the peak increase of over 40 per cent in 1993.

In fact, Kenya gradually liberalised the exchange rate regime in the early 1990s from a crawling peg[8] based on a real exchange rate rule **to** a dual system. This reform led to a sharp increase in exports and current account improvement (Maehle et al. 2013). The authors argue that policy tightening after the 1992 elections helped stabilize prices. In 1994, Kenya accepted the obligations of Article VIII of the IMF agreement, and maintained no exchange rate restriction on current transactions. According to KIPPRA (2013), the high inflation rate observed in 2011 (Figure 3) is explained by high international oil prices, drought conditions and exchange rate depreciation.

In the period 1997 to 2007, the average rate of inflation was 10 per cent. Kenya's economy was severely affected by the post-election violence in 2007 and the financial crisis in 2008. Kenya's growth declined from 7.1 per cent in 2007 to 1.7 per cent in 2008, while inflation increased from 10 per cent to almost 25 per cent in 2008. The average annual inflation rate in Kenya was recorded at 5.7 per cent in 2013, down from 9.6 per cent in 2012 (Central Bank of Kenya). The sharp increase in inflation in Figure 3 is attributable to the move to a floating regime, combined with excess money supply and increased government spending (Maehle et al. 2013).

Kenya has a relatively high debt level compared to some of its SSA African counterparts, up around 50 per cent to 60 per cent of GDP. Kenya did not benefit from the debt reduction that some of the African countries benefited from in recent years. The country has been able to sustain its debt level over a long period of time which has given investors confidence that the government has the willingness and capacity to pay its debts (World Bank, 2014).

2.2.5. Investment and trade

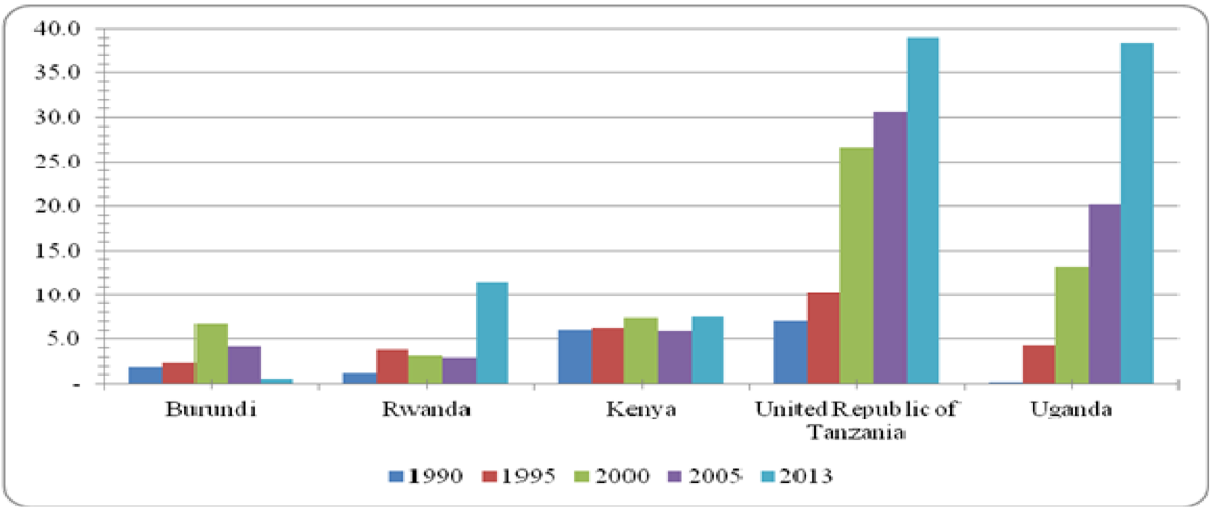
Public and private investment is critical for growth of country economies. The past two decades have witnessed a steady rise in investments, mainly driven by the booming construction and transport sector. KIPPRA (2013) points out that the share

[8] A crawling peg is situated somewhere between fixed and flexible exchange rates. It is an exchange rate regime usually seen as a part of fixed exchange rate regimes that allows depreciation or appreciation to happen gradually.

of public investment in gross investment has increased over the past decade. In 2012, the relative shares for public and domestic private investment were 23.4 per cent and 76.6 per cent, respectively.

FDI inward stock (i.e. all direct investments held by non-residents in the reporting economy) as a percentage of GDP (Figure 4) was estimated at 7.5 per cent in Kenya in 2013. There were disparities in growth between East African countries, with Tanzania recording an impressive growth of 39.1 per cent, followed by Uganda (38.3) and Rwanda (11.5). Everywhere, with the exception of Burundi, East African countries have recorded a steady increase in FDI inflow since 2000 (KNBS, 2014).

Figure 4: FDI inward stock as a percentage of GDP (1990-2013)[9]



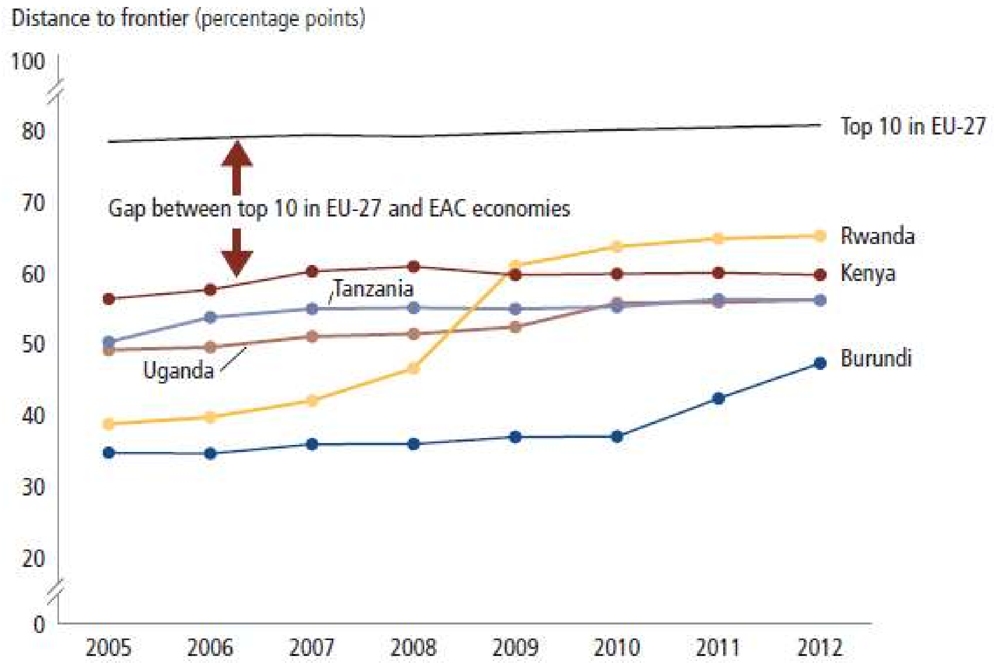
Source: Own calculations based on UNCTAD data

The improvement in FDI's growth of EAC countries is partly due to the implementation in recent years of institutional and regulatory reforms, creating a more investment-friendly climate. The World Bank Doing Business Report (2013) outlines that over the past eight years, EAC countries have continued to take steps to make it easier for local firms to start up and operate. The EAC economies have, in 2012, an average ranking of 117 with regard to the ease of doing business (among

[9] Data are available only from 1990 onwards. A general problem regarding this analysis is the availability of data over a long period, namely 1960 – 2014. Given that constraint, there is no uniformity in the analysis in terms of time frame.

185 economies globally). As shown in Figure 5, there is a great variation among them – with Rwanda at 52 in the global ranking, Uganda, Kenya, Tanzania and Burundi at 120, 121, 134 and 159 respectively. Within the EAC, Rwanda is the country that has narrowed the gap with better performers the most since 2005 (World Bank Doing Business Report, 2013).

Figure 5: Doing business in the EAC (2005 – 2012)



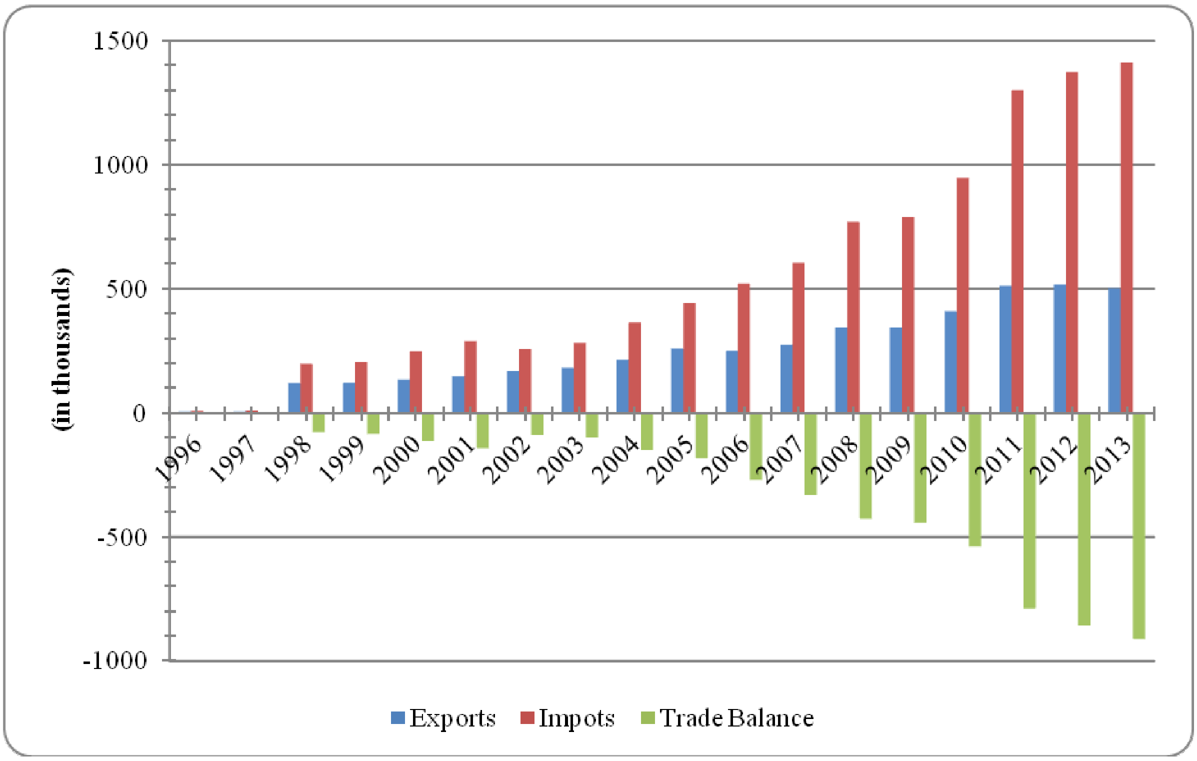
Note: The distance to frontier measure shows how far on average an economy is from the best performance achieved by any economy on each *Doing Business* indicator since 2005. The measure is normalized to range between 0 and 100, with 100 representing the best performance (the frontier). The top 10 in EU-27 are the 10 economies closest to the frontier among current members of the European Union.

Source: Doing Business database.

With respect to international trade, Kenya is a relatively open economy, with a trade to GDP ratio (2011-2013) of 68.2 per cent. In 2013, Kenya's exports totalled KSh 502.0 billion, while imports totalled KSh 1,413.0 billion (KNBS, 2014). The export-import ratio was 35.5 per cent in 2013.

Figure 6 shows the value of exports and imports and the trade balance in Kenya for the period 1996-2013. It can be seen from the figure that exports and imports grew exponentially in the last two decades, reaching KSh 502 billion in 2013 (from KSh 5.9 billion in 1996 for exports) and KSh 1,413 billion (from KSh 8.4 billion in 1996), respectively (KNBS, 2014). Kenya is largely a trade deficit country. In 1996, for instance, the deficit stood at KSh 2.5 billion, while this figure increased dramatically to KSh 911 billion in 2013.

Figure 6: Export, imports and trade balance 1996-2013[10]

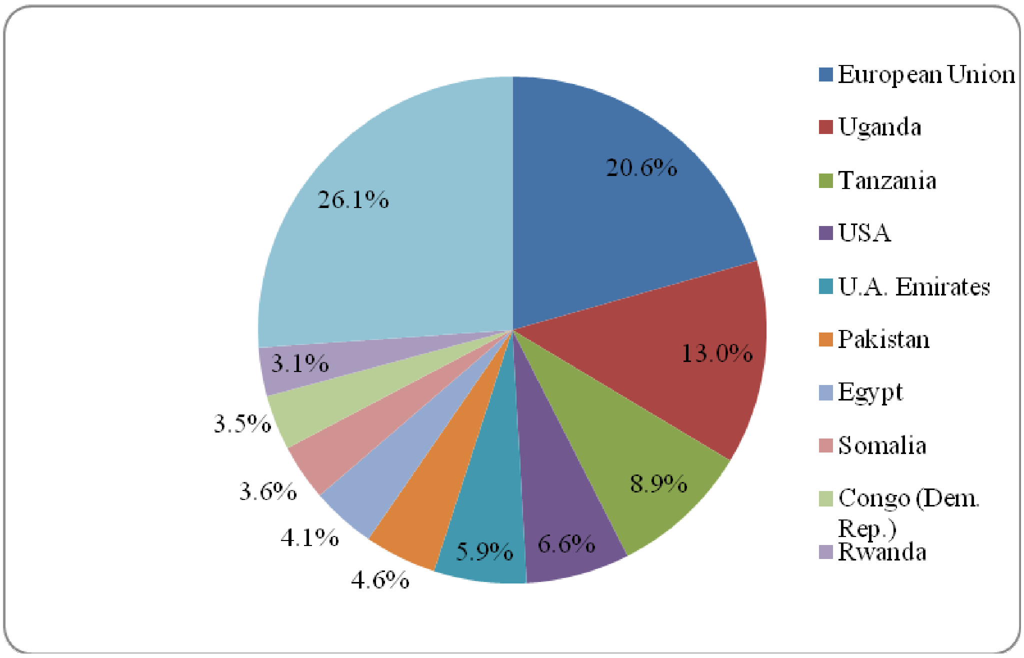


Source: Based on data from KNBS

The leading market for Kenya's exports is Africa, taking a 45 per cent share of all exports in 2013. Uganda (13 per cent) and Tanzania (8.9 per cent) are Kenya's top customers (Figure 7). Other major African importers of Kenyan goods are the Democratic Republic of Congo, Egypt, Rwanda and Sudan. Kenya's next largest market is Europe, which absorbed 20.6 per cent of its exports in 2013. The major customers were the United Kingdom, the Netherlands, Germany and France. In Asia, major importers of Kenyan goods in 2013 were Pakistan and the United Arab Emirates.

[10] Data are available only from 1995 onwards.

Figure 7: Share of total exports by destination (2013)

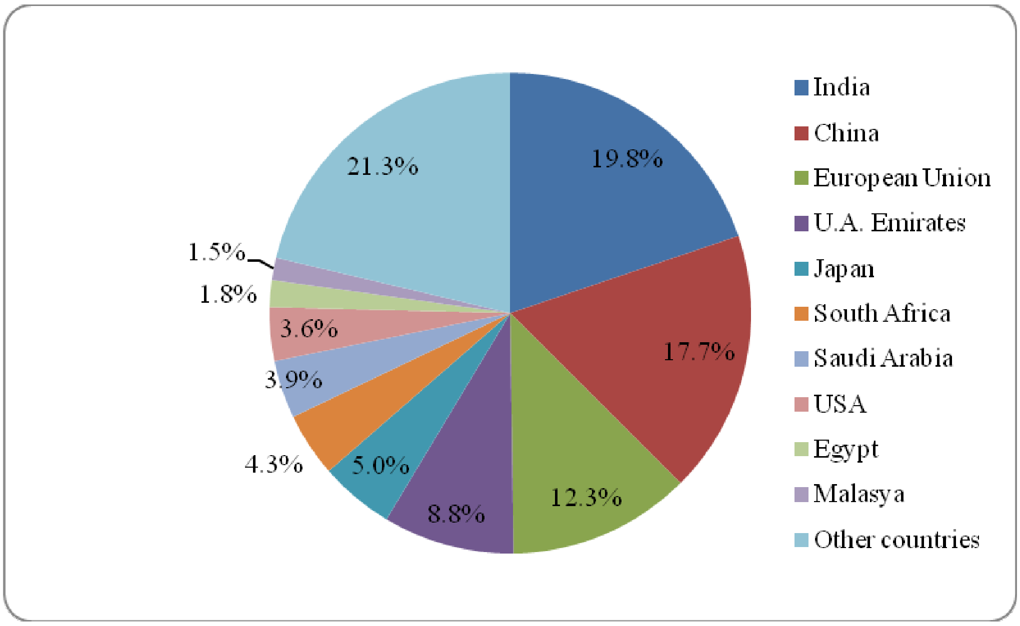


Source: Based on data from IMF

Kenya's main exports include horticulture (cut flowers, fruits and vegetables, both fresh and processed), tea, iron and steel, coffee (unroasted), fish, plastics, essential oils, tobacco and tobacco products, animal and vegetable oils, livestock and livestock products as well as tourism. Agricultural commodities, notably tea, horticulture, and coffee, account for around 35 per cent of the country's merchandise export earnings (KNBS, 2013).

As illustrated in Figure 8, the county's top suppliers in 2013 included India (19.8 per cent), China (17.7 per cent), the European Union (21.3 per cent) and the United Arab Emirates (5.0 per cent). Kenya's main imports include crude petroleum and petroleum products, industrial machinery, motor vehicles, construction materials, processed foods, electrical products, leather products, and medicinal and pharmaceutical products (KNBS, 2013).

Figure 8: Share of total imports by destination (2013)



Source: Based on data from IMF

2.2.6. Regional and sub-regional organisations

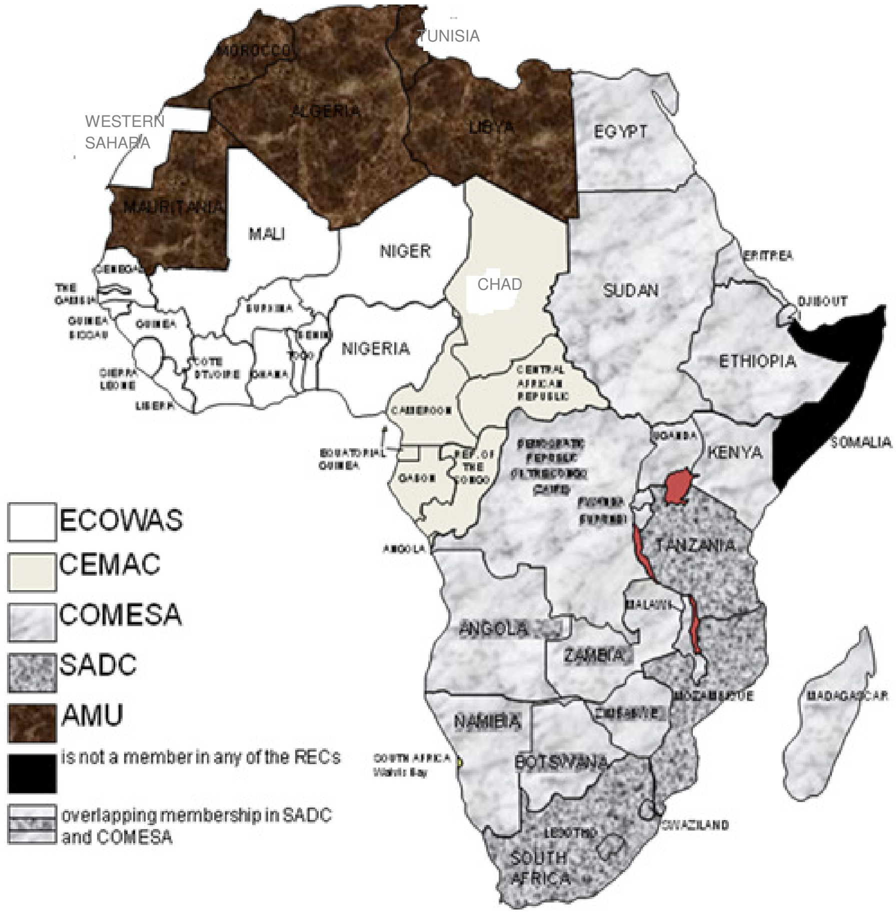
Kenya is a member of the East African Community (EAC), an intergovernmental organisation of five countries: Burundi, Kenya, Rwanda, Uganda, and the United Republic of Tanzania. EAC's objective is to attain a prosperous, competitive, secure, stable and politically united East Africa. Air Transport has been given particular attention in the EAC Treaty. As its objective, EAC member countries are to "harmonize their policies on civil aviation for the facilitation of passenger and cargo air services in the Community".[11] Kenya is the country with the largest economy and most advanced private sector within the EAC. The country's economy is much better linked to the other economies in terms of investment flows and trade, with Uganda and Tanzania being Kenya's main destinations of exports in Africa. Thanks to its more advanced human capital base, its more diversified economy, and its role as a leader in the information and communication revolution in the region, Kenya's economy is expected to remain strong (World Bank, 2014).

[11] www.eac.int – The website of the East African Community.

In addition to the EAC, Kenya is also part of the Common Market for Eastern and Southern Africa (COMESA), a regional organisation that has established a free trade zone between eastern, southern, and central African states. This dual regional bloc membership of Kenya has, in some cases, slowed down decision-making processes due to the need for harmonisation between individual regional economic communities (RECs). To address this obstacle, EAC, COMESA, and SADC founded the COMESA-EAC-SADC Tripartite in 2005 (Schlumberger and Weisskopf, 2014).

Figure 9 gives an overview of the African regional economic communities that have active programmes in the air transport sector. These include: AMU; COMESA; SADC; ECOWAS and CEMAC.

Figure 9: Selected African regional economic communities (illustration by the author)

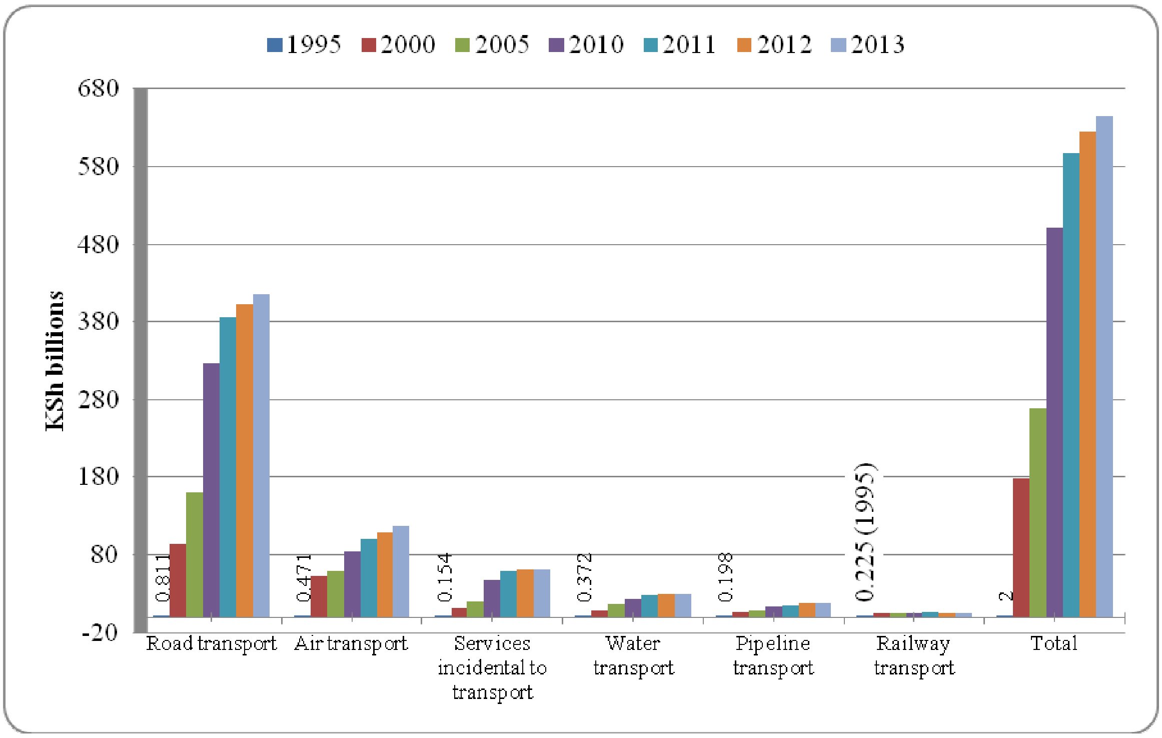


SADC is an organisation of fifteen independent states of Southern Africa. The main objective of the COMESA/ EAC/ SADC tripartite cooperation with respect to air transportation is to foster greater regional co-operation through provision of better quality and competitively priced air transport services.

2.2.7. The Kenyan transport sector

KNBS (2014) argues that the contribution of the transport sector to Kenya's GDP remained stable at around 7.5 per cent of GDP over 1995 – 2014 (Figure 10). Transport output increased from KSh 2 billion in 1995 to an estimated KSh 646 billion in 2013, with road transport accounting for 64.24 per cent of the total, followed by air transport[12] (18.1 per cent) (Figure 10). Despite the improved economic performance of the transport sector during the last decade, transport in Kenya faces several problems, notably high input costs due to the rising world price of oil, and inefficient and poor overall infrastructure (KNBS, 2014).

Figure 10: Transport output, 1995-2013[13]



Source: Based on data from KNBS, 2014

[12] Air transport is analysed in detail in Section 2.4.
[13] Data are available only from 1995 onwards.

In a study on Kenya's infrastructure conducted by Briceño-Garmendia and Shkaratan (2011), it was established that between 2000 and 2010, infrastructure contributed 0.5 percentage points to Kenya's annual per capita GDP growth. The authors argued that raising Kenya's infrastructure to the level of Africa's middle-income countries, such as South Africa and Mauritius, would increase its contribution up to 3 percentage points. In recent years, Kenya has allocated substantial sums to address transport infrastructure needs. According to KNBS (2014), transport related project allocation increased by 18 per cent to 123.6 billion KSh for the period 2012-2013. However, by and large, Kenya's transport infrastructure indicators still remain below the levels found in Africa's middle-income countries.

The Ministry of Transport is in charge of developing/reviewing and overseeing the enforcement of transport and meteorological policies. It is also responsible for the various transport regulatory bodies: the Transport Licensing Board, which regulates road transport services; Kenya Civil Aviation Authority (KCAA), the regulator in the aviation industry; Kenya Airports Authority, which regulates airports; Kenya Ports Authority, the ports regulator; and the Kenya Maritime Authority, the shipping industry regulator.

2.2.7.1. Road transport

Kenya has about 178,000 km of roads, of which 63,290 kms are classified, while the rest is unclassified (MoT, 2009). Briceño-Garmendia and Shkaratan, (2011) argue that the length of the trunk network is more than adequate. Of the 44.35 million inhabitants (2013), 78 per cent live in rural areas, of which 30 per cent have adequate access to the transport system (World Bank, 2013). Road transport is the only means of access to rural communities and accounts for 93 per cent of the total movement of passengers and freight in Kenya (MoT, 2009). Transport infrastructure development is one of the key pillars of the Vision 2030, the country's new development blueprint covering the period 2008 to 2030. Vision 2030 envisages that Kenya will become a globally competitive and prosperous middle-income country within the next two decades.

A comparison with African low income countries and middle income countries (such as South Africa, Mauritius) indicates that Kenya's length of the trunk network is more than adequate. Other achievements include good maintenance provision and high quality sector institution. Nevertheless, the country faces a huge rehabilitation backlog which absorbs maintenance funding. Moreover, road sector investments (at around 1 per cent of GDP in 2006) were low by regional standards, and addressing the rehabilitation backlog would require a one-time push on road sector investments (Briceño-Garmendia and Shkaratan, 2011).

In 2012 the Kenyan Ministry of Road Transport published a Transport Policy paper which identifies current and future challenges of the transport sector and addresses the modalities of its reorganisation (MoR, 2012). The aim of the policy is to " attain an efficient roads sub-sector that supports and promotes economic growth through the cost effective provision and maintenance of roads infrastructure, while aligning the management of the sub-sector with the Constitution" (MoR, 2012, p.8). Road transport services prices are market determined. Cabotage is not allowed. Together with its neighbouring countries, Kenya is implementing the Northern Corridor Transit Transport Agreement, which facilitates the transport of goods to and from the port of Mombasa.

2.2.7.2. Rail and maritime transport

The rail and maritime transport are cost advantageous for transporting bulky and heavy commodities over long distances. Rail is the second most important mode of transport in Kenya, after road transport, for both freight and passenger services (MoT, 2009). According to Briceño-Garmendia and Shkaratan (2011), the performance of rail service is relatively poor. The authors argue that owing to deterioration of the infrastructure, freight traffic on the rail corridor has declined to fewer than 1 million tons per year and handles less than 6 per cent of the cargo passing through the northern corridor that links Kenya to neighbouring countries.

The maritime transport system in Kenya consists of one major seaport, Mombasa, and other smaller scheduled ports along the Kenyan coastline (namely, Funzi, Vanga, Shimoni, Kilifi, Malindi, Lamu, Kiunga and Mtwapa). The port of Mombasa is managed by Kenya Port Authority (MoT, 2009). It is one of the modern ports in SSA and a major provider of essential international maritime links for the land-locked countries of Uganda, Rwanda, Burundi, Democratic Republic of Congo, Ethiopia, Somalia, Southern Sudan and North-Eastern Tanzania. It is the second-largest port in Sub-Saharan Africa after Durban in terms of tonnage and containers handled. The port is facing significant capacity constraints and, as a consequence, its role in transhipment is declining. The Performance of the port is relatively good compared with other ports in eastern and southern Africa (Briceño-Garmendia and Shkaratan, 2011).

2.3. Air transport and tourism - a literature review

Transport, in general, is important when it comes to explaining tourism growth (Page, 2005). Prideaux (2000) argues that the operation of the transport system is often taken as given and the impact that transport can exert over the shape and welfare of the tourism industry is often ignored. Air transport occupies a central position in the long-haul tourism. Air access is a necessary precondition for international, and in many cases for domestic tourism in many developing nations. Most destinations in developing countries are long-haul, meaning that fare impacts will be stronger. In this connection, the regulatory conditions governing air transport play a crucial role in the demand for tourism.

The positive impact of an efficient aviation infrastructure as an integral component of the tourism system has recently received theoretical and empirical support in a number of studies (e.g. Debbage, 2002; Forsyth, 2006a & 2006b; Papatheodorou, 2002; Warnock-Smith and Morrell, 2008; Graham, et al., 2008; ICF International SH&E, 2010; Duval and Schiff, 2011; Warnock-Smith and O'Connell, 2011; Dobruszkes and Mondou, 2013). The strong complementarities between air transport and tourism to certain regions mean that the performance of tourism is dependent on both market conditions and government policy prevailing in the aviation industry and vice-versa. This implies that both industries should be considered simultaneously. It has been argued that, until recently, international aviation agreements were negotiated between countries with no reference to any impacts they might have on other industries, especially tourism (Forsyth, 2006b; Dwyer et al., 2010).

Consequently, the economic impact of alternative civil aviation regimes has often been investigated with no explicit reference to the benefits of tourism.

Similarly, developments in tourism also affect air transport by influencing demand. Bieger and Wittmer (2006) point out that the development of attractions, such as theme parks, have been important in creating large and regular traffic streams that in Europe are now supporting some low-cost carriers. Investigating the interrelation between air transport and tourism, Bieger and Wittmer (2006) identify four overlapping phases as follows:

Tourism as a neglected business

Scheduled and regular air transport began after World War I with postal services and services for business people. Leisure and tourism traffic became part of the traffic carried in the 1930s with the emergence of bigger planes such as the DC2 and DC3.

Tourism as secondary activity

The abundance of large airplanes available in the aftermath of World War II increased the dependence of network and flag carriers on tourist traffic.

Specialisation in tourism

Improvements in aviation technologies, such as the development of wide-body aircraft, have had a major impact on tourism, most obviously through reduced costs and lower fares. The result has been a rapid growth in long-haul tourism such as Seychelles, Kenya, the Maldives and the Caribbean Islands.

Tourism and business traffic combined

The deregulation of air transport has enabled the introduction of lower fares and new products, such as low cost carrier (LCC) airlines. The lower fare concept of the LCCs has attracted significant traffic volumes. New forms of tourism, such as short-stay city tourism have emerged and traffic, involving visiting friends and relatives, has fed this new type of air service. Furthermore, the LCCs are having an impact on the development of secondary destinations. The destinations have realized the importance of LCCs in bringing tourists, and have in many cases (especially in Europe) offered LCCs promotional funding to encourage the provision of services.

Bieger and Wittmer (2006) further distinguish between pure quantity of tourism demand, the quality of demand in terms of visitor structure (often measured in terms of their spending power) and the structure of visits in terms of length, goal of visits, etc., which all have an influence on the provision of infrastructure. The timing and frequency of flights, together with the nature of the airlines offering services, can affect the quality of the tourists arriving. They further argue that on the air transport supply side, the network structure of the airlines and, in particular, the position of the destination airport within these networks can influence market accessibility and, with this, the fare structure and the types of tourists who will travel. Airports, and especially airport infrastructure and strategy, as well as airlines, are important within this type of framework. Destinations in reasonable proximity of an airport with high-quality infrastructure – e.g., runway of more than 3000m, comfortable departure and arrival services tend, for economic reasons, to attract larger airplanes at lower frequencies. Airport infrastructure and strategy, the regulatory environment in which it is provided as well as technical developments heavily influence air transport supply. Business models of the airlines (i.e. network/hub carriers, regional airlines, charter airlines and LCCs) can affect tourism flow as well.

Graham and Dennis (2010) also found that LCCs increased air traffic to Malta from a number of European origination points. Other studies argue that the emergence of low-cost airlines is a crucial step towards the development of air travel in tourism much in the same way as the development of the charter airlines and aviation deregulation ((Rey, Myro and Galera (2011); Castillo-Manzano et al. (2011); Bieger and Wittmer (2006) and Davison and Ryley (2010)).

Air transport occupies a central position in long-haul tourism. Kenya, like many other African destinations, is a long-haul tourist destination from major source markets, meaning that the impact of air connectivity will be stronger. In this connection, the regulatory conditions governing air transport play a crucial role in the demand for tourism. In a meta-analysis of studies on air travel demand, BTCE (1994) and Brons, et al. (2002) argue that long-haul travellers are more sensitive to airfare changes than short-haul travellers. This largely reflects among others the relative lack of substitute modes on longer distance flights and the fact that long distance flights are usually more expensive than short-distance flights to begin with. Brons et al. (2002) estimated an average travel cost elasticity of -1.146. Furthermore, using pooled time-series cross-section data to estimate dynamic econometric models for air travel by British residents to 20 OECD countries and for residents of these 20 countries to the UK, Dargay and Hanly (2001) found that airfares were an important determinant of demand, with long-run elasticities of the order of -0.3 to -0.6. It has also been found that leisure travellers exhibit more elastic demand for air travel as compared to business travellers (Gillen et al., 2003; Oum et al., 1992).

The relationship between air transport and poverty alleviation has also been investigated (ATAG, 2003). The traditional argument in favour of a positive link between air transport liberalisation and poverty focuses on the three linkages. DCs often are endowed with tourism-attraction potentials, but most countries are located far away from the main origins of international tourism, namely, North America, Europe and Japan. It is important to note that the existing quantitative literature has not given enough attention to the distributional consequences of policy changes with regard to air transport.

Finally, another strand of the literature focuses on the impact on tourism of international climate policy regimes. Abeyratne (1999) explores the link between tourism and air transport for small island developing states, with emphasis placed on environment protection. The study concludes that without an effective management of the two activities, sustainable development cannot be achieved. Pentelowa and Scott (2011) look at the implications, for the Caribbean tourism industry, of the inclusion of aviation in international climate policy regimes. They conclude that under current proposals, there will be no meaningful impact on the growth of arrival numbers to the Caribbean from the major markets of Europe and North America. Copeland (1992) discusses the role of airlines in the tourism and environment debate and presents the case for their greater involvement in environmental issues.

2.4. The Kenyan air transport sector

2.4.1. The regulatory context

The Government of Kenya recognises the aviation industry as a facilitator for tourism and for the transport of high yielding exports and perishable goods like floriculture and fish products. The country has enacted legislation aiming at liberalising air transport and setting up a two-level regulatory system (World Bank, 2005).
Such a system basically consists of:

- an independent Civil Aviation Authority in charge of regulating air transport (granting of licences, enforcement of technical regulations and monitoring of competition practices), whereas
- the government structure retains the formulation of policies through legislation and the negotiation of international agreements, especially BASAs (Bilateral Air Services Agreements).

The Integrated National Transport Policy (2009, p. 111) defines Kenya's mission for air transport as follows:

"To provide efficient, safe, secure, reliable, affordable and fully integrated aviation infrastructure and services that meet the needs of local, regional and international passenger and freight transport in order to achieve national development objectives in an economical and environmentally sustainable manner."

Key policy principles guiding the formulation of aviation policy are:

(a) "appropriate allocation of roles between the government, private sector and civil society commensurate to attracting investment, promoting growth and facilitating private sector participation in the aviation sector;
(b) promoting aviation safety and security;
(c) optimal development, maintenance and utilisation of air transport infrastructure;
(d) promoting fair competition;
(e) ensuring consumer satisfaction and protection;

(f) development and retention of human resources in the sub-sector;
(g) formulation of clear dispute resolution arrangements;
(h) improving the environmental performance of air transport;
(i) promoting local participation in the industry to boost national investment and
(j) observing strict enforcement of regulatory mechanisms to enhance industry order and discipline."

The following instruments represent the legal mandate for the regulation of air transport services:

- The Minister for transport;
- Kenya Civil Aviation Authority;
- Kenya Airports Authority.

The Ministry of Transport is in charge of developing and overseeing enforcement of transport and meteorological policies. Members of the National Civil Aviation Security Committee are appointed by the Minister. This committee is also responsible for the air transport regulatory bodies: Kenya Civil Aviation Authority and Kenya Airports Authority.

Historically, civil aviation in Kenya followed British rules and regulations until the EAC was established in 1963 (GoK, 2009). The three EAC member states (Kenya, Tanzania and Uganda) formed the East African Directorate of Civil Aviation, which formulated aviation policy for the region. The main objectives of the EADCA were to provide aerodrome infrastructure, air navigation services, and search and rescue coordination in the region.

The collapse[14] of the EAC in 1977 led to the demise of the EADCA, and only Kenya established its own civil aviation organisation. The first draft of Kenyan aviation policy was written in 1978 and revised in 1999, when new concepts like liberalisation, code

[14] The factors behind the collapse of EAC include, among others: (1) different political ideologies pursued by individual partner states; (2) disagreements on the sharing of benefits from jointly owned common services organisations and lack of policy to redress the situation; and (3) low private sector and civil society involvement in the running of the then Community.

sharing between airlines and Computer Reservation Systems were incorporated (GoK, 2009).

The KCAA was established by the civil aviation (Amendment) Act of 24th October 2002 as an autonomous corporate body that took over the functions of the defunct Directorate of Civil Aviation and the licensing of air services hitherto under Civil Aviation Board. The primary functions of KCAA can be categorised in the following manner:

- the regulation and supervision of aviation safety and security;
- the economic regulation of air services and the development of civil aviation;
- providing air navigation services;
- regulating safety and technical measures;
- granting licences for international and domestic non-scheduled air service operations into and within Kenya; and
- training of aviation personnel.

The national laws and regulations are based on the International Civil Aviation Organisation Standards and Recommended Practices. Kenya is a signatory to the Chicago Convention of 1944 and its Annexes. KCAA is required to consider and advise the Minister of Transport on a wide range of matters including:

- the establishment of air services; civil aviation legislation;
- measures to promote or support any airlines designated by the Government for the purposes of any international air service agreement;
- fares and freight rates and related matters, including implementation of any IATA resolution;
- air navigation facilities and services, and the cost of establishing and maintaining air navigation facilities and
- the policy to be adopted in order to recover such costs (WTO, 2007).

2.4.2. Air transport liberalisation in Kenya

The key features of air transport in Kenya have experienced significant changes in the past decade. The most important changes have affected the regulatory context. KCAA has been established as an autonomous body, in charge of administering policies set by the Government. As mentioned above, liberalisation policies were introduced during the 1990s and have been accompanied by partial privatisation of the former state-owned carrier (World Bank, 2005).

This section begins with an analysis of the economic regulation of international air transport, followed by a description of the relationship between air transport liberalisation and poverty and ends with an examination of the state of air services regulation in Kenya

2.4.2.1. The origins of liberalisation

The history of international air services can be divided into the three periods: the period of complete national sovereignty (1919-1939), the period of regulation (1939-1978) and the period of gradual removal of restrictions on traffic rights (from 1978 until today) (Productivity Commission, 1998).

In fact, in the first period, air transport networks were in their infancy, nationally oriented and characterized by direct state intervention and little efficiency. The principles of national sovereignty were formulated in the Paris Convention of 1919. The Paris Convention is, in fact, the starting point for the regulation of air transport (Productivity Commission, 1998).

Likewise, the principles of the second period were laid down in the Chicago Convention of 1944, which established the commercial aviation rights. The Chicago Convention set up the International Civil Aviation Organisation (an intergovernmental agency primarily concerned with government interests in aviation), the definition of "freedom of the air" and the framework of bilateral agreements. As can be seen from Table 1, there are currently nine different freedoms. The Bermuda I agreement between the USA and the UK signed in 1946 at Hamilton, Bermuda, was an early bilateral agreement involving civil aviation, entered into by two countries. Most significantly, the Chicago Convention was successful in drawing up a multilateral agreement[15] in international air transport with regard to three aspects: pricing, capacity and traffic rights. What is equally important is the creation of the International Air Transport Association in 1945, an association of airlines. It added three more freedoms to the two granted by the Chicago convention (third, four and fifth freedom) (Doganis, 2002).

Table 1: Freedom of the air

First freedom	The right to overfly a foreign country (A) from a home country en-route to another (B) without landing
Second Freedom	The right to stop in a foreign country for technical purpose only
Third Freedom	The right to carry traffic from a home country to a foreign country (A) for purpose of commercial services
Fourth Freedom	The right to embark traffic in a foreign country (A) and take them to home country for purpose of commercial services
Fifth Freedom	The right to carry traffic between two foreign countries on a flight that either originated in or is destined for the carrier's home country
Sixth Freedom	The right to carry traffic between two foreign countries via the carrier's home country by combining third and fourth freedoms
Seventh Freedom	The right to operate passenger services between two countries (A and B) outside the home country
Eighth Freedom	The right to carry traffic between two domestic points in a foreign country on a flight that either originated in or is destined for the carrier's home country
Ninth Freedom	The right to carry traffic between two domestic points in a foreign country. Also referred to as "full cabotage" or "open-skies" privileges

Moreover, until 1978, the US government, within the *regulatory* framework of the Civil Aeronautics Board, regulated all economic aspects of air transport: limiting the entry of air carriers into new markets, awarding traffic rights on each route, regulating fares for passengers, giving subsidies for small route and monitoring and regulating agreements and mergers between airlines (Doganis, 2002).

[15] However, this regulatory framework has undergone no significant changes within the past 70 years. With the exception of the European Union, where a single aviation market has been achieved through a comprehensive multilateral agreement, multilateralism has played a very minor role in aviation liberalisation.

However, following the introduction of the Airline Deregulation Act of 1978, the USA was a pioneer in introducing competition in air transport. This marks the beginning of the third period, as noted earlier. Deregulation was intended to remove barriers to entry, thus replacing government regulators with market forces as the arbiter of fares and service. Greater competition translated into an important increase of traffic, a decline in fares, and more choice for the consumer and significant technological innovations in the airline industry (e.g. Morrison & Winston, 1995; Borenstein, 1992; Kahn, 1988; Graham & Kaplan, 1985; Smith & Cox, 2008). Moreover, the liberalisation of air services in North America and the European Union has profoundly modified the strategies of airlines as well as air passenger services (Oum et al. 2010).

As transport technology has reduced travel time and costs, areas that were once viewed as inaccessible have become accessible. Forsyth (2006a) argues that the growth of tourism in the past fifty years has been greatly stimulated by innovations and favourable conditions in air transport.

2.4.2.2. The Kenyan experience

The framework of liberalisation of air transport in Kenya is based on the basic arrangements under the EAC, the Common Market for Eastern and Southern Africa (COMESA), the Yamoussoukro Decision[16] (YD) and existing bilateral air service agreements (BASAs) under the recommendation of International Civil Aviation Organisation (ICAO). EAC's objective is to attain a prosperous, competitive, secure, stable and politically united East Africa. Air Transport has been given particular attention in the EAC Treaty. As its objective, EAC member countries are to "harmonize their policies on civil aviation for the facilitation of passenger and cargo air services in the Community".[17] In addition to the EAC, Kenya is also part of COMESA, a regional organisation that has established a free trade zone between

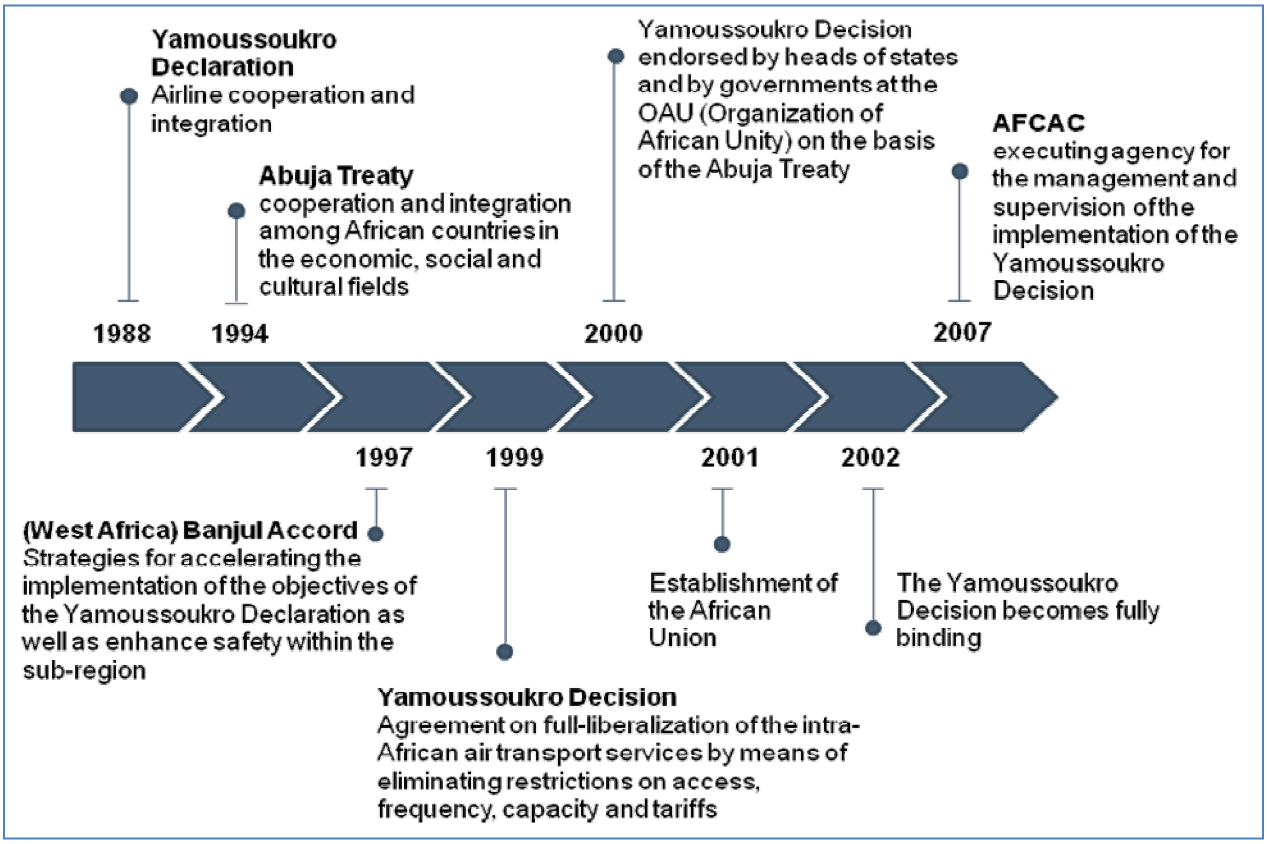
[16] Kenya is signatory of the Chicago Convention and member of ICAO. Kenya is also a member of AFCAC (African Civil Aviation Commission). As member of the African Union, it is bound by the Yamoussoukro Decision on the liberalisation of air transport in Africa.

[17] www.eac.int.

eastern, southern, and central African states. According to Irandu (2008), EAC has adopted the YD.

***The Yamoussoukro Decision* –** In 1988, African Ministers adopted the Yamoussoukro Declaration, which aimed at airline cooperation and integration. The Treaty establishing the African Economic Community (Abuja Treaty) was adopted in 1991 and enforced in 1994 (Figure 11). In 1997, four West African States, namely Cape Verde, The Gambia, Ghana and Nigeria, met in Banjul, The Gambia, to map out strategies for accelerating the implementation of the objectives of the Yamoussoukro Declaration as well as to enhance safety within the Sub-Region. In addition to the founder members, current membership also comprises Guinea, Liberia, and Sierra Leone.

Figure 11 Progress towards liberalisation of air transport in Africa (illustration by the author)



After a series of meetings, African transport ministers announced the "Yamoussoukro Decision" in 1999, and it was formally adopted by the governments of the OAU known as the African Union in 2000. The African Union was established in 2001 with the goal of promoting socio-economic development. The YD has been adopted by the AU in such a way that it is automatically binding for all its 44 members. The Yamoussoukro Decision became fully binding on 12 August 2002. At the Third Session of African Union Ministers Responsible for Air Transport, held in Addis Ababa, Ethiopia in May 2007, the ministers entrusted AFCAC, a specialized agency of the AU, with the attributions and responsibilities of the Executing Agency for the implementation of the YD.

The YD established principles for internal market liberalisation and fair competition of the air transport sector, with the aim of providing safe, efficient, reliable, and affordable air services to consumers. Specifically, the YD called for: (1) liberalisation of the intra-African air transport services by means of gradually eliminating all non-physical barriers and restrictions on access, frequency, capacity and tariffs; (2) provision of first, second, third, fourth and fifth freedom rights for passengers and freight air services by eligible airlines; (3) ensuring fair competition on a non-discriminatory basis; (4) compliance with international safety standards.

Not only is the YD conception far less ambitious than the European Union's Single Aviation Market, with only third, fourth and fifth freedom relaxations considered, but the agreement has not been ratified by all members. The YD provides for a similar regime for scheduled and unscheduled flights (passengers and cargo). Of the 54 African countries 44 signed the Yamoussoukro Decision, 10 have not.[18] Two of the 10 countries that are non-members of the Yamoussoukro have implemented the YD by means of their Regional Economic Communities, namely South Africa and Equatorial Guinea (Schlumberger, 2010). Table 2 provides a comparison of the liberalisation of European and African air transport services.

[18] These states (Djibouti, Equatorial Guinea, Eritrea, Gabon, Madagascar, Mauritania, Morocco, Somalia, South Africa, and Swaziland) cannot be considered parties to the Yamoussoukro Decision and therefore are in no way obliged to liberalize the air market.

Table 2: Comparison of the liberalisation of European and African air transport services

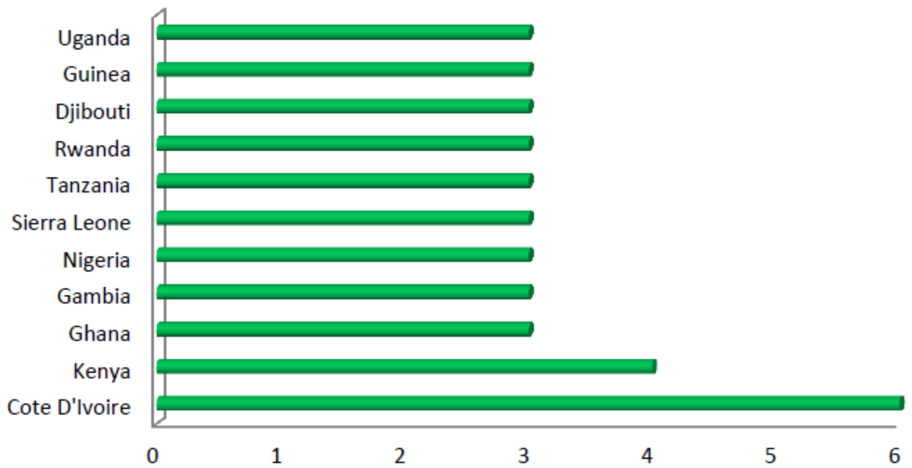
EU (third deregulation package April 1997)	**Africa (Key propositions of the Yamoussoukro Decision, 1999)**
Market access	
Market access: EU airlines may freely establish connections within EU borders.	African states mutually grant themselves the right to exercise traffic rights, but retain the power to designate the airlines.
Tariffs	
Tariff freedom limited to intra-European routes. No restriction on fare.	Tariff freedom limited to eligible airlines. States can reject excessive increases and low tariffs that adversely affect the economic viability of airlines
Designation of airlines	
Without procedure of designation for airlines of EU countries which can freely operate in any EU country.	Designation by states. Conditions for eligibility of airlines are: (a) The designated airline must be legally constituted in accordance with the laws of a member state. (b) The headquarters and main operating activities of the designated airlines should be in the countries concerned.
Frequency and capacity	
No limitations on frequencies and type of aircraft. This freedom is often technically limited by the absence of available slots in the big Europeans airports.	Freedom of capacity on intra-African routes. None of the signatory states may unilaterally restrict capacity, number of flights, type of aircraft, or traffic rights except on a non-discriminatory basis for certain environmental or technical reasons with respect to air safety or security.
Granting of traffic rights	
Authorisation of cabotage. These liberalisation measures only concern EU airlines and not airlines from third countries.	Free granting of traffic rights for the first, second, third, fourth and fifth freedoms. The decision does not oblige the signatory state to grant cabotage rights.
Licensing & ownership	
Multiple licenses granted to member states only if carrier is located in EU. Must be majority controlled, owned by member EU states/nationals (ownership of an EU airline by a non-EU national must be limited to 49.9 per cent).	Must be majority controlled, owned by national governments of the contracting states or state parties to the YD.

Source: Illustration by the author based on information from the European Commission and ECA (2005)

Kenya engaged in the liberalisation air transport sub-sector in the 1990s. The country has actively participated in regional and sub-regional economic blocs for the development of more open markets and has embraced the principles of liberalisation (Ministry of Transport (MoT, 2009). The status of liberalisation from the perspective of the key provisions of the decision shows the following results.

Traffic rights – Kenya has demonstrated greater flexibility in the granting of 3rd and 4th freedom traffic rights and relaxation of 5th freedom traffic (see Figure 12). The country has signed over 90 Bilateral Air Service Agreements (BASAs) and the majority of those agreements are liberal with no restrictions on frequency and capacity. The Ministry of Transport negotiated, reviewed and concluded several BASAs in 2012. The most notable negotiated and/ or re-negotiated BASAs included those relating to Nigeria, Angola, India, Saudi Arabia, Canada and Mexico, among others. This has helped to make JKIA a hub and a focal point for major aviation activity in the region (Kenya Airways, 2012). In 2000 Kenya and South Africa agreed on multiple designations and increased the number of daily flights from four to 14 on the Johannesburg-Nairobi route. In 2003, the agreement was further liberalized, when the remaining restrictions on capacity were removed. Myburgh, et al. (2006) found that between May 2000 and September 2005, monthly passenger volumes increased by 69 per cent over the pre-liberalisation trend.

Figure 12: African countries that have granted at least three Fifth Freedom traffic rights



Source: The African Airlines Association, www.afraa.org

With the exception of code-sharing arrangements, where the country has adopted a restrictive approach and continues to deal at bilateral levels, all other types of co-operations between Kenyan carriers and non-Kenyan carriers are encouraged, especially where they promote the development of capacity among local carriers to access various markets and increase foreign investment into the country, particularly in the aviation sector. Kenya has – on the basis of discussions held amongst aviation authorities and the stakeholders on the benefits of this arrangement – provisionally approved guidelines for franchising. These include domestic franchises, sub-regional franchise agreements and agreements between Kenyan carriers and international carriers on different markets.

Domestic routes in Kenya are liberalised and operators are free to fly any route without a special license, provided that they give notice of their flight schedules to the KCAA (MoT, 2009). However, the domestic market lacks an effective regulatory framework for ensuring a level playing field for all operators. This is not surprising as it is generally argued that most African countries do not regulate competition or have institutions that specialise in competition matters, which definitely allows room for fare collusion (Surovitskikh, 2013). MoT (2009) claims that competition and dispute resolution mechanisms in aviation are not clearly defined.

Carrier designation and ownership – Clearly, the relaxation of the carrier designation and ownership clause is likely to introduce competitive entry by new carriers as well as encourage investment by existing carriers. With respect to designation, Kenya has embraced multi-designation (ECA, 2005). The country sets foreign ownership limit at 49 per cent for both domestic and international airlines (MoT, 2009).

Frequency and capacity – Kenya has in recent years renegotiated its bilateral agreements and has lifted restrictions on capacity and frequencies. However, the government may oppose capacity increases in the event of disparity between the airport capacity, availability of appropriate equipment and type of aircraft operated (ECA, 2005).

Tariffs – Tariffs require prior approval. The Kenyan policy on airline tariffs for scheduled international air services is greatly influenced by decisions at international forums. These include mainly the recommendations of the ICAO and the tariffs developed at the IATA Tariff Conferences. Charter rates and tariffs are deregulated and are guided by market forces (MoT, 2009).

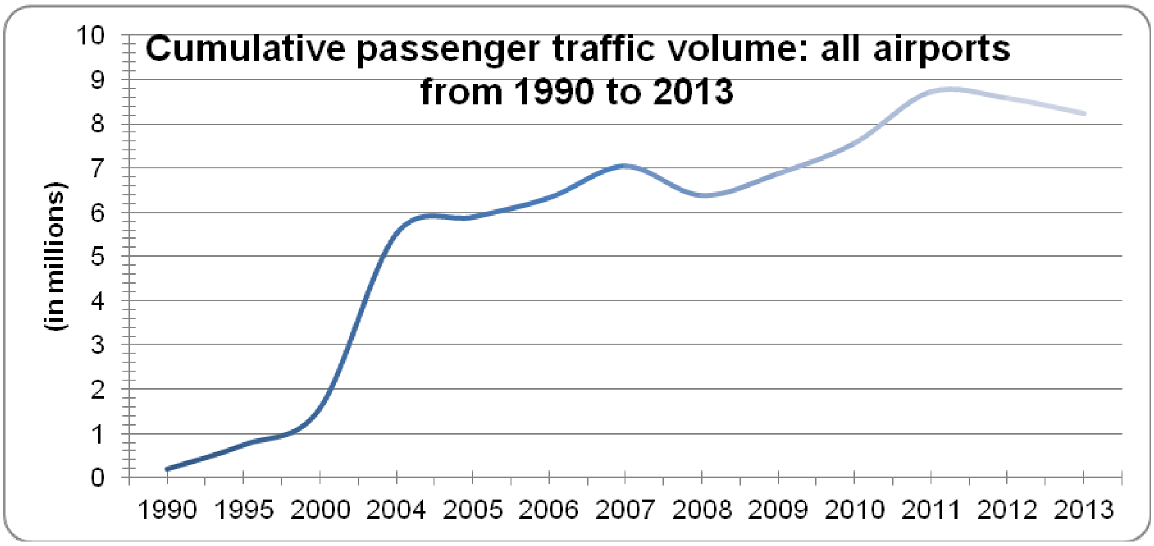
The Kenyan Ministry of Transport claimed that, within the context of liberalisation, Kenya's national interests must be safeguarded. In other words, the government of Kenya shall ensure that provision of air services between Kenya and other states is governed by principles of equal opportunity and mutual reciprocity. This practice is detrimental to liberalisation.

Schlumberger and Weisskopf (2014) argue that, despite the positive progress in privatisation, government involvement in the air transport sector has not disappeared entirely. They argue that, as a response to the financial difficulties of Kenya Airways, the Kenyan government is considering increasing its share in the carrier. They further argue that government intervention was already evident in 2006 when Ethiopia Airlines was refused traffic rights in Kenya, leaving Kenya Airways to be the only provider on the Entebbe (Uganda) to Nairobi route. Government involvement leads to rent seeking and anti-competitive behaviour. Such an environment is not conducive to further application of liberalisation strategies.

2.4.3. Air transport trends in Kenya

The country has witnessed a steady increase in the total passenger movement, which rose from less than 1 million in 1990 to more than 8 million in 2013 (Figure 13). This has been driven by the creation of favourable conditions in air transport such as improvements in infrastructure and business environments, which have resulted in the stimulation of growth in trade and tourism.

Figure 13: Air transport in Kenya, passengers carried (million)[19]



Source: Based on data from KCAA

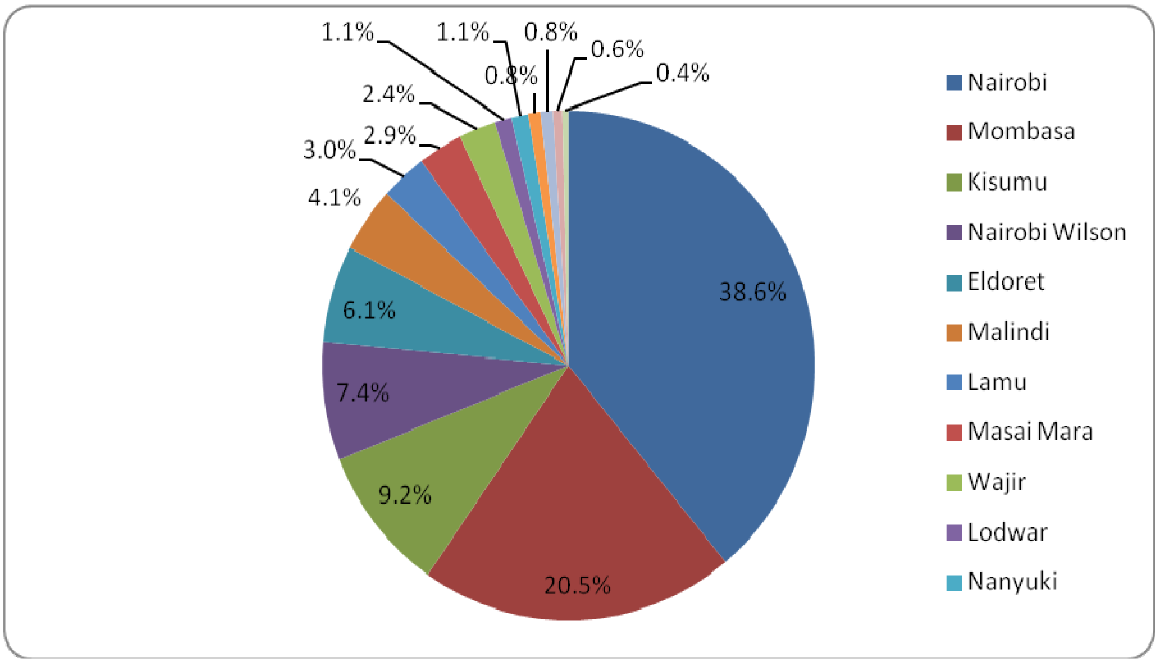
2.4.3.1. Domestic passenger air traffic

In 2013, there were over 2.2 million available seat kilometres in domestic air traffic in Kenya. Kenya has the largest domestic traffic in EAC, followed by Tanzania. The Figure (14) below gives an overview of the domestic airlines schedules in Kenya in 2013.

As Figure 14 shows, the domestic air transport market is concentrated around the two airports, namely Nairobi and Mombasa, Kenya's two largest cities and economic centres. Nairobi absorbs the largest number of passengers (38.6 per cent), followed by Mombasa (20.5 per cent). There are 17 round-trip daily flights connecting the two cities. High frequency domestic traffic also occurs between the country's capital and Lamu, Malindi and Mara Serena Airport, located in Masai Mara. This feeds tourism traffic from Nairobi to popular tourist destinations (Schlumberger and Weisskopf, 2014).

[19] Data are available only from 1990 onwards.

Figure 14: Domestic capacity share in Kenya by airports (non-stop departures; 2013)



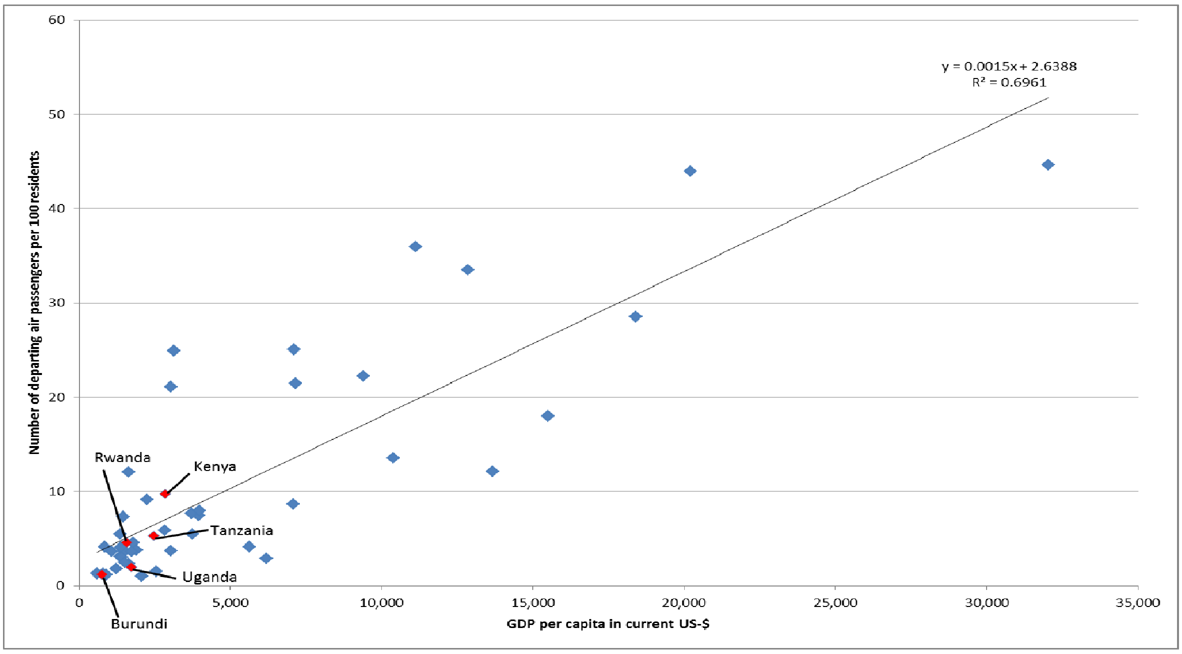
Source: Based on data from Routesonline

2.4.3.2. Intra-EAC, intra-Africa and intercontinental air traffic

Air transport in the East African Community is characterised by low intensity of travel As illustrated in (Figure 15) propensity to fly varies from 1.9 to 9.7 originating air trip per 100 residents in Burundi and Kenya with a real GDP per capita of USD 749 and USD 2,838, respectively.

Intra-EAC air transport is limited to few routes, primarily connecting the EAC's large- and medium-size cities to the region's hub in Nairobi. The route between Tanzania and Kenya is the most frequently travelled, followed by the route between Kenya and Uganda. In 2012, as measured by the number of weekly seats, the main traffic streams to the EAC go to Dar es Salaam International (Tanzania) and Entebbe (Uganda) (Table 3). In addition, key routes include services between capital cities as well as tourist destinations such as the route from Zanzibar to Mombasa (Schlumberger & Weisskopf, 2014).

Figure 15: Relationship between GDP/Capita and number of departing passengers in 2013 for continental African States (own illustration)



Source: Based on data from World Bank/Sabre Market Intelligence

Table 3: Top international markets from Kenya (non-stop weekly departures, January 2012)

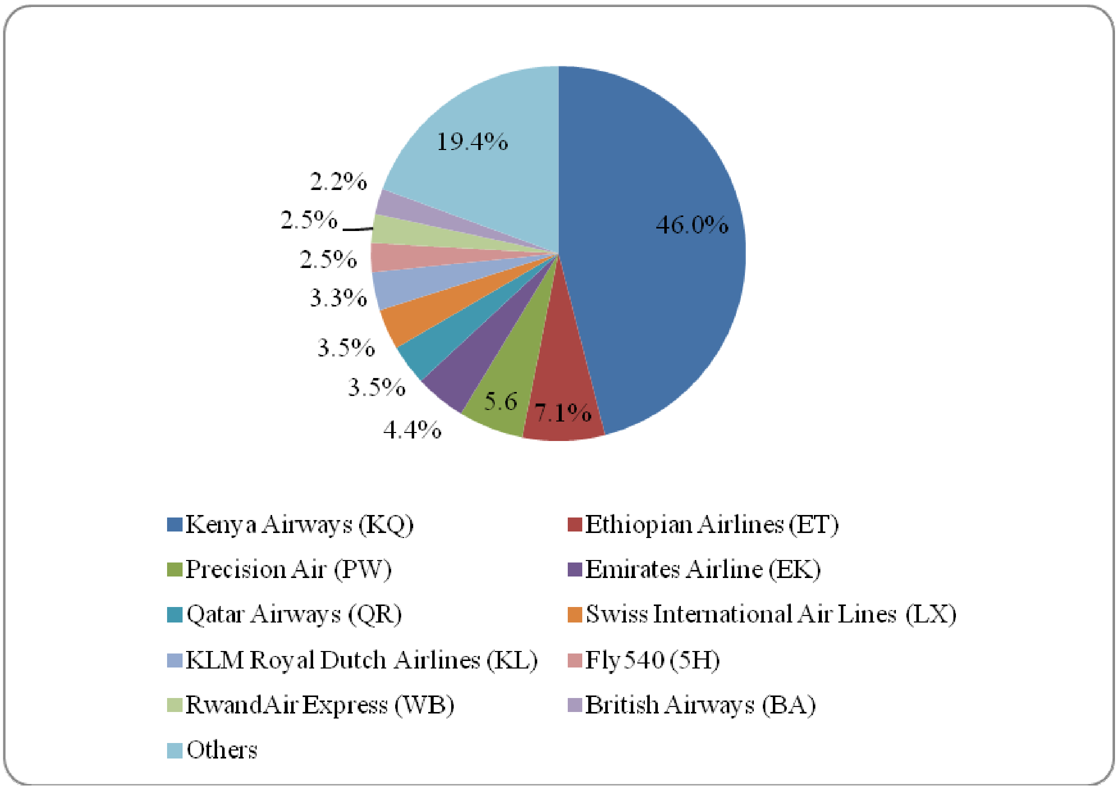
Rank	Airport	Weekly departures	Weekly seats	Per cent capacity
1	Dar es Salaam International	60	6,611	7.7
2	London Heathrow	22	6,378	7.5
3	Dubai International	26	6,232	7.3
4	Amsterdam Schiphol	14	5,054	5.9
5	Entebbe	61	4,880	5.7
6	Johannesburg OR Tambo International	26	3,952	4.6
7	Addis Ababa	30	3,731	4.4
8	Kilimanjaro	42	3,509	4.1
9	Bujumbura International	28	3,222	3.8
10	Juba	46	3,066	3.6
Others		285	38,703	45.4
Total		**640**	**85,338**	**100**

Source: Routesonline, 19 January 2012

At the continental level (excluded intra-EAC), Johannesburg OR Tambo International (South Africa) and Addis Ababa (Ethiopia) were, in 2012, the largest markets from Kenya, accounting for 4.6 per cent and 4.4 per cent, respectively, of total traffic. Traffic between Kenya and Ethiopia is partly operated by Ethiopian Airlines which holds a 7.1 per cent share of weekly capacity in Kenya (Figure 16). It is worth highlighting that in 2000 Kenya and South Africa agreed on multiple designations, and increased the number of daily flights from 4 to 14 on the Johannesburg-Nairobi route. In 2003, the agreement was further liberalized, when the remaining restrictions on capacity were removed. Myburgh et al. (2006) found that between May 2000 and September 2005, monthly passenger volumes increased by 69 per cent over the pre-liberalisation trend.

At the intercontinental level, and according to 2014 figures, London Heathrow (7.5 per cent) is the largest market from Kenya, followed by Dubai International (7.5 per cent) and Amsterdam Schiphol with a market share of 5.9 per cent.

Figure 16: Market share per carrier on international routes from Kenya (non-stop weekly departures, May 2014)

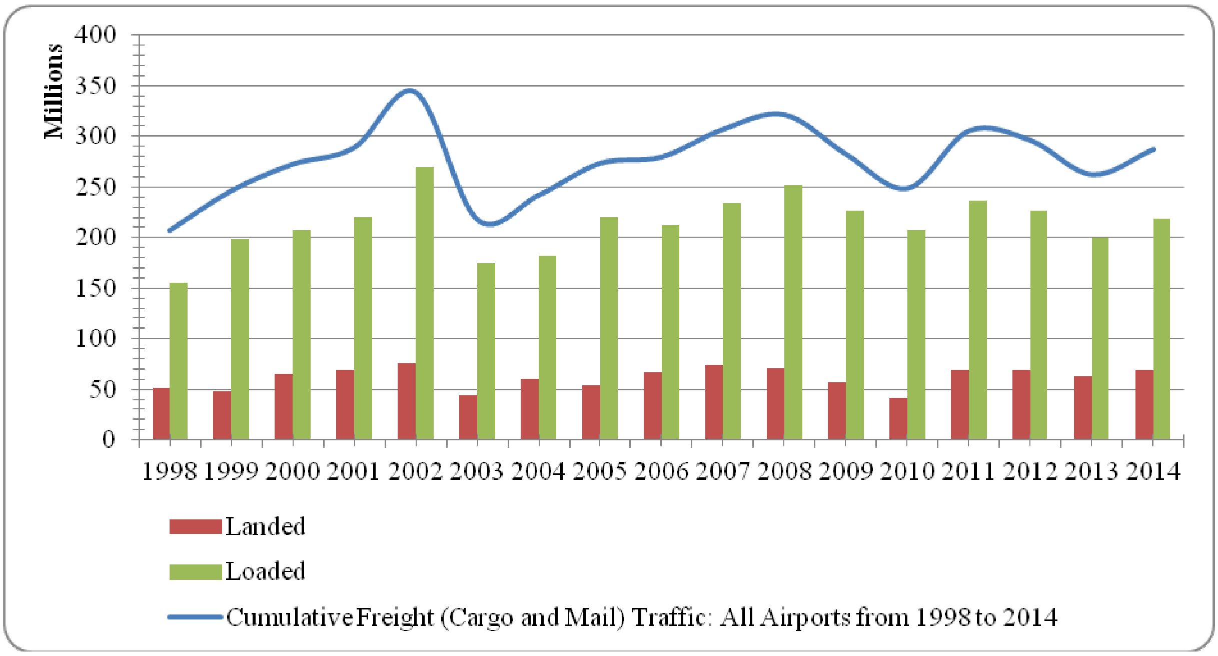


Source: Based on data from Routesonline, 29 May 2014

2.4.3.3. Cargo and mail

Cumulative freight handled increased from 207 million ton-km in 1998 to 287 million ton-km in 2014, partly because of larger horticulture exports (Figure 17).

Figure 17: Air transport in Kenya, freight (million ton-km)[20]



Source: Based on data from KCAA

Some of the country's highest-value exports, such as cut flowers and fresh produce are highly perishable and require air transport to remain in a condition to be sold. On the whole, Kenya registered between 1998 and 2014 a 17 per cent growth in cargo exports to the traditional markets in Europe and the emerging markets in the Middle and Far East. The terrorist attacks of September 11 and the financial crisis of 2008 as well as general economic slowdown in Europe adversely affected air cargo operations across the country.

The volume of cargo and mail transported in 2014 by Kenya Airways grew by 9.5 per cent (287453.2 tons) compared to 2013 (262,481tons). JKIA handled nearly three-quarters of the total air cargo and mail traffic. While there was a 10 per cent increase

[20] Data are available only from 1998 onwards.

in volume of imports (68,895 tons in 2014 compared to 62,880 in 2013), 9 per cent increases were recorded for the volume of exports (218,555 versus 199,601).

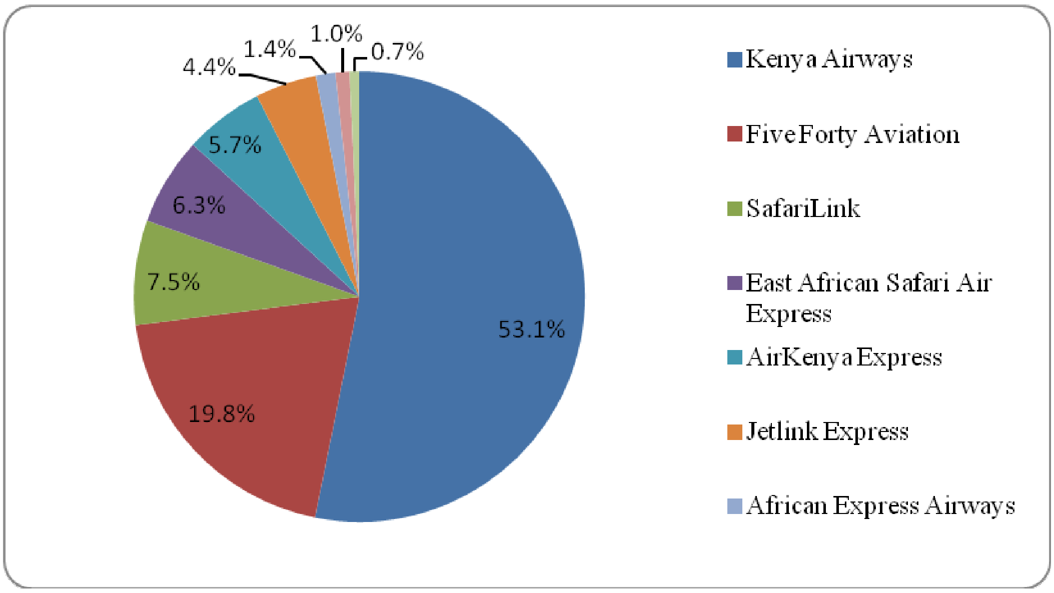
2.4.3.4. Full service carriers

The Kenyan aviation industry is a dynamic one, dominated by Kenya Airways, which held 46 per cent of the share of weekly capacity in 2014 (Figure 15 above). It is the designated national carrier, operating scheduled services into and out of Kenya in accordance with BASAs. However, other Kenyan companies are allowed to operate international and domestic charter airlines and operate into and out of Kenya as well as within Kenya.

With respect to foreign airlines, African airlines, namely Ethiopian Airlines (7.1 per cent) and Precision Air (5.6 per cent) are the next largest airlines operating in Kenya, followed by Emirates Airline (4.4 per cent) (Figure 15). Abate (2014) outlines that intra-African traffic is dominated by few airlines and competition is very limited. Moreover, there is too little market on most routes to sustain the operation of several airlines. This forces airlines to operate in multiple destinations simultaneously, which requires fifth traffic rights to and beyond intermediate points of city-pair routes. Non-African airlines include, among others, Emirates Airline (4.4 per cent), Qatar Airways (3.5 per cent), Swiss International Air Lines (3.5 per cent) and KLM (3.3 per cent). Ranganathan and Foster (2011) indicate that because of its hub status, both in East Africa and beyond, Kenya has exceptionally high international connectivity.

With regard to domestic capacity share by airline, Kenya Airways retains a 53.1 per cent share (2014) – whereas the next largest market shares, of Five Forty Aviation and SafariLink, are respectively 19.8 per cent and 7.5 per cent (Figure 18). As a result of the country's move toward a deregulated domestic market, some key routes have seen the entry of competitors. However, its domestic connectivity is low, which reflects the limited purchasing power of its domestic market (Ranganathan & Foster, 2011).

Figure 18: Domestic capacity share per carrier in Kenya (non-stop departures 2013)



Source: Based on data from Routesonline, 29 May 2014

***Kenya Airways* –** Founded in 1977 and owned by the government, Kenya Airways was the first African airline to become privatized in 1996. Moreover, the government decided to sell 77 per cent of the state-owned enterprises to a broad array of investors. As shown in Table 4, the airline is owned by KLM (26 per cent), foreign institutions (13.02 per cent), Kenyan government (23 per cent), Kenyan investors (37.26 per cent) and foreign investors (0.72 per cent) (Table 4).

Table 4: Kenya Airways shareholder analysis (2013)

Domicile	Shares	%	Holders
KLM	120,020,026	26.00	1
Foreign Institutions	60,123,604	13.02	49
Foreign Individuals	3,283,304	0.72	484
Government of Kenya	106,171,561	23.00	1
Local Institutions	69,807,876	15.12	3,415
Local Individuals	102,209,112	22.14	69,299
Total	461,615,483	100.00%	73,249

Source: Kenya Airways

The carrier's head office is located in Embakasi, Nairobi, with its hub at JKIA. Kenya Airways has been a SkyTeam member since 2007. From 23 destinations in 1977 to 63 in March 2014, the carrier is serving 56 destinations in Africa (including five in Kenya, according to OAG data). Kenya Airways currently operates a fleet of 47 (2014) passenger aircraft consisting of five 777s, six 767s, fourteen 737s, 20 E-jets and one 787.

The airline carried a total of 3.7 million passengers in 2014. Carrier's traffic, measured in revenue passenger kilometres, grew from 3,435 million in 2000 to 9,309 million in 2014. This represents a growth of 171 per cent across the period. The passenger load factor came to 65.6 per cent, a decline of 4.5 percentage points compared to 2013 (Annual Report Kenya Airways, 2014). It should be noted that airlines operating in Africa have generally experienced lower load factors, approximately 10 per cent lower than in most other regions (IATA, 2013).

According to CAPA (18 March 2014), Africa accounted for nearly 72.3 per cent of Kenya Airway's international seat capacity in March 2014, while Western Europe, Asia and Middle East accounted for 11.4 per cent, 13 per cent and 3.4 per cent, respectively.

Kenya Airways has, in recent years, been pursuing an acquisition strategy. The carrier is rapidly expanding its geographic coverage, especially in the African market, by acquiring interests in airlines. Moreover, Kenya Airways Limited holds 41.23 per cent equity interest in Precision Air of Tanzania; there are plans to form a strategic partnership with RwandAir and Air Namibia. The carrier's 10-year plan envisions an expansion of its current fleet by 153 per cent, from 47 (2014) to 119 by 2021. The airline is likewise aiming at increasing its destinations from 55 (2011) to 115 routes in 77 countries in six continents by 2021.

2.4.3.5. Low cost carriers and charter operators

Low cost-carries have been the key drivers in domestic and regional air transport development in Kenya. In Europe, for instance, the emergence of LCCs has implications for airport strategy (Tchouamou-Njoya and Niemeier, 2011). The importance of LCCs for tourism has been investigated by Rey, Myro and Galera

(2011); Castillo-Manzano et al. (2011); Bieger and Wittmer (2006) and Davison and Ryley (2010). These studies argue that the emergence of low cost airlines is a crucial step towards the development of air travel in tourism, much in the same way as the development of the charter airlines and aviation deregulation.

It should also be noted that there is a direct link between the development of charter companies and tourism development. Laws (1997) argues that without regular access to charter flights, it would be almost impossible for mass-market tourism to attract sufficient visitors to sustain a fully developed tourism industry.

The LCC sector in East Africa in general, and in Kenya in particular, is evolving rapidly (Figure 19). Almost a fifth (23 per cent in 2013 compared with 10 per cent in 2001) of domestic seats in Kenya are on LCCs, led by Fly540 and Kenya Airways subsidiary, Jambo Jet. Approximately 9 per cent of international seats are on LCCs in Kenya (CAPA, 29 September 2013).

Air travel in Kenya, as in other African countries, is far more expensive than in other developing countries. In order to provide an assessment of fare levels in the EAC market, Schlumberger and Weisskopf (2014) compared fares for selected dates for domestic and intra-EAC routes with routes in other regions that are currently operated by LCCs. They found that on the routes where LCC Fly540 is present in Kenya, Kenya Airways actually undercuts the LCC by a small margin on the chosen dates, thereby displaying some sign of fare convergence in the market. They argue that the competition with the LCCs seems to have brought down fares to a similar level along some routes, such as the Nairobi to Mombasa route. Charters are important insofar as they provide direct access to large tourist-generating markets.

Established in 2005, Fly540 is owned by Five Forty Aviation Ltd., with a 49 per cent investment stake by British company Lonrho Africa. The carrier offers a no-frills air transport service for 5,540 Kenya shillings (approximately US$60) round-trip fare. Fly540 Kenya flies from Jomo Kenyatta International Airport to six destinations across Kenya, Juba in South Sudan and Zanzibar in Tanzania, with daily one-way flights.

Jambojet was established to help meet rising competition in Kenya Airways' core markets from new, independent LCCs. Jambojet operates regional and domestic services, utilising a fleet of Boeing 737-300 aircraft (CAPA - Profile on Jambojet).

The emergence of LCCs operations has helped to bring growth to the domestic and regional markets. Its progress is tied to economic growth, a growing middle class and liberalisation of air services. The development and expansion of LCCs should also contribute to greater economic integration and to the development of tourism. According to Africa Development Bank, approximately 4 million of the 37 million Kenyan population belong to the middle class and earn between US$2,500 and US$40,000 a year.

Table 5: LCCs in Kenya

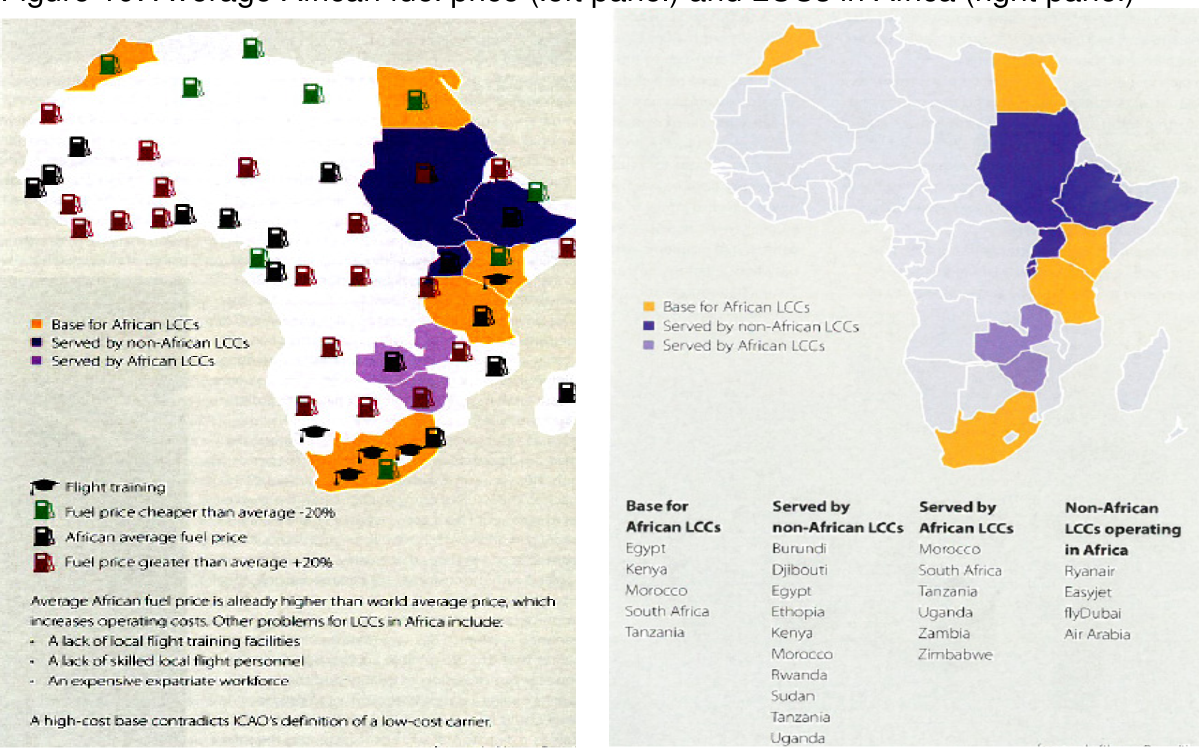
Airline	**Base**	**Operating since**	**Route network**	
			domestic	international
Jambojet (*Kenya* Airways' low-cost subsidiary)	Nairobi	2014	4	0
JetLink Express	Nairobi	2006	5	4
Fly540	Nairobi	2005		
AirKenya Express (hybrid carrier, operates domestic scheduled and charter services)	Nairobi	1987	11	1

Source: Author's compilation based on airlines' annual reports and CAPA

Fares – World Bank (2005) points out that owing to high density and high levels of competition, fares in East Africa appear more moderate, for intra-regional services as well as for long-haul as opposed to other Regions of the African continent. Moreover, on the long haul-market, competition is more intense than on the domestic and short-haul market. This is due to that fact that there are numerous competitors in this fast growing market. Competitors include Kenya Airways, KLM/Air France, Air Berlin and British Airways, SWISS and the three major "sixth freedom" carriers, Ethiopian, Emirates and Turkish Airlines. Another reason why fares are lower in EAC is that traffic is more concentrated (especially on the Nairobi hub), thus generating higher economies of scale. World Bank (2005) further outlines that on the domestic markets, Kenya has experienced intensified competition. The study finds that fares have reduced on both domestic and international routes with large market volumes such as Nairobi-Mombasa as well as on the routes to Europe and Dubai.

However, while competition and demand conditions are important in explaining the level of fares, it should be noted that factors such as ease and cost of doing business and the cost of input also play a role (Twining-Ward, 2009). Airline operating costs are found to be very high in Africa as compared to other parts of the world[21]. Figure 19 shows that with the exception of Djibouti, Equatorial Guinea, Kenya, South Africa and North African countries, where fuel prices are 20 per cent lower than the African average, fuel prices is in most countries 20 per cent higher than the African average.

Figure 19: Average African fuel price (left panel) and LCCs in Africa (right panel)



Source: Low Cost & Regional Airline Business/July 2015[22]

[21] http://www.afraa.org
[22] http://www.lowcostandregional.com/feature/low-cost-carriers-capacity-share-in-africa

2.4.3.6. Airports

Infrastructure is a key factor when explaining tourism flows. Duval and Schiff (2011) use New Zealand as a case study to illustrate the effect of air services availability on international visitors, concluding that the existence of regional hubs and robust third-country carriers provide sufficient airlift for visitors from countries without non-stop air services to New Zealand. Khadoroo (2007) points out that transport infrastructure matters in overall tourism development. Applying a gravity model of trade to the tourism services industry for 28 countries over the decade 1990–2000, Khadoroo and Seetanah (2008) empirically estimate the link between transport infrastructure and tourism flows using a dynamic panel framework. They found a positive relationship between transport capital stock of countries in the sample and the number of tourist arrivals. The implication is that government should integrate transportation policies into tourism planning, especially for those countries with poor infrastructure.

The establishment of airport hubs paves the ways for economies of scale, as it enables airlines to strengthen their load factors, reduce the costs of travel and increase their connectivity (Pels, 2001; Alderighi et al. 2005). The use of hubs would serve to increase the number of connections in tourism generating markets, which would strengthen the region's potential for tourism development. Lohmann et al. (2009) argue that Singapore and Dubai have used tightly combined airline, airport and tourism strategies to become major international tourism destinations. In order to obtain maximum synergy, the tourism and aviation industry must collaborate to link the hub strategies to strategies for the expansion of national and regional airlines and of tourism and to jointly promote aviation infrastructure development and safety.

There are five international airports in Kenya.[23] In addition, there are more than 150 airstrips throughout the country; 16 of the main airports are state-owned and managed by KAA, and others are owned by the provincial administration and individuals (WTO, 2007).

[23] These are Jomo Kenyatta International Airport; Moi International Airport; Wilson Airport; Kisumu International Airport and Eldoret International Airport. There are some tourist specific airports such as Malindi Airport and Wilson Airport as well as dedicated cargo airports such Meru Airport.

The KAA is a state cooperation established under an Act of Parliament, the Kenya Airports Authority Act Cap 395, laws of Kenya, which came into force on 31st May 1991. Most of the airports are administrated by Kenya Airports Authority. Kenya's Jomo Kenyatta International Airport is the busiest airport in Kenya and a major hub of aviation activity for cargo and tourist passengers in East Africa, and is served by some 50 scheduled airlines, with direct connections to Europe, the Middle East, Asia and Africa. Located 15 kilometres east of Nairobi, JKIA is a hub for the national carrier Kenya Airways. Prior to liberalisation, the government of Kenya had a policy of authorising scheduled services at JKIA and charters at Mombasa airport (World Bank, 2005).

The JKIA airport in Nairobi was first opened in 1958 and it was designed for a maximum capacity of 2.5 million passengers a year (CAPA – Profile on JKIA). It is the busiest airport in East and Central Africa and is the 7th busiest airport in Africa. The airport is served by one terminal building constructed in the 1970's (JKIA website).[24] In 2014, the airport handled 4 million passengers and 168,556 tons of cargo. According to CAPA (August 2014), the airport stated it will have landside capacity to handle 12 million passengers following the completion of the ongoing airport's expansion programme, an increase from the current 6.5 million passengers. Airside capacity is estimated at 80,000 aircraft movements per annum versus nearly 75,000 movements in 2011.[25]

There are few reports available on runway conditions in the EAC. A report produced by the AICD program previously assessed the runway quality of major airports in Africa. It identified that the airports in the region receiving the highest volumes of traffic, for example Nairobi and Dar es Salaam, generally have higher quality runways of standard length for larger jet aircraft operations (Bofinger, 2009).

Tables 6 shows the various passenger related taxes and charges (in 2011) that are applicable at some selected airports. As can be seen from Table 6 below, West

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[24] The airport is being expanded at the moment and land availability is not a constraint on the airport's future development.

[25] https://www.kaa.go.ke/airports/nairobi-jomo-kenyatta-intl-airport/

African airports have the highest passenger charges, with charges as high as US $ 75 per passenger in Accra. These high charges in West Africa might be explained by the low level of traffic which is concentrated on few major airports. Among the selected airports in East Africa, Nairobi and Entebbe have the highest charges at US $ 40 per passenger. Passengers in airports in the North African region enjoy the lowest charges. Unlike large airports in developed countries, where up to half of an airport's revenue can come from non-aviation activities, African airports are highly dependent on airside and passenger charges. Airport charges in and out of Addis Ababa, when compared to Nairobi Airport, provide a competitive advantage for Ethiopia as a tourism destination (Chingosho, 2012). Generally, passengers departing from Kenya pay higher charges than passengers departing from Southern and North Africa.

Table 6: Passenger taxes and charges (US $) – comparison of selected African Airports

Southern Africa		**West Africa**		**East Africa**		**North Africa**	
Airport	Taxes/ Charges	Airport	Taxes/ Charges	Airport	Taxes/ Charges	Airport	Taxes/ Charges
Luanda	20	Kinshasa	30.46	Addis Ababa	25	Cairo	15
Maputo	30	Accra	75	Nairobi	40	Tripoli	4.89
Johannesburg	26.18	Lagos	35	Kigali	30	Casablanca	15.18
Lusaka	25	Dakar	38.84	Entebbe	40	Khartoum	12.54

Source: Chingosho (2012)

With the exception of the World Economic Forum’s annual quality of air transport infrastructure report, there are few indexes that measure the overall quality of air transport infrastructure. As Table 7 shows, the quality of Kenya’s air transport infrastructure is ranked the highest among EAC states, followed, with a significant margin, by Rwanda and Uganda. This not surprising given Kenya’s position in the region as the largest economy and with the most liberal and advanced air transport sector.

Table 7: Airfields in EAC

Country	Number of airfields	Scheduled service (July 2013)	Paved	Unpaved	International	ERJ-170-100 capable (approx. 5,400 ft at maximum take-off weight)
Burundi	3	1	1	2	1	1
Kenya	194	17	15	179	5	4
Tanzania	106	14	11	95	6	5
Rwanda	7	3	4	3	2	1
Uganda	46	2	5	41	1	3
Total	**356**	**37**	**36**	**320**	**15**	**14**

Source: Schlumberger and Weisskopf (2014)

Tanzania and Burundi appear to have the lowest ranking air transport infrastructure. The 2013 WEF survey on global tourism and travel competitiveness shows that Kenya's air transport infrastructure was ranked 77th (out of all 140 economies) in the travel tourism competitiveness index (TTCI). Although this gives an indication of the overall quality of air transport infrastructure, large differences prevail between individual airports, requiring a more detailed assessment (Schlumberger & Weisskopf, 2014). According to World Bank (2005), airports users (i.e. airlines) are relatively satisfied with the services of the terminal facilities at JKIA.

2.4.3.7. Air traffic management services and ground handlings

The region is divided into two areas: the Nairobi FIR (Flight Information Region) and the Dar es Salaam FIR. The lower airspaces[26] of Uganda and Rwanda are managed respectively by the Entebbe and Kigali air traffic centres as "delegated sectors" of the Nairobi FIR and Dar es Salaam FIR respectively (World Bank, 2005).

Air traffic control services in Kenya are provided by a specialised department of the KCAA. This department is responsible for the management and operation of Air

[26] That is below Flight Level 260 in Uganda and Flight Level 240 in Rwanda, or up to 26,000 feet or 24,000 feet over the 1,013 millibar mark.

traffic services and Search and Rescue within the Nairobi Flight Information Region (FIR).
This includes:

- En-route Control offered at JKIA by Area Control Centre for over-flights, landing and departing aircrafts;
- Approach Control offered in all the airports manned by KCAA;
- Aerodrome Control offered in all the eight major airports. Air Traffic Flow Management (AFTM), whose objective is to ensure optimum flow of air traffic to or through areas during times when demand exceeds, or is expected to exceed, available capacity of the Air Traffic Control System;
- Search and Rescue, involving the coordination and direction of search and rescue services with all partner agencies for aircrafts in distress (KCAA).

Communications, Navigation and Surveillance Infrastructure in the EAC is still largely insufficient, but some progress has been achieved in recent years (Schlumberger and Weisskopf, 2014). The establishment of a single Upper Space Area Control Centre for the EAC is considered as a long term prospect.

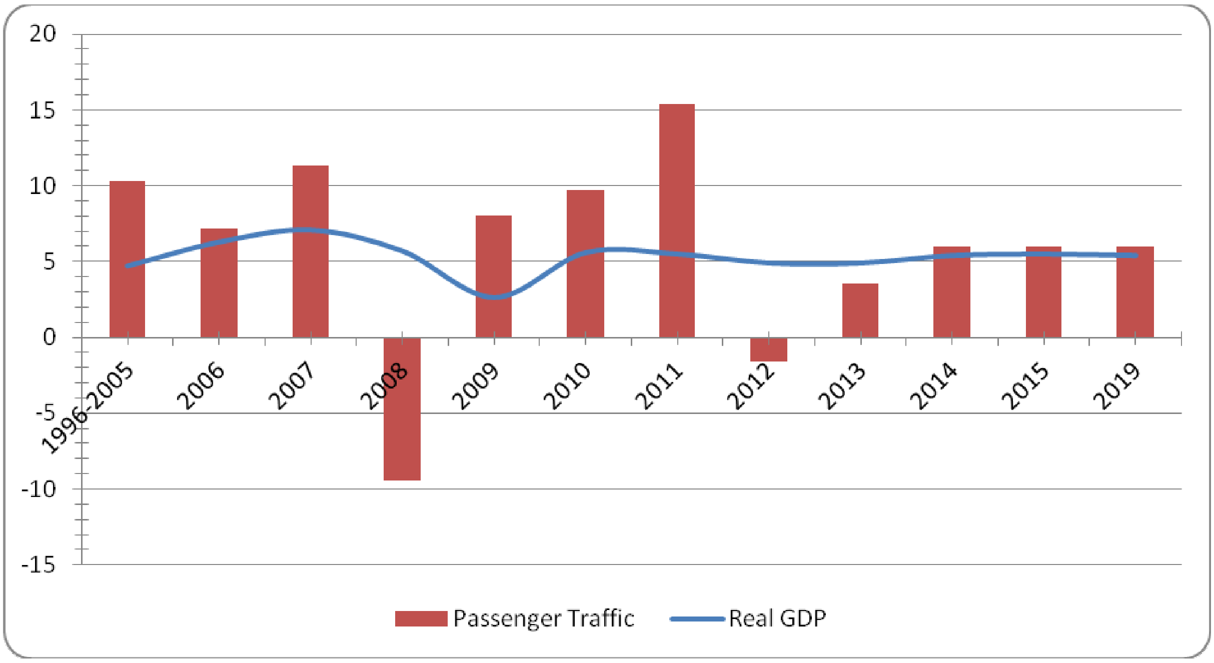
With respect to ground handlings, Kenya has embraced a competition policy. Eight companies provide ground handling services at JKIA. Two of them are linked to other organisations (Swissport and Kenya Airways) and the remaining six are independent Kenyan companies. Four of them also operate at Mombasa Airport (World Bank, 2005).

2.4.4. Potential air transport demand

Demand for aviation services is ultimately contingent on the general health of the economy. Thus, a large and growing economy is the foundation for business travel. Kenya's air transport industry grew at a robust rate of 5.8 per cent per year on average in the period 1996-2013 (as measured in passenger revenue kilometre).

As illustrated in Figure 20, growth rates in passenger volumes coincide with growth rates in the economy. Kenya has showed fluctuating growth levels over the past five decades, with particularly low levels of growth in 2008/09 and 2012. The fluctuations were caused by its exposure to the global financial crisis, including reduced flows of remittances and the depreciation of the shilling (McKormick, 2008). On the whole, GDP growth in Kenya appears to be in line or above the average GDP growth rate of 4.1 per cent experienced across Sub-Saharan developing countries.

Figure 20: GDP versus year-on-year passenger traffic growth in Kenya 1996-2019 (annual per cent change)[27]



Source: Based on data from KCAA Report 2014 and IMF WEO Report, April 2014

The country's analysis indicates an average increase in traffic of 5.3 per cent between 2015 and 2019 (KCAA, 2014). During the same period, the average growth domestic product (GDP) rate in Kenya is estimated at 5.1 per cent (IMF, 2014) driven largely by domestic consumption, production of oil and gas, and tourism industries.

Moreover, leading aircraft manufacturers forecast significant growth in Africa's air transport market. Airbus (2013) has forecast that average annual growth rates for traffic to and within Africa will reach 5.7 per cent between 2012 and 2030. Between

[27] Data are available only from 1996 onwards.

2015 and 2034, domestic and intra-regional traffic is expected to grow at 4.9 per cent per year (IATA 2015; Boeing, 2015).

Along the way, changes in the regulation of the air carrier industry can also have a significant effect on demand. Institutions aimed at facilitating the implementation of necessary measures for liberalisation of air transport markets within EAC, COMESA and SADC have been established. This implies that the trend towards liberalisation of air transport in Kenya will continue.

2.5. Tourism in Kenya

Tourism is one of the top three exports of Kenya. Along with coffee and tea, tourism is one of the major growth and employment drivers in the Kenyan economy.[28] The first National Tourism Policy of Kenya was formulated under *Sessional paper No. 8 of 1969*, entitled *Tourism Development in Kenya*. That policy set growth targets and spelt out strategies on how the government and private sector would develop tourism so that it would become one of Kenya's leading economic activities. In 2002, the Ministry of Tourism and Wildlife initiated the process of developing a comprehensive tourism policy and legislation. Although a draft policy and bill have been developed, they are yet to be finalized. The draft Tourism Bill proposes the establishment of the Kenya Tourism Authority, Kenya Tourism Board, regional tourism boards, Kenya Tourism Research Institute, and Kenya Tourism Development Fund (KIPPRA, 2009). The Ministry of Tourism is responsible for the formulation, co-ordination and administration of policy in respect to the tourism sector. The tourism sector is mainly regulated by the Hotels and Restaurant Act of 1986 (Cap 494); the Tourist Industry Licensing Act of 1990 (Cap 381); and the Wildlife Conservation and Management Act of 1989 (Cap 376).

Kenya offers some of the finest natural attractions in the world, combined with a high-quality network of hotels and game lodges. With its national parks, game reserves,

[28] The tourism industry contributes significantly to the GDP of Kenya. According to WTTC (2013), the travel and tourism sector contributed approximately 5.0 per cent directly and 12.5 per cent indirectly (i.e. including the indirect, induced and catalytic effects) to GDP in 2012.

marine parks, biosphere reserves, archaeological sites, and good beaches, Kenya is a natural tourism magnet.[29] However, many of these resources remain largely unexploited (UNECA, 2011). Kenya's tourism product can be divided into three main categories, namely, safari tourism, coastal tourism and business and conference travel (Table 8).

Table 8: Tourism product line overview

PRODUCT LINE	HISTORIC	CURRENT	POTENTIAL
Safari	World class tourism experiences with limited competition	Increasing pressure as other African destinations develop wild animal tourism and assets are threatened	Regain market position as premier safari destination and tap increasing interest from emerging markets (that is, Brazil, Russia, India and China)
Coastal	Thriving exotic beach destination that matured into a popular mass-tourism destination	Outdated product unable to compete with new destinations offering stylish tourism experiences at an appropriate price or value	Offer demand-driven mix of established and innovative coastal tourism offerings for mass, mid-scale and boutique segments drawing niche and special interest segments (that is, cultural heritage, adventure, and so on)
Business and Conference	Small segment catering to high-end international clientele	Low volume mix of international, intraregional, and domestic business travelers; independent and group profile	Build volume, length of stay, and consumption of multiple products (that is business/conference stay combined with other tourism activities) through targeted and tailored products attractive to domestic, intraregional, and long-haul travelers

Source: World Bank (2010)

Source of Employment

Unemployment is a major challenge facing Kenya owing to the fact that the rate of economic growth is too low, as compared to the growth of the labour force, to bring about meaningful opportunities for the working age population. KIPPRA (2013) estimates that in 2009 the average rate of unemployment in Kenya stood at 8.6 per cent. However, a large share of employment is in the informal sector. Informal sector employees are often under-employed (defined as persons working for less than 29 hours a week) or they work for very long hours and often earn below the poverty line (US $ 1.15). KIPPRA highlights that the proportion of the under-employed (to the

[29] Kenya is also being promoted as a meeting, conference, and exhibition venue (Investment Promotion Centre, 2004).

total employed persons), was about 5 per cent in 1998/99, 21 per cent in 2005/06 and 18 per cent in 2009.

Tourism is directly or indirectly responsible for providing about half a million jobs in 2013. The sector provides direct and indirect, formal and informal, skilled, unskilled and semi-skilled employment. Employment ranges from work in formal sectors such as rated hotels, in tourism intermediary organisations, including tour operators and travel agents, to informal activities dominated by vending and hawking of various goods and services in tourist hotspots (UNECA, 2011).

Foreign Exchange Earnings

The tourism industry is also one of the leading foreign exchange earners in Kenya. Export earnings from international tourists generated 19.5 per cent of total exports in the same year. Tourism receipts grew by 125 per cent between 1995 and 2011 reaching US$ 1,844 million.

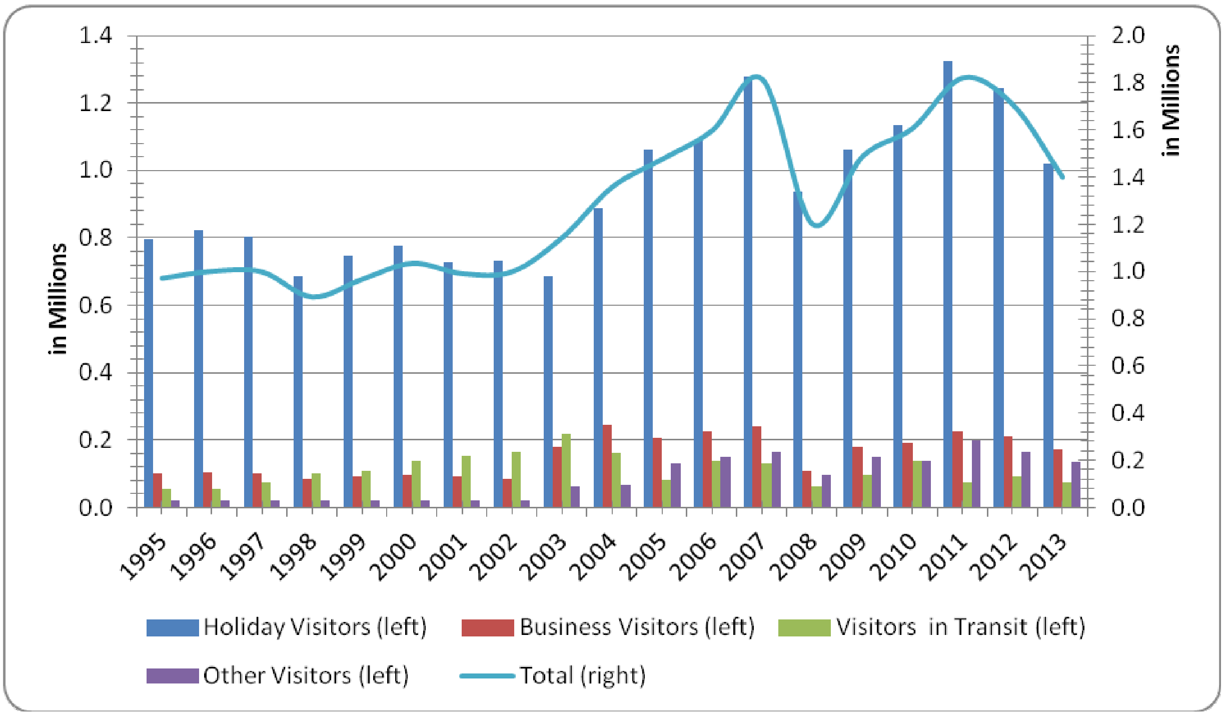
Government revenue

The tourism industry is a major source of government revenue in Kenya. UNECA points out that in Kenya tourism's contribution to government revenue accounts for 7.6 per cent (US$ 466 million, 2010) of total government revenue.

2.5.1. Overall performance

Figure 21 shows the historical annual visitor arrival according to purpose of visit during 1995-2013. About 82 per cent of visitor arrivals in Kenya during 1995 were for the purpose of 'holidays' followed by 'business' (10 per cent) and visitors in transit (6 per cent). 'Other visitors' refers to, among others, 'visiting friends & relatives' and accounted for 2 per cent of arrivals in 1995. The share of visitors in transit has been gradually declining over the past 20 years, while the share of VFR has increased from 21,600 in 1995 to about 134,242 (9.5 per cent) in 2013. The 33.8 per cent reduction of tourists in 2008 was largely due to the post-election violence that occurred during the first quarter of 2008 (UNECA, 2011).

Figure 21: Annual visitor arrival according to purpose of visit[30]

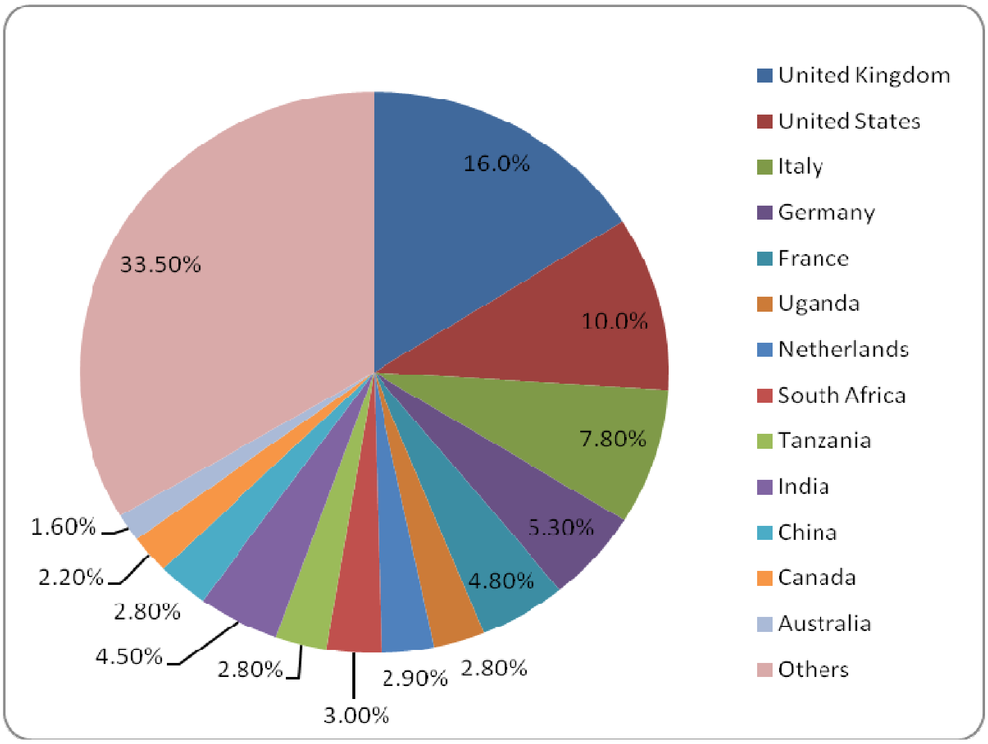


Source: Based on data from KNBS

Figure 22 gives the percentage shares of the visitor arrivals from top 10 source countries for Kenya for 2010. The United Kingdom was the largest among tourist generating markets for Kenya in the year 2010, as in the past years. The share of United Kingdom in the total tourist traffic to Kenya was 16 per cent. The second largest tourist generating market was the United States (10 per cent) while Italy (7.8 per cent) and Germany (5.3 per cent) took third and fourth position. The share of visitors from Europe fell from 77.7 per cent in 2000 to 73.8 per cent in 2004, of which about 70 per cent were holidaymakers.

[30] Data are available only from 1995 onwards.

Figure 22: Inbound tourists by country of origin, 2010



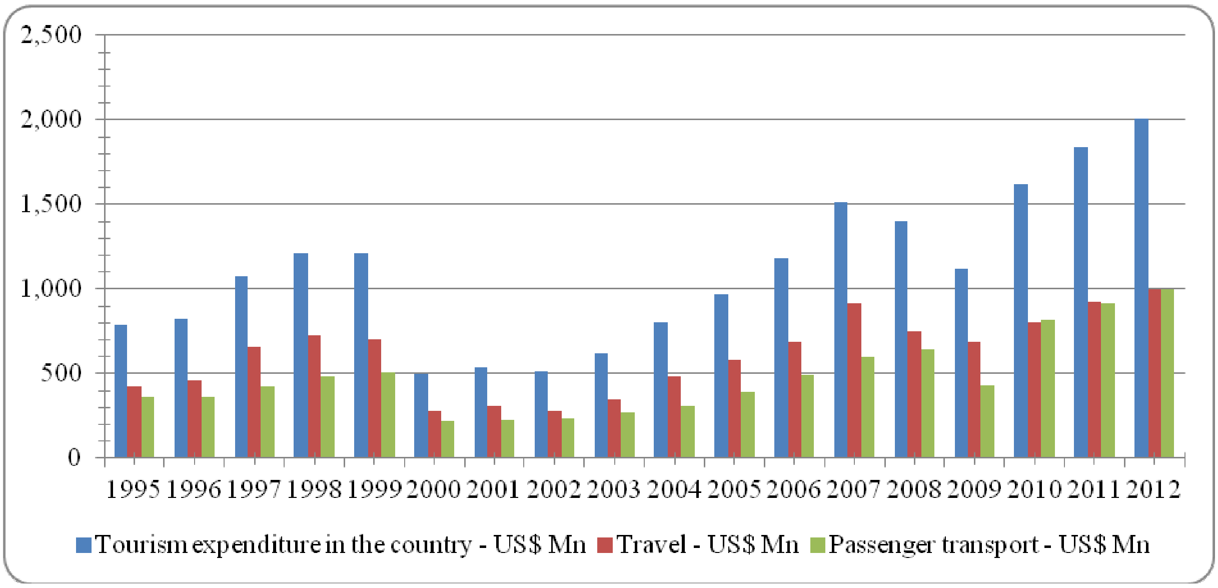
Source: Based on data from KNBS

South Africa (3 per cent) topped the African market, followed by Tanzania (2.8 per cent) and Uganda (2.2 per cent). From Asian markets, India led with 4.5 per cent of total arrivals, followed by China (2.8 per cent) and the United Arab Emirates (1.2 per cent). Asian tourists, particularly from India and Japan, have increased rapidly over the last few years, and now account for over 6 per cent of the total.[31] As a result of insecurity along the Indian Ocean , cruise tourism recorded only 508 arrivals in 2010 as compared to 12,096 received in 2009 (KNBS, 2010).

Export earnings from international tourists generated 19.5 per cent of total exports in 2013. The World Tourism Organisation distinguishes between international tourism receipts for travel items and receipts for passenger passenger items (Figure 23).

[31] This data excluded cross-border travel, Kenyan Diaspora returning home and foreign experts working in the country.

Figure 23: Tourism expenditures in Kenya

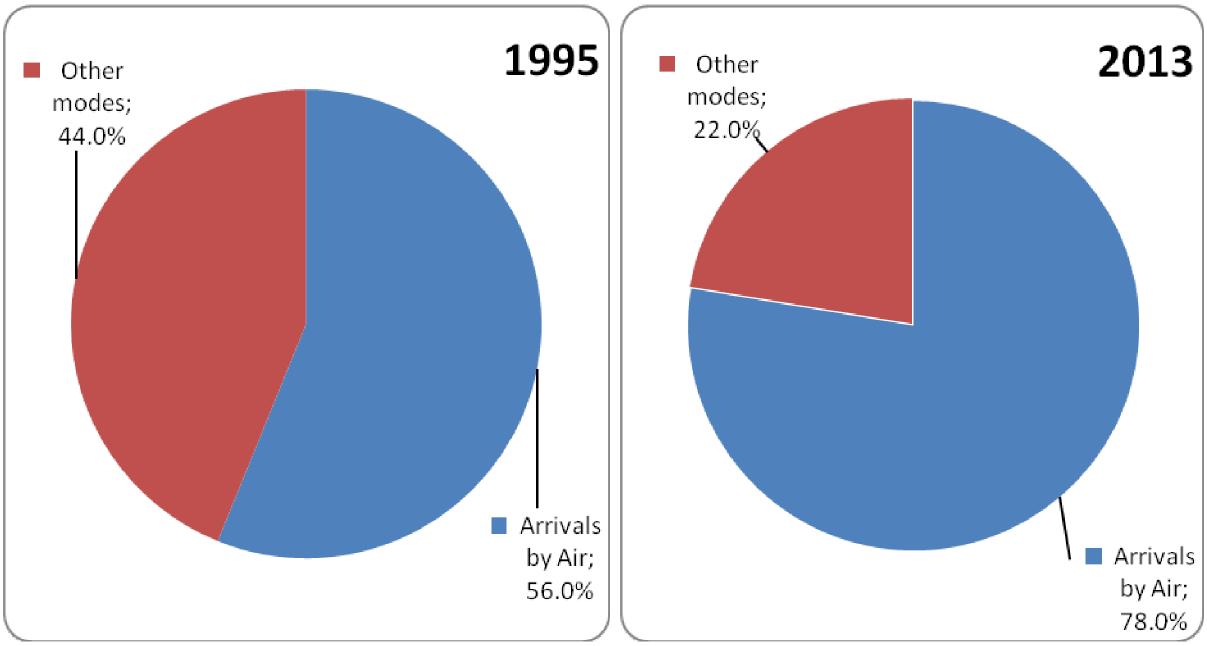


Source: Based on data from UNWTO

Travel items refer to acquired from an economy by travellers during visits of less than one year in that economy (such as expenses for food, accommodation, entrance fee, etc.). Excluded is the international carriage of travellers which is covered in passenger services under transportation. International tourism receipts for passenger transportation are expenditures by international inbound visitors for all services provided in the international transportation by resident carriers. Also included are passenger services performed within an economy by non-resident carriers. Excluded are passenger services provided to non-residents by resident carriers within the resident economies; these are included in travel items. As far as Kenya is concerned, receipts for travel items accounted for 50 per cent of total receipts in 2012. The corresponding figure for 2000 was 57 per cent. It results from these figures that the share of receipts for travel items has increased from 43 per cent in 2000 to 50 per cent in 2012. This development might be explained by an increase in market share of resident carriers in the international transportation or an increase market share (market access) of foreign carries in the Kenya domestic market.

Figure 24 gives percentage shares of visitors during 1995-2013 according to the mode of transport. Travel by air is the most preferred mode of transport. In 1995, out of 973,600 visitor arrivals in Kenya, the majority (56 per cent) arrived by air. The corresponding figure for 2013 was 78 per cent. In 1995, about 44 per cent (22 per cent in 2013) arrived by other modes of transport, predominantly land and sea (KNBS, 2014).

Figure 24: Inbound tourism by mode of transport[32]



Source: Based on data from KNBS

An analysis of the performance of the Kenyan tourism sector using the Travel and Tourism Competitiveness Index[33] (TTCI) indicates that Kenya performs relatively well as compared to other countries in the region (Table 9).

[32] Data are available only from 1995 onwards.

[33] The World Economic Forum, in close collaboration with Booz Allen Hamilton, IATA, the United UNWTO, and WTTC has developed a Travel and Tourism Competitiveness Index in an effort to measure the factors and policies that make it attractive to develop the T&T sector in different countries. The TTCI is based on three broad categories (subindexes) of variables that facilitate or drive T&T competitiveness. These are travel and tourism regulatory framework, travel and tourism business environment and infrastructure, and travel and tourism human, cultural, and natural resources. TTCI covers 140 economies.

Table 9: The Travel & Tourism competitiveness index of EAC countries (2013)

Subindexes									
	Overall index			T&T regulatory framework		Business environment and infrastructure		T&T human, cultural, and natural resources	
Country	Regional rank / 31	Overall rank / 140	Score	Rank / 140	Score	Rank / 140	Score	Rank	Score / 140
Kenya	8	96	3.66	108	3.98	105	2.98	60	4.01
Rwanda	9	105	3.56	78	4.46	117	2.74	104	3.49
Tanzania	12	109	3.46	118	3.67	125	2.68	59	4.02
Uganda	13	116	3.39	116	3.71	121	2.70	79	3.79
Burundi	30	138	2.82	130	3.4	139	2.33	138	2.73

Source: WEF (2013)

Kenya is ranked 8th regionally and 96th overall in the 2013 TTCI (WEF, 2013). Key factors that contribute to such a low ranking are the TT business environment and infrastructure, health and hygiene levels as well as the security situation in the country.

In terms of the TT regulatory environment, the most important concerns are the lack of a clear tourism policy as well as the lack of proper health and hygiene, and the lack of prioritisation of travel and tourism nationally (WEF, 2013). The Travel and Tourism Business Environment was also a key facet that contributed to poor performance and was a key growth constraint for the sector. Key aspects to note here were the state of air transport infrastructure; state of tourism infrastructure; and the state of ICT infrastructure. Openness in terms of visa requirements and bilateral air service agreements has improved significantly, property rights are insufficiently protected, and much time and high costs are still required to start a business (WEF, 2013).

It is strongly ranked as far as the government spending on the sector and effective destination marketing campaigns are (ranked 23rd on this pillar) concerned and strongly ranked on the TT environmental sustainability (ranked 21st).

2.5.2. SWOT analysis of Kenya's tourism sector

A SWOT analysis of the sector is as indicated in Table 10 below.

Table 10: SWOT analysis of Kenya's tourism sector

KEY STRENGTHS
- Internationally renowned tourist destinations - Reputation for hospitality and diverse tourism products. - Well-established tourist facilities and tourism infrastructure in the region - Quality trained staff in the region - Highly ranked in East Africa as a Conference Tourism Destination in Africa - Foreign ownership of tourism companies by international operators in Kenya is prevalent and encouraged - Good airline connectivity
KEY WEAKNESSES
- Out-dated legal and policy framework - Over-reliance on traditional source markets - Poor general infrastructure - Insufficient financial resources for tourism development and marketing - Inadequate skills in areas necessary for strengthening the sector - Inappropriate standardisation guidelines for tourist facilities - Inadequate research in tourism - Inadequate capacity of tourist security agents
KEY OPPORTUNITIES
- Untapped tourism potential e.g. eco-tourism, culture, conference, and cruise - Unexploited domestic tourism market - Emerging markets in tourism in Africa, Asia and the Middle East - Expansion of global digital economy (E-business). - Expansion of air and water transportation - Growth of Conference Tourism - Development of Nairobi as a 24hr Metropolis - Development of resort cities as envisaged in Vision 2030 tourism flagship projects
KEY THREATS
- Occasional negative media publicity - Perception of Kenya as an insecure destination - Increasing tourism competition in the region - Erosion of cultural values - Adverse travel advisories - Cost of doing business - Piracy in the Indian Ocean – threat to cruise tourism

Source: Adapted from UNECA, 2011

The analysis reveals that Kenya's key strength is its global renown as a tourist destination, while the country's key weakness is its weak institutional and regulatory support framework. Other problems facing the Kenyan tourism include: inadequate diversification of tourism products and market segments; deterioration of the country's tourism infrastructure and other tourism-related services; safety and security concerns; a lack of skilled labour; and poor control over tourism development UNCTAD (2007).

According to UNCTAD (2008), Kenya is lagging behind its neighbours in the region in attracting international investments in tourism. In 2004, the tourism sector accounted for 10.7 per cent of the foreign direct investment registered with the Kenyan Investment Authority. It was found that, unlike the perceptions that foreign investors were dominant, local investors dominated the Kenyan tourism industry (about 57 per cent in hotels and restaurants, and 75 per cent in tour operators). This perception might be explained by the fact that most of the local owners are of Asian and British origin, and have historical or family links with the United Kingdom and India. However, there are major differences between foreign owned firms (hotels, tour operators, etc.) and those entirely locally owned in terms of capacity, size of purchase, turnover, profits and taxes paid. Firms with foreign ownership made much higher purchases, with most of the purchases from wholesalers and little from small and medium-sized enterprises. However, it was found that commodities and services consumed by tourists were mainly local sources with only 17.3 per cent imported, which is an indication that there is a substantial linkage between the tourism sector and the domestic economy (UNCTAD, 2008).

The above analysis demonstrates that aviation and tourism industries are closely interlinked. The future evolution of Kenya as a destination will very much depend on the development in air transport. This poses the question of how to strengthen the links between the two industries in order to better exploit their potential.

2.6. Strengthening links between air transport and tourism in Kenya

In order to optimize the benefits of aviation and tourism, a better alignment of tourism and air transport policies as well as greater collaboration in several areas of strategic importance to air transport and tourism is required. These areas include, but are not limited to:

- liberalisation of domestic and international air transport.
- taxes, charges and other levies on aviation and tourism and their potential impacts;
- environmental protection;
- safety and security concerns.

One key factor within the control of governments that can significantly influence air traffic flows, costs and competitiveness is the decision on liberalisation of air transport. This research has shown that, other things being equal, open skies policy is likely to play a prominent role in strengthening the interdependence between air transport and tourism development in Kenya.

In a recent study commissioned by IATA, InterVISTA (2014) outlines the benefits that would accrue if 12 African nations[34] were to implement the 1999 Yamoussoukro Decision, the policy framework for opening up skies between African countries. It was found that the additional services generated by liberalization between those markets will provide an extra 155,000 jobs and $1.3 billion in annual GDP. Further benefits would include 4.9 million passengers a year and enhanced connectivity. With respect to Kenya, the results were that, with liberalisation, passenger volumes would increase by 60 per cent, national GDP would increase by US $ 77 million and 15,900 jobs would be created.

Equally important are policies aiming at simplifying visa processing and establishing multi-state regional visas and e-visas. It should be noted that significant efforts have therefore been made to facilitate intra- and interregional tourism. The EAC

[34] These were Algeria, Egypt and Tunisia in North Africa; Ethiopia, Kenya and Uganda in East Africa; Ghana, Nigeria and Senegal in West Africa; and Angola, Namibia and South Africa in Southern Africa.

Secretariat is trying, for example, to remove restrictive customs and border control processes to facilitate travel in the region. To this end, all EAC member states met in July 2013, to outline new milestones for the introduction of a common EAC tourism visa, as well as a common passport for EAC member countries. Tourists can visit any of the East African Community states (Kenya, Uganda, and Tanzania) under an East African Single Tourist Visa which makes travel to that region easier and more attractive. These changes will also be a key factor for another known source of LCC demand, the so-called VFR travel resulting from intra-regional migration flows.

It has been argued that taxes on aviation charges have a negative impact on tourism. Thus, as Smyth and Pearce (2008) point out, air travel is increasingly sensitive to price due to the increased sensitivity of corporate travel buyers to price and greater transparency of price brought about by the internet and other improvements in communication as well as no frills competition. Abeyratne (1993) studied the effects of taxation of international air transport on tourism, concluding that both industries are inextricably linked to each other and to tax one in order to develop the other would be a self-defeating measure. It is therefore crucial to assess the wider economic benefits and costs of taxes and other levies on aviation and tourism.

2.7. Chapter summary

This chapter has investigated the importance of air transport in the development of tourism and described current market trends of the Kenyan aviation and tourism industries. In doing so, it has undertaken a review of the literature on the role of air transport in the development of tourism and compiled current market trends of the Kenyan commercial aviation and tourism industry with a special focus on the case of Kenya. It has been noted that air transport regulation implemented after the Second World War took the form of restrictive bilateral agreements between countries with regard to prices, the number of flights and the number of seats that could be offered.

The contribution of tourism to the Kenyan economy has been investigated as well as its performance and the challenges facing the sector. While air transport in Kenya is, on the one hand, mainly driven by expansion in the leisure and business tourism, it is, on the other hand, an important driver to the tourism industry. As regards aviation policy in Kenya, the liberalisation process is undertaken within the framework of the Yamoussoukro Decision (YD). The implementation of the YD is being taken care of by means of regional economic communities, namely EAC and COMESA. Though good progress has been achieved in implementing the YD across the sub-region, much remains to be done to ensure that a genuine market-oriented approach to aviation policies is achieved. It has been found that Kenya has liberalised both international and domestic services, although some minor restrictions remain. A review of the literature has shown that air transport liberalisation is found by a significant number of studies to be the most appropriate strategy for stimulating further growth in tourism exports. It has been noted that liberalizing air services would lead to significant growth in tourism traffic. It has been noted that air services liberalisation between Kenya and its African counterparts by implementing the YD would lead to substantial growth in tourism traffic. Moreover, for tourism and aviation to provide the long-term sustainable growth and employment required to help support the Kenyan economy, constraints on aviation capacity need to be resolved.

This chapter highlights that air transport liberalisation, taxation, better alignment of tourism and air transport policies, and regional cooperation are keys to bridge the gap between tourism and air transport policies and promote travel facilitation. The increase in employment stemming from air transport liberalisation would lead to a reduction in poverty by generating additional employment for the poor or increasing tax collection, especially if the additional tax is used to boost investment in social infrastructure. The next chapter reviews the literature on the economic impacts of tourism expansion.

CHAPTER 3. TOURISM ECONOMIC EVALUATION – A SURVEY

3.1. Introduction

The previous chapter examined the current trends in air transport and tourism in Kenya. It was found that tourism in Kenya has been steadily growing in terms of arrivals and revenue generated. However, despite its importance, the net social benefit of tourism growth, that is, poverty and income distribution effects of the tourism industry are a relatively unexplored aspect of tourism in Kenya. Economic models of research in tourism are dominated by the impact of tourism measured in terms of its contribution to gross national product, employment and income generation. As a private sector led, outward-oriented industry, the question is whether tourism can contribute to Kenya's urgent need for pro-poor growth, an important area that this research will delve deeply into. This chapter reviews the techniques used to explore the welfare impact of tourism. The chapter is structured as follows: Section 3.2 examines the link between tourism specialisation and long-run economic growth of African countries, to assess whether tourism can be a sustainable source of economic development. This is followed by an analysis of the link between tourism and poverty reduction in Section 3.3. Section 3.4 investigates the economic approaches for tourism impact analysis, whereas Section 3.5 reviews tourism-focused CGE studies. Section 3.6 discusses the rationale for building a tourism-focused CGE model for Kenya and Section 3.7 summarises the main findings of this chapter.

3.2. Tourism and economic growth

In order to organize our thinking about the links between tourism and poverty reduction, it helps to understand the way in which tourism spending affects the economy at a more general level. That is, the relationship between tourism spending and "macro" variables, such as GDP and employment. Many attempts to explain the linkages between tourism and economic growth have been made. Most of the studies apply statistical methods, such as regression analysis or time-series models. Fayissa et al. (2008), for instance, investigate the impact of tourism on economic growth and development in Africa. The results show that receipts from the tourism industry contribute significantly both to the current level of gross domestic product and to the economic growth of sub-Saharan African countries, as do investments in physical and human capital. The authors' findings imply that African economies could enhance their short-run economic growth by strengthening their tourism industries strategically.

Figini and Vici (2010) provide an empirical assessment of the relationship between tourism specialisation and economic growth in a cross-section of countries, using data from more than 150 countries, covering different time spans between 1980 and 2005. They found that tourism-based countries did not grow at a higher rate than non-tourism-based countries, except for the 1980–1990 period for which, however, the data on international tourism was not fully reliable. Their findings contrast with previous findings, for example, Brau et al. (2004 and 2007), who, in an empirical analysis of the relationship between growth, country size and tourism specialisation and using a dataset covering the period 1980-2003, found that small tourism countries that are highly specialised in tourism grew significantly faster than all the other sub-groups considered in the analysis.

Durbarry (2004) applied a cointegration and causality analysis to investigate the impact of tourism on economic growth in Mauritius. The author argues that developing primary, secondary and tertiary sectors simultaneously is a necessary condition for economic growth and development. However, the tourism sector has had the greatest impact on the economy of Mauritius during the past three decades, although the sugar and manufacturing sectors have contributed significantly to growth.

For a developing country like Kenya, the critical issue is whether growth trickles down to the poor. Cross-country studies have shown that sustained economic growth reduces poverty (Kraay, 2004). However, there is a widespread consensus that not all forms of growth have the same impact on poverty. Studies have demonstrated that the sectoral pattern of growth will affect the extent of poverty reduction (Loayza and Raddatz, 2006; Coxhead and Warr, 1995; Fane and Warr, 2002). If, for example, the tourism sector in a destination is (low-skilled) labour-intensive, it is likely that its expansion will generate high income flows to the poor.

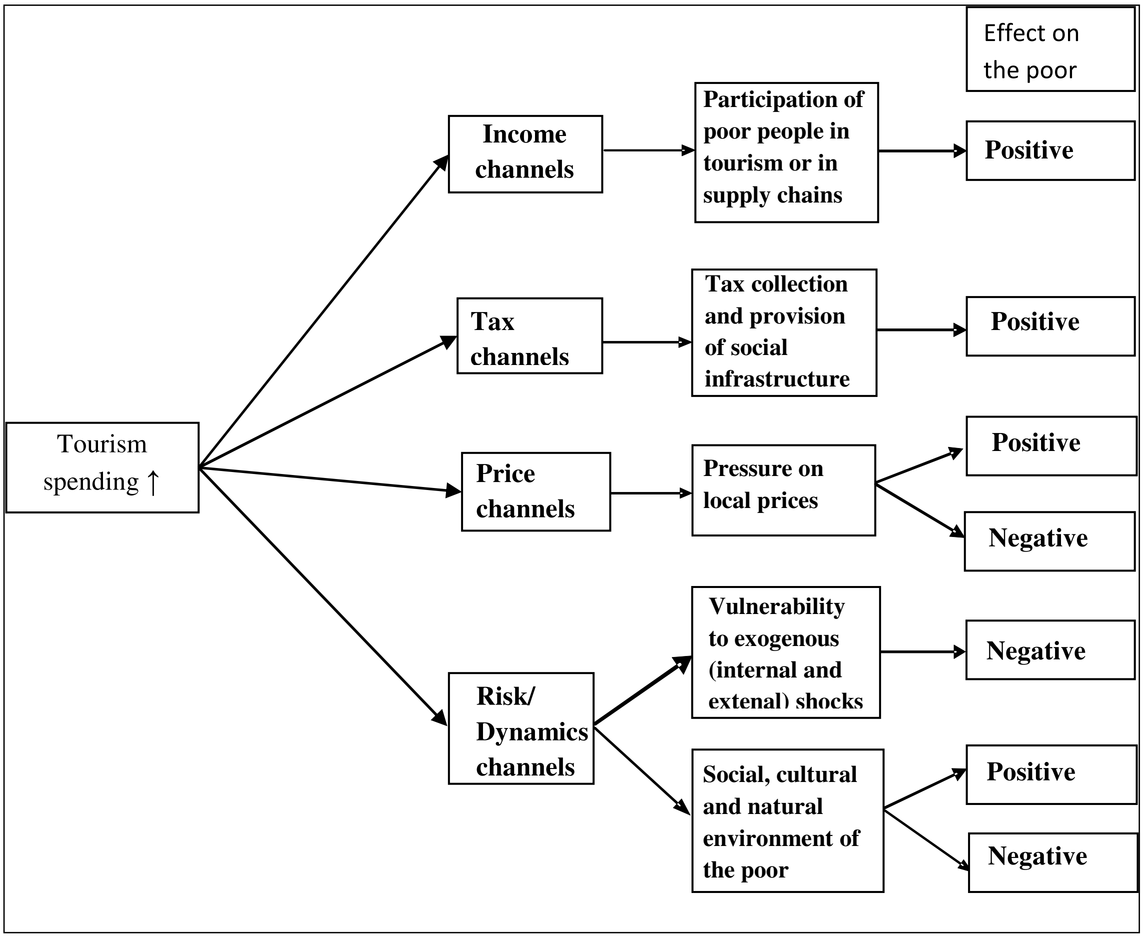
3.3. Tourism and poverty relief

For the purpose of this research, it seems useful to address the relationship between tourism development and poverty reduction. There are many different ways by which tourism can engage the poor, boost local economic development, or affect the physical and social environment of local communities. The link between tourism and the reduction of poverty is best understood by considering the link between trade liberalisation and poverty reduction (McCulloch et al., 2001). Figure 25 shows the channels through which tourism may affect the poor. These include income, tax, price and risk channels (Blake et al., 2008).

3.3.1. Price Channel

The first channel relates to prices faced by poor households for the goods they purchase. Poor households earn income through direct or indirect participation in tourism (ITC, 2009). Thus, tourism spending can be expected to affect the prices of commodities, which in turn may affect the living standards that poor households can enjoy for a given level of available expenditure (Blake et al., 2008). Broadly speaking, tourism growth is likely to exert upward pressure on the prices of tourism-related commodities. In other words, an increase in tourism spending is expected to raise the prices for the types of goods and services that the tourists consume (hotel accommodation, tour operator, car rentals, souvenir goods, etc.), which may, in turn, cause a slight increase in the average price of all commodities in the economy. On the other hand, the growth of tourism is expected to raise aggregate income as with export boom. Blake et al. (2008) argue that when considering the impacts of tourism expansion through the price channel, it is important to look at these in terms of relative price changes. Tourism related commodities are obviously not pre-eminent amongst the consumption bundle of the poor. Therefore, with regard to poor households, the direct effects of the price channel are likely to raise only slightly the prices paid by the poor, through food-purchasing and sometimes water prices or water availability in some cases as well as power availability.

Figure 25: Channels by which tourism spending may affect the poor (own illustration)



3.3.2. Household Income Channel

The second channel is income, stemming either from employed or self-employed labour or from returns to capital. Poor households earn income through direct or indirect participation in tourism (ITC, 2009). Thus, stimulating the expansion of sectors that are assumed to be relatively (low-skilled) labour-intensive, such as tourism, can be expected to raise the demand for labour and in most cases for unskilled labour. Given that poor households are endowed with low-skilled labour owing to their low education levels, and given tourism's ability to absorb low-skilled workers, tourism promotion can be expected to be good for global poverty reduction. However, this effect might be moderate, if poor households lack skills required for employment in the tourism related sectors (Blake et al. 2008). Often, however, the gain from tourism growth accrue to factors other than unskilled labours, namely to semi-skilled labours or middle-income households, who have the skills required in these industries. In this case, tourism growth may increase income inequality.

Additionally, unskilled labours in other traditional export sectors may be destroyed, and returns from, say, agriculture may fall as tourism expands. If the poor derive a considerable share of their income from commodity export sectors, tourism expansion is likely to have a negative impact on poverty reduction (Blake et al. 2008). In fact, the higher the value of these exports in relation to GDP and the share of poor households active in these sectors, the larger the negative impact of tourism promotion on poverty reduction and vice versa. In such circumstances, additional policy instruments are required to offset the welfare losses occasioning tourism promotion. This aspect will be taken into account when estimating the impact of tourism expansion through earnings in Kenya.

3.3.3. Government Income Channel

Tourism also contributes to the tax base of local or national government and the additional revenue can be used to provide or improve the social infrastructure. ITC (2009) argues that positive effects can include better social infrastructure, education, stronger local institutions and gender equality. Broadly speaking, changes in tourism spending would affect government revenue, for example through tax collection, and therefore can lead to changes in government spending. Higher government revenue from taxing tourism can ease poverty in developing countries, depending on the types of public services that are delivered using the revenues generated from the taxes. The UNWTO (1998) has identified 45 different types of tourism taxes that can be divided into five broad areas of tourism taxes as follows (as cited by Dwyer et al. 2010):

- taxes on airlines and airports;
- hotels and other accommodation;
- road transportation;
- food and beverages;
- providers of tourism services.

The tourism sector can be taxed either by taxing the tourists directly or the tourism related industries. These tax revenues can be used to increase public spending in infrastructure, education, basic health, sanitation and social protection accessible to the poor. However, the linkages between tourism expansion as well as tourism taxation, government revenue, total spending and spending relevant to the poor are somewhat indirect and complex.

Blake et al. (2008) further argue that since some export sectors may experience declines in production as a result of tourism growth, tax revenue from these sectors may also decline. The authors indicate that the aggregate fiscal position of the government may worsen if other export sectors are taxed heavily and that, in general, an increase in tax revenue may be expected. When considering the effect on the poor through the government channel, it is important to investigate different options regarding the way the government spends its increased revenues. Then, as noted above, some governments may use the increased revenues to reduce their deficits; some use them to pay off foreign debts, while others may use these revenues on poverty alleviation programs (Blake et al., 2008). These options will be examined in the empirical section as well.

3.3.4. Risk /Dynamic Channels

The fourth channel relates to risks and other long-term dynamic influences. The risk channel traces the manner in which tourism spending increases or decreases the ability of poor households to cope with the consequences of various shocks. Shocks can be defined as sudden, unanticipated events with an immediate, adverse impact on the welfare of households. For instance, fluctuations of tourist arrivals expose the poor to the risk of income shocks. Global events such as terrorist attacks and the outbreak of SARS, on the one hand, and local events such as the post-election violence in Kenya in 2007, on the other hand, adversely affect tourism and consequently expose workers and producers to risks.

Blake et al. (2008) acknowledge that the effects of prices, exchange rates and the activities of developed country tour operators and airlines may also contribute to the instability of tourism earnings in developing countries. The authors argue that exposure to risk through tourism, however, has to be considered against the risks involved in the alternatives of poor households. In Kenya, a large proportion of poor households depend on farming to secure their livelihood. The production of primary products makes the poor vulnerable, not only to natural hazard shocks such as drought, which is very common in Kenya, but also to a long-term downward terms-of-trade path of primary commodities. These adverse risks are perhaps not easy to quantify and are not included in the empirical part of this research.

The dynamic impact of tourism on local economic development can be positive and negative. Some positive dynamic impacts of tourism include the following:

- Tourism can encourage the development of new infrastructure and services
- Tourism can stimulate the creation and growth of new enterprises
- Tourism can facilitate skill developments
- Tourism can provide incentives to conserve natural areas as well as generate revenue for natural and cultural resources to be managed in a more sustainable way.

However, tourism can adversely affect the poor through competition for resources, high prices or the degradation of natural resources.

3.4. Economic evaluation of tourism

As for applied economic approaches to tourism impact analysis of a proposed project or proposed policy change, Cost-benefit Analyses, Economic Impact Analysis, and Computable General Equilibrium Analysis models are highly prevalent.[35] EIA and CGE models are models with general equilibrium components, while CBA is typically a partial equilibrium technique. All these techniques have their strengths and weaknesses. This section briefly summarizes the applicability, structure and limitations of these methodologies.

[35] While these techniques are not the only tools available for economic impact analysis, they represent the type of tools that are most frequently used. Other quantitative techniques include: Social Accounting Matrix models, econometric models, etc.

3.4.1. Cost-benefit Analyses of inbound tourism

CBA is a means of assessing the net benefits of a project or policy. CBA can be defined as a systematic process of evaluating and assessing the costs and benefits of a proposal (project, program, policy) in monetary terms, as they are expected to occur through the life of the project. CBA is concerned with measuring all impacts of relevance, whether occurring in markets or as implicit values (Boardman et al. 2010). Cost benefit analysis can be used to guide a wide range of decisions, especially within the following four broad contexts: analysing capital expenditure; analysing a policy option; retaining or disposing an existing asset; and post evaluation of a project or program. CBA has a well-developed theoretical foundation - neoclassical welfare economics - which is based on the individual being the best judges of his/her own welfare and the welfare of society being the sum of the welfare of individuals (Dwyer et al. 2010).

Dwyer and Forsyth (1993) argue that while the benefits to a country from inbound tourism seem obvious, its costs are not “so obvious” and must be taken into account in an overall assessment of tourism impact on the economy. Potential gains from extra tourism receipts include increased business and trading opportunities for existing and new firms, additional income and employment of factors, promotion of regional economic development, diversification of industry structure, preservation of valued natural environments, increased variety of attractions and facilities available to residents and increased opportunities for social and cultural exchange. While the cost of imported goods and services and costs of pollution, congestion, despoliation of fragile environment as well as adverse sociocultural conditions have been widely explored when CBA models are applied to tourism, less attention has been paid to the cost of providing goods and services to tourists and adverse effects on other sectors resulting from tourism expansion (Dwyer and Forsyth, 1993). The authors highlight that CBA can help, particularly through estimating the net benefits, to determine policy matters such as the optimal level of tourism promotion, appropriate aviation strategies and formulation of the National Tourism Strategy. There have been theoretical analyses of tourism in general using the CBA framework (Bevan and Soskice, 1976; Hefner, 2001; Burgan and Mules, 2001; Forsyth and Dwyer, 2007;

Dwyer et al. 2010). There have also been cost-benefit studies of specific tourism projects, such as a hotel (Forbes, 1976), protection of beaches (Raybould and Mules, 1999); mass tourism (Vanhove, 2003); and major events (Harman, 2007; Vanhove, 2003).

Other main advantages of CBA are its ability to encourage clear consideration of the true value added from a proposal by focusing on incremental net benefits; and its emphasis on the quantification of costs and benefits on a comparable basis can provide a useful ‘hard edge’ to an evaluation strategy (Dwyer et al. 2010).

As might be expected, CBA is not without its problems. One limitation of CBA is the lack of accounting for distributional impact in a cost-benefit analysis. Furthermore, CBA does not provide answers on how to value key shadow prices such as labour in a time of unemployment. Also, it cannot be used to capture the wider economic impact and has difficulties in handling complex tax effects as well macro effects (Dwyer et al. 2010). CBA often includes subjective assumptions regarding non-economic values. Another limitation of CBA is that costs and benefits can be difficult to quantify. Additionally, income distributional effects may be difficult to handle with the CBA framework.

3.4.2. Multiplier analysis and I-O analysis

I-O analysis is used to describe the linkages between production sectors in an economy. Multiplier analysis and I-O analysis are used to capture not only the direct and indirect effects, but also the induced effects. Thus, the overall economic impact of tourism spending is the sum of direct, indirect and induced effects within a country or region.

Direct impact consists of expenditures by tourists, which generate sales revenues and income for suppliers who sell goods and services directly to tourists, salaries and wages for households in connection with tourism-related employment, and revenues to the government through tourism-related taxation. Expenditures by tourists on imported goods represent a loss to the host economy through leakage. Maurer et al. (1992) argued that the more a developing country relies on luxury tourism, the greater is the danger of high expenditures for imported luxury goods. Indeed, a large share of travellers' expenditures in certain types of tourism (all-inclusive tours, for example) leak away from developing countries because of foreign ownership of industry, imported goods, hotels, foreign tours operators and airlines and other reasons. The direct effects are quantified within tourism-related activities.

Indirect impact comes from the production changes resulting from various rounds of re-spending of direct in-suppliers in other backward-linked industries. In other words, to provide tourism-related goods and services, direct businesses must purchase a range of different inputs from other firms. These purchases will provide further income to other firms, households and to government. Businesses supplying the direct businesses will re-spend the income received to buy necessary inputs and will provide income to other businesses, households and the government, that in turn, also purchase goods and services thus continuing the process. In sum, indirect effects result from 'downstream effects', therefore they include the benefits realized by the supply chain.

Induced impact comes from changes in economic activity owing to household spending earned directly or indirectly as a result of tourism spending. Thus, part of the extra earnings received by domestic residents and businesses will be re-spent 'downstream' on the consumption of commodities which are, in most cases, unrelated to the supply of tourism products (Dwyer et al., 2010).

In fact, for a number of years, the analysis of tourism impact has relied on input-output (I-O) modelling. Input output analysis describes the linkages between the production sectors in an economy (Leontief, 1987). Developed in the 1930s and 1940s, it was used to measure the amount of factor inputs required to produce a given set of outputs. I-O has been used extensively to evaluate the contribution of tourism to an economy. A few examples include Archer (1973), Fletcher and Archer (1991), Pye and Lin (1983), Crompton, Lee, and Shuster (2001), Tyrrell and Johnston (2001). The purpose of I-O models is to quantitatively estimate the direct impact of tourist spending on the tourism-related sectors and, through this, on other productive activities with which they are linked. Input-output models can be used to assess the value added and inter-industries relationship attributable to tourism at the country level (Kweka et al., 2003; Archer, 1995; Archer & Fletcher, 1996; Heng & Low, 1990; Seow, 1981, and Khan et al., 1990) and to examine the impact of tourism in a province setting and city setting (West, 1993; DBEDT, 2002; Frechtling & Horvath, 1999; Finn & Erdem, 1995). Table 11 reports the multiplier effects (at the country level) of selected applied I-O studies for developing countries.

Table 11: Selected applied multiplier analysis for developing countries

Economy	Authors	Output multiplier	Income multiplier	Employment multiplier**	Import multiplier
Singapore	Heng & Low (1990)	1.47	0.77	22	0.17
Seychelles	Archer & Fletcher (1996)	-	0.88*	-	0.32
Tanzania	Kweka et al. (2003)	-	0.69	2,531	0.21
Kenya	Summary (1986)	1.81	0.64	-	-

** = Employment multipliers show number of full time equivalent employees per million dollars (US) of tourist expenditure; * = direct, indirect and induced effects

What is in favour of the I-O model is its general equilibrium approach, focusing upon industry interdependencies which exist in the economy. It also allows for flexible aggregation of sectors. Other advantages of the I-O technique are its ease of use and transparency. However, though I-O models can provide insights to the economic impact of policy distortions, they have some clear disadvantages. Despite their general equilibrium structure, I-O models do not pay explicit attention to the effects of tourism expenditures on factor incomes or income distribution. Input-output models assume linear responses and highly elastic supplies of resources.

The growth of tourism output can be expected to raise the costs and, therefore, prices of other products. If, for example, tourism growth induces an increase in domestic prices relative to foreign prices, this will result in an appreciation of the real exchange rate, which then will lead to a decline of other exporting industries. The effect of an appreciation of the exchange rate on non-tourism related sectors or sectors with very low export share will be ambiguous. On the other hand, an increase in tourism spending is likely to have a positive effect on industries that are not linked to either tourism or export activities (owing to increases in income and therefore consumption). In economies where resources are scarce, the positive impact of these industries will be small, not to say negative, because of increased costs of competition with the tourism sector for labour and capital.

Even in economies where unemployment may be high, the impact is problematic. In those economies, skilled labour shortages often exist, meaning that tourism expansion will place additional pressure on the demand for skilled labour, raising wage rates and reducing the demand for skilled labour elsewhere (Dwyer and Forsyth, 2011). Thus, I-O analyses do not explicitly take account of the interrelationships between tourism growth and resource constraints, exchange rates, price and wages changes, government taxing and spending policies (for an excellent discussion of the limitations of I-O analyses, see Dwyer et al., 2004). Thus, in I-O models, prices do not change and wages do not change, and an increase in employment is possible without changes to wages. Clearly, increases in wages mean that other businesses must pay higher wages in order to retain labour (Blake et al., 2008).

3.4.3. Social Accounting Matrix (SAM)

SAM has been used to generate multipliers. SAM definition and construction is dealt with in detail in Chapter 4. The SAM approach can be used to model not only economic impact, similar to I-O models, but also the distributional impact. It helps capture the trilateral transactions among production activities, factors, and institutions. However, the SAM approach is demand driven and does not account for supply constraints or the possibility of substitution (Adelman and Robinson, 1986). Furthermore, SAM models have similar assumptions as those underlying I-O models (see Table 12) and therefore are inappropriate to derive economic impact of policy changes.

Table 12: Overview of General Model Features

	I-O	SAM	CGE
Occurrence	Common	Less common	Increasingly being used
Complexity	Simple	Simple	Complex
Data Requirements	Least	More	Most
Role of Prices	Fixed	Fixed	Endogenous
Technology	Fixed	Fixed	Not necessarily fixed
Supply of Inputs	Excess capacity	Constraints possible	Constraints possible
Time Frame	Extreme short-run	Extreme short-run	Variable
Sectoral Impacts	Unidirectional	Unidirectional	Multidirectional
Theoretical Structure	Linear	Linear	Non-linear
Costs to Implement	Inexpensive	Inexpensive	Costly

Source: Adapted from Patriquin et al. (2000)

The use of the SAM framework in studying the economic impact of tourism appears to be limited. Wagner (1997) presents one of the first studies using a SAM to analyse the economic impact of tourism. The paper examines the economic effects of tourism in the Brazilian municipality of Guaraquecaba. The author found that the region relies heavily on imported inputs, commodities and capital. Therefore, tourism spending will generate only a small economic impact on the region. Daniels (2004) applies occupation and wage data to estimate the income effects of sport tourism events on different households. The results of the study suggest that using an IMPLAN SAM may be inappropriate, as it is biased to high income households. Instead a modified model that used average full-time equivalent wages offers a viable alternative method of estimating the true income effects. This particular model illustrated that the occupations most likely to be affected by events have full-time equivalent salaries that tend to range between $15,000 and $40,000.

3.4.4. CGE models

Unlike econometric models, CGE models treat an economy as a whole, allowing for feedback effects of one industry or market on another. CGE modelling approach is an empirical counterpart of the well-known general equilibrium theory or approach. General equilibrium theory can be defined as a branch of theoretical economics that explains how a whole economic system functions. In other words, it investigates the coordination of mutually influencing, yet separately decided activities of millions of agents by means of price signals. The present approach of CGE model relies on the Walrasian general equilibrium structure Walras (1874) and the contributions made by among others Arrow and Debreu (1954), Harberger (1962), Scarf (1967, 1973) and Arrow and Hahn (1971). The Walrasian GE analysis focuses on the theoretical existence, uniqueness and stability of general equilibra and is of a general, abstract and rigorous nature and does not include numerical analysis. In contrast, CGE models are designed to establish a numerical framework for empirical analysis and evaluation of the economic policies. This is why they are called Computable General Equilibrium models.

CGE models can simply be characterized as theory with numbers. In other words, a CGE model may be defined as a system of equations describing the behaviour of the agents identified in the model and the technological and institutional constraints facing them. Many economic theories involve optimisation behaviour of economic agents under given resource and technology constraints. Households maximize their utility subject to their budget constraints and firms maximize their profits subject to their production technology constraints. Solutions of these optimisation problems yield the demand and supply schedules, respectively. Markets equalize demand and supply by adjusting prices. This theoretical structure is usually derived from neoclassical microeconomics. Computable General Equilibrium models can depict such market economies in a quantitative manner. The core behavioural equations are supplemented with (i) market clearing equations which equate supply and demand for each commodity, service, and factors of production and for foreign exchange; (ii) income-expenditure identities which ensure that the economic model is a closed system; and (ii) production functions which determine how much output is produced for any given level of factor employment. The model is calibrated to numerical database for one benchmark period, the central core of which is the Social Accounting Matrix described in Chapter 4. Calibration involves solving unknown parameters in the model system. In order to obtain a solution to the model, the model's equations are solved simultaneously.

CGE models make it possible to account for nonlinear responses, resource constraint, and price changes when analysing the economic impacts of tourism shocks. Thus CGE models overcome the major limiting assumptions of Economic Impact Analysis models. Dwyer et al. (2004, p.1) point out that CGE modelling is the "preferred technique in analysing the economic impacts of tourism". Blake (2000, p. 2) states that "tourism lends itself to CGE analysis because it is by nature a multi-sector activity". Dwyer et al. (2004), in a study on tourism's economic effects, argue for the use of a CGE model over an input-output model in tourism economic impact analysis research. The CGE model, they argue, offers various options for evaluating regionally based, country-based or policy-oriented tourism impacts, is more flexible in approaching real life applications and is theoretically more satisfactory.

The pioneering of CGE models was the Norwegian multi-sectoral growth model developed by Johansen (1960). Since then, many CGE models have been developed to analyse, for example, development issues by Dervis et al. (1982); taxation and international trade issues by Shoven and Whalley (1992). A model of the Australian economy, known as ORANI with its variants, was set up by Dixon et al. (1982). CGE modelling has become popular because of the increasing needs for analysis of policies related to resource-allocation issues.

3.4.4.1. Strengths of CGE modelling of tourism's economic impacts

CGE modelling of tourism's economic impact have several strengths that are worthy of emphasizing. CGE models have a solid microeconomic foundation and are capable of capturing the indirect and feedback effects of a wide range of possible policy changes without excessive simplification and aggregation. The second refers to the fact that CGE models recognize the complexity of interactions in the behaviour of the economic agents, as they act in their own interests. Thus, CGE models are the most rigorous way of assessing economic impact. By explicitly recognizing resource constraints and incorporating mechanisms for potential crowding out of one activity by another as well as all input-output mechanisms, CGE models can provide substantial input into policy making. Most importantly, a CGE analysis can incorporate overall welfare measures, very often as measured by equivalent variations (see Chapter 4 for details), which have the advantage of a constant comparison point (Hosoe et al., 2010).

Dwyer et al. (2004) argue that when assessing the impact of inbound tourism expenditures, it is necessary to take a general equilibrium approach which takes into account and allows for the negative as well as the positive impacts. Similarly, Gooroochurn & Sinclair (2005) argue that an increase in taxation in one sector of tourism can result in expenditure changes in others due to the complementary and substitutive nature of many of its composite sectors. Furthermore, land, labour and capital for tourism have alternative uses, such as money spent on tourism products. When there is an inbound tourism boom, the increase demand for activities sold to tourists pushes up prices, discouraging other exports and competing industries. Thus, change in tourism (or any other economic change) will lead to a change in the pattern of economic activity (Dwyer et al., 2004).

Dwyer et al. (2010) argue that CGE models are already playing an important role in improving our understanding of the limits of tourism as a catalyst for growth. The results of CGE models can be tested for robustness and the assumptions can be varied, providing researchers and policy makers in both developed and developing countries with an analytical tool for identifying the economic impact of particular types of tourism shocks. CGE models can be used to quantify the effects of changes in taxation, technology, population growth, subsidies or government borrowing, as well as to predict the effects of a range of alternative policies or exogenous expenditure shocks. Blake (2000, p. 27) argues that “one of the key features of numerical simulation is that it quantifies effects that may be difficult to assess theoretically”.

3.4.4.2. Objection to CGE approaches

One stream of criticism of CGE modelling is that it relies on the elasticity parameter values that are included in it. To address this concern, CGE modellers now perform sensitivity analysis for exogenously provided data or estimate the elasticity parameters econometrically where appropriate data are available. Other criticisms include the lack of financial or monetary aspects of CGE models. Most CGE models focus on real-side economy; thus, they can deal with economies in terms of only relative prices, not absolute prices. As a result, CGE models cannot deal with monetary phenomena such as inflation or (nominal) foreign exchange rate policy. To overcome this difficulty, a few so-called financial CGE models have been developed (Hosoe et al., 2010).

Another stream of criticism of the use of CGE modelling is that estimating impact with a one-year dataset can be compared to taking a still picture of a dynamically evolving reality (Hosoe et al., 2010). That is, inclusion of dynamic components of an economy, such as investment and savings, in a static model based on a static estimation procedure is theoretically inconsistent. In consideration of this shortcoming, dynamic CGE models have been developed, where inter-temporal resource allocation, such as investments and savings, are established fully on the basis of micro foundations. The CGE model is sometimes criticised as being unable to assess the importance of one sector in terms of what proportion of GDP is attributable to that sector. Rather, it is a tool for comparing "what-if" policy simulations (Blake, 2000).

3.4.4.3. Static versus Dynamic General Equilibrium models

One way in which CGE models can be distinguished is according to the treatment of time. CGE models can therefore be separated into two broad categories, comparative static (intra-temporal) and recursive-dynamic.

Like I-O models, comparative static equilibrium models do not contain any explicit time dimension, comparing just the economy at two distinct points in time. Typically, the two positions compared are the economy with a given policy change and the economy without the policy change. The obvious disadvantage of a comparative static approach is that it does not provide any details of the adjustment path of the economy between the two points in time. Static models are therefore appropriate for much of the analysis that is undertaken on tourism policy, where understanding the adjustment path is considered to be less important to the analyst than the final outcome of the policy shock (Dwyer et al., 2004).

An alternative category of CGE models, recursive dynamic models, consist of a series of static models, referring to a sequence of years, linked by inter-temporal equations describing investment decisions, capital accumulation and population (total labour supply). Thus a dynamic recursive equilibrium model performs year-to-year simulations, i.e. solves a model for period t and then solves the model for t+1 and so on. Recursive dynamic equilibrium models are appropriate for situations where inter-temporal allocation is the major concern. They can be used to forecast the structure of the economy as well as to assess the effects of policy and various shocks.

Recursive (sequential) dynamic models differ from an intertemporal (forward-looking) model with regard to the solution approach and the expectations of economic agents. In the latter, the optimizing behaviour of economic agents encompasses all periods up to the time horizon simultaneously. Thus, forward-looking CGE models are based on optimal growth theory, where the behaviour of economic agents is characterized by perfect foresight. In recursive dynamics, decisions about production, consumption and investment are made on the basis of past and current values of variables, not on future values (though it may depend on expected future values), and this is often referred to as myopic behaviour. From a developing country perspective, it is hard to assume that agents have perfect foresight. We therefore believe that it is much more appropriate to develop a recursive dynamic CGE model (Decaluwé et al. 2010).

CGE models may further be distinguished according to their level of spatial detail. A CGE model could, for example, be a national, a multi-country, a regional or a multi-region model. Within the category of multi-region CGE models, a further distinction can be drawn as to how each region is modelled: top-down; bottom-up; and hybrid framework (combination of top-down and bottom-up). In line with most CGE models, a national, recursive dynamic model will be used in this research.

3.5. CGE studies of tourism impacts – a literature review

While modelling the multi-sector, economy-wide impacts of tourism is not new, it is worth noting that most models have been too aggregated and their underlying assumptions are too restrictive to be of much use for policy makers. As will be seen in the following sections, CGE models have been widely[36] used in recent years in tourism economics analysis. CGE models have addressed a variety of issues, such as economic impact of a tourism boom; the economic impact of a tourism crisis; the economic impact of special events; tourism and trade; the impacts of changes in inbound tourism on welfare and poverty; economic impact of climate change; economic impact of tourism taxation; and economic impacts on destinations of tourists from different market segments. These issues have been investigated and reviewed below. This research will build on previous contributions to research in the area of economic impacts of changes in inbound tourism using CGE models. The focus will be on the tourism-based CGE applied on least developed countries (LDCs).

3.5.1. Tourism expansion

In a pioneering study, Adams and Parmenter (1995) investigated the effects of additional expansion of inbound tourism on the Australian economy using the CGE model. They constructed a 117-sector general equilibrium model for Australia using the ORANI-F database to simulate a 10 per cent growth in inbound tourism (i.e. an increase in the growth rate of inbound tourism to 17 per cent relative to a base year rate of 7 per cent). The ORANI-F model is a static model augmented with some simple dynamic relationships. Unlike most tourism CGE models, the authors explicitly model the supply side of the tourism sector. The model was used to simulate the macro and the industry effects of increased tourism in Australia under specific assumptions regarding tourism facilities, aggregate employment, and the rate of return on capital, real government consumption and the public sector borrowing requirement. More specifically, they assume limited excess tourism facilities, whereas the four last variables are assumed to be unaffected by tourism expansion.

The results show that, on a macroeconomic basis, there are small increases in real GDP (0.37 per cent), and in capital formation (1.39 per cent). The increase in capital formation generates an increase in real investment (8.38 per cent). On the other

[36] Due to the increasing availability of relevant data – i.e. data for this kind of analysis are increasingly being developed world-wide – CGE analysis is increasingly been used in the tourism field.

hand, the tourism expansion leads to an appreciation of the real exchange rate (21.13 per cent), which leads to import substitution (25.35 per cent) and the contraction of the traditional exports of mining and agricultural commodities. The increased tourism leads to a slight reduction in the growth of private consumption (0.17 per cent) due to an increase in income tax rates (11.16 per cent). The appreciation of the real exchange rate, together with the high import content of the induced investment, leads to a worsening of the balance of trade.

At the sectoral level, the authors' simulations indicate that some sectors gain and others lose from additional tourism expansion to Australia. Industries closely related to the tourism industry, as well as industries indirectly supplying tourism-related activities, are among the most positively affected. Growth prospects in non-tourism exporting sectors as well as in import-competing sectors are reduced by the appreciation of the real exchange rate brought about by additional tourism expansion.

There has also been work conducted on the relationship between tourism expansion and the growth prospects of local industries by Adams and Parmenter (1993, 1999). They distributed the increased tourism numbers of an assumed 10 per cent increase in the national rate of growth of inbound tourism to Australia across the different States of Australia according to their existing market shares. In doing so they distinguished between local and national industries. The results of tourism expansion on the rate of economic growth in any state are very mixed. In fact, the effect of a nationwide expansion of international tourism on the growth prospects of local industries in any State is dependent upon the composition of the production of its industries and upon the size of local multipliers – i.e. upon whether the goods and services produced by the industries of any State are traded extensively across borders (also referred to as national industries) or whether they have little interstate trade (local industries). Similar to the national CGE model, industries that have a large proportion of exports and face considerable import competition experience a decline.

The authors point out that States in which a greater share of their gross state product (GSP) is due to national industries and local tourism-related industries, and in which a smaller share of their GSP accounted for by industries in the traditional export sectors, will have the most gain from additional tourism. Of the six States, Queensland, usually thought to be the most tourism-oriented of the Australian states, is projected to be a net loser in an economy-wide expansion of tourism, resulting from a decline in traditional export industries and the import of competing industries (GSP decrease by 9.15 per cent). Victoria State, in which traditional exports account for a relatively low share of GSP, but which has a large international airport (a national industry according to the definition above), has most to gain from a 10 per cent annual increase in visitor flows (GSP increase by 6.39 per cent).

Using a CGE model based on the ORANI model, Narayan (2004) simulated the impact of additional tourism expenditure on Fiji's economy. Tourism is Fiji's largest industry, with inbound tourism earnings representing 20 per cent of GDP and employing around 40,000 people. A simulated 10 per cent increase in tourist expenditure results in an increase in real wage rates owing to an increase in economic activity. The increase in real wage rates results in private disposable incomes (1.88 per cent) which, in turn, leads to an increase in real private consumption of 1.89 per cent, helping to increase real GDP by 0.5 per cent. The additional tourism expenditure is estimated to have a positive impact on total exports (1.65 per cent), which outweigh the increase in total imports (1.09 per cent). Real aggregate private investment will also increase by around 0.35 per cent. Additional findings of this research with regard to economy-wide effects are the projected increases in government revenues; value added tax (2.5 per cent); income tax revenues (2.4 per cent) and tariff revenue (0.79 per cent). The research found further that the informal sector labour wage rates will increase by 5.8 per cent, whereas wage rates for unskilled labour in rural and urban areas will increase by 1.8 per cent and 1.2 per cent, respectively, leading to an increase in national welfare of 0.67 per cent.

At the sectoral level, Narayan's simulations indicate that the real output of Fiji's traditional export sectors of Kava, dalo and fish will decline by around 2.5 per cent, 2.3 per cent and 2.0 per cent, respectively. There will also be a fall in manufacturing, textiles (2.6 per cent) and clothing (1.7 per cent) exports as well as in processed food exports (around 8 per cent). These negative effects can be attributed to the fact that additional tourist expenditure induces an appreciation of the real exchange rate. Thus, the associated increases in domestic prices of goods and services and wage rates relative to foreign prices erode Fiji's competitive advantage of traditional export sectors.

On the other hand, with regard to export effects, the real output of industries closely related to the tourism industry (e.g. hotel industry, transportation and trade) are among the most positively affected by additional tourism expenditure. Tourism related industries will also experience an increase in imports, with fruit and vegetable imports being the most affected (39 per cent). The results provide useful information for policy makers who are concerned with the impacts of such shocks.

Blake (2000) uses a CGE model to analyse tourism and tourism policy in Spain, aiming at shedding some light on the nature of tourism and tourism tax policy in a general equilibrium framework. The data used for the study are from a 49-sector Spanish tourism input-output table for 1992, which includes six tourism sectors and six travel sectors. The author simulates a 10 per cent increase in the demand for foreign tourism, concluding that this leads to welfare increasing by 0.05 per cent of GDP; to small increases in real private consumption, domestic tourism and investment; and to adjustment through a real exchange rate appreciation (0.61 per cent) that reduces exports from other exporting sectors and increases imports. The sectoral results of a tourism boom in Spain is as follows: tourism and travel sectors (1.19 per cent); food, beverage and tobacco (0.22 per cent); other services (0.05 per cent) agriculture (-0.02 per cent); other primary (0.23 per cent); and other manufacturing (-1.2 per cent).

Blake et al. (2001) use the 'Nottingham' CGE model, incorporating Tourism Satellite Accounts as the fundamental data input to analyse tourism in the United States. The authors explored three different simulations: a 10 per cent increase in foreign tourist expenditures; a 10 per cent increase in Air Transport Productivity; and the removal of indirect taxes, replacing them with non-distorting taxes. The results of a 10 per cent increase in foreign tourist expenditures suggest that this leads to increases in GDP (0.1 per cent) and in an increase in economic welfare, as measured by equivalent variation. The CGE-based results of tourism are then compared with I-O models of tourism's economic impact. The input-output models overestimate the total GDP effect, underestimate the total effect on tourism sectors and completely miss the negative effects on non-tourism sectors. The main reason for the differences is that I-O models omit crowding-out mechanisms. The authors argue that CGE modelling allows for a more comprehensive analysis of the economic impact of tourism.

Dwyer et al. (2003) construct a multi-regional general equilibrium model to estimate both the short-run and long-run effects of increased tourism on the economy of New South Wales, and the rest of Australia. In 2000, 4,946,000 tourists visited Australia, generating foreign exchange equivalent to A$15.4 billion. Tourism to Australia has been increasing at 9.6 per cent a year over the past decade and was forecast to increase by 6.6 per cent annually until at least 2010. The state of New South Wales was visited by around two-thirds of all inbound tourists. The authors undertook several types of simulations aimed at exploring whether there were any differences in the economic impact of expenditure from different origin markets on a host destination, and, if so, to examine the implication for policy-making.

Simulation 1: the effects of a 10 per cent increase in the world demand for Australian tourism on the economy of New South Wales;

Simulation 2: the effects of a 10 per cent increase in international tourism to New South Wales assuming constant demand for tourism to the rest of Australia;

Simulation 3: the effects of a 10 per cent increase in interstate tourism to New South Wales with (a) full substitution from the rest of Australia's intrastate tourism, and (b) full substitution from the rest of Australia's expenditure on other goods and services; and

Simulation 4: the effects of an increase in intrastate tourism in New South Wales, where the additional expenditure replaces (a) that which would have been spent on tourism in other states and (b) that which would have been spent on other (non-tourism) goods and services from all sources.

The authors employed the M2RNSW CGE model. The results of the short-run simulations (it is assumed that industry capital stocks are fixed and that there are no changes in industry investment) of increased tourism for New South Wales , Rest of Australia and for (total) Australia (New South Wales plus Rest of Australia) appear in Table 13. Results show that the greatest gain to New South Wales's GSP (which increases by 0.308 per cent) and to its employment (which increases by 0.369 per cent) are associated with an increase in intrastate tourism by New South Wales residents under simulation 1 (a). International tourists generate the smallest GDP and employment on the state of 0.104 per cent and 0.102 per cent, respectively. For Australia as a whole (i.e. including the effects in New South Wales) the results are positive in five of the six scenarios, the greatest gain nationally being associated with international tourism.

Table 13: Results from simulations of a 10 per cent increase in tourism in New South Wales and Rest of Australia

Source of increased tourism expenditure	Increased tourism expenditure (A$ million)	Impact on real Gross State Product (A$ million)	(%)	Impact on employment (Jobs)	(%)
Intrastate tourism in NSW substituted for RoA interstate tourism					
NSW	1,032	734	0.308	11,238	0.369
RoA	–1,032	–615	0.142	–10,891	–0.179
Australia	0	119	0.018	347	0.017
Interstate tourism to NSW: full substitution from RoA expenditure on other goods and services					
NSW	540	382	0.160	6,111	0.201
RoA	0	–210	–0.049	–3,772	–0.062
Australia	540	172	0.026	2,338	0.032
Interstate tourism to NSW: full substitution from intra-tourism in RoA					
NSW	540	322	0.135	4,992	0.164
RoA	–540	–383	–0.089	–6,672	0.110
Australia	0	–60	–0.009	–1,680	–0.012
International tourism to NSW					
NSW	636	364	0.153	6,012	0.197
RoA	0	–121	–0.028	–2,736	–0.045
Australia	636	244	0.107	3,276	0.042
Intrastate tourism in NSW substituted for other goods and services					
NSW	1,032	354	0.148	4,998	0.164
RoA	0	168	0.039	3,696	0.061
Australia	1,032	522	0.078	8,694	0.098
International tourism to Australia					
NSW	636	249	0.104	3,666	0.120
RoA	1,074	471	0.109	8,013	0.132
Australia	1,710	718	0.107	11,679	0.128

Source: Dwyer et al. (2003)

Another study on the economic impact of tourism that simulates an increase in tourism expenditures is Kweka's Tanzanian model (Kweka, 2004). Tanzania is endowed with various natural resources that form a mainstay of tourist attractions; almost a third of the land area is allocated to natural parks. As a share of total exports, tourism earnings increased from 15 per cent in the 1980s to over 40 per cent in the 1990s, becoming the second largest foreign exchange earner after agriculture. By using a CGE model based on SAM, an empirical investigation of the impact of tourism growth on real GDP, total welfare and exports was carried out by conducting four simulations and assuming tourism demand elasticity of (-1).

Simulation 1: An increase in tourism expenditures by 20 per cent;
Simulation 2: An increase in infrastructure efficiency owing to a decrease in costs of distribution and marketing by 10 per cent;

Simulation 3: A combination of simulations 1 and 2;
Simulation 4: A 10 per cent tourism tax as way of amplifying the benefit of tourism on the economy.

The model includes two households (urban or rural). The results of the first simulation indicate that tourism expansion and tourism taxation have a substantial positive impact on GDP, total welfare, export and tax revenue. Under the first simulation, GDP increases by 0.1 per cent and total welfare by 0.043 per cent, whereas the distributional impact of tourism expansion disproportionally benefits the rural areas. Under scenario two, real GDP increases by 0.5 per cent, and total welfare rises remarkably by about 2 per cent. The representative enterprise records the highest rise in welfare (about 4 per cent). Contrary to the results of the previous simulation, welfare increases for both households, where the rural household's welfare (2.3 per cent) increases by nearly twice as much as that of urban household's (1.3 per cent). Total exports increase by 1.4 per cent, of which non-tourism exports increased significantly by 2 per cent compared to tourism exports (0.4 per cent). In the case of the third simulation, real GDP remains unaffected, while total welfare increases by about 3 per cent of the base value. The welfare of rural households increases by 9 per cent, while that of urban households declines by 8 per cent. The change in tax revenue is slightly negative (-0.6 per cent). However, efficient infrastructure increased the consumption of imports; competitive imports increased marginally by 1 per cent, and intermediate imports declined more by 0.1 per cent, making the net increase in total imports of 0.7 per cent.

Imposing a 10 per cent tax on all tourist expenditures (simulation four) is found to significantly increase government revenue (over 2 per cent) and real GDP (0.3 per cent). Total welfare increases by about similar magnitude to real GDP (0.2 per cent). Unlike in the previous scenario, the welfare of both households and government increase, while that of enterprises falls. Kweka (2004) concludes that urban areas will benefit more from tourism expansion than rural ones, unless governments invest in improving infrastructure. The analysis considered two ways to maximize the beneficial impact of tourism on the economy of Tanzania: the introduction of a tourism tax, and an improvement of infrastructure efficiency. Such measures may involve increased government investment spending to improve the transport links between rural and urban areas.

Using the embryonic 'Dutch disease' literature on tourism, Nowak and Sahli (2007) examine the economy-wide effects of an inbound tourism boom on a small open island economy. An important result obtained in this study is that increased inbound tourism may lead to net welfare losses when tourism products are from intensive use of coastal land.

3.5.2. Tourism boom and poverty relief

Although it is often assumed that tourism provides a means of relieving poverty, there has been little quantitative research conducted on the distributional effects of tourism across entire economies. Most studies on the interactions between tourism and poverty have focused on the potential impact of tourism on projects and programs which aim to reduce poverty. Tourism CGE Studies that have explicitly investigated the connection between tourism policies or shocks and poverty reduction include Wattanakuljarus and Coxhead (2008) and Blake et al. (2008).

Wattanakuljarus and Coxhead (2008) simulate the effects of a boom in inbound tourism demand on the Thai economy. Their stated goal is to take account of general equilibrium adjustments in answering the question whether tourism can have a pro-poor impact. The authors assume that inbound tourism increases by 10 per cent. The simulations indicate that tourism expansion induces growth in GDP (between 0.88 per cent and 2.06 per cent depending on the assumptions regarding factor constraints), increase in household consumption and in total domestic absorption by between 3.81 per cent and 4.11 per cent, and 2.9 per cent and 2.06 per cent respectively. However, although tourism growth benefits all four classes of households in the model, the biggest gains accrue to high-income and non-agricultural households in every scenario. Thus, tourism expansion raises household incomes but worsens their distribution. The authors argue that tourism promotion is not a “pro-poor” strategy because tourism sectors are not especially labour-intensive, and their expansion brings about a real appreciation that undermines profitability and reduces employment in tradable sectors, notably agriculture, from which the poor derive a substantial fraction of their income. According to this study, tourism growth is, in Thailand, neither pro-poor nor pro agriculture. The policy implication of this study is that tourism promotion to increase international tourism may increase the gap between the rich and the poor, meaning that additional policy instruments will be needed to address this increased inequality.

Blake et al. (2008) applied a CGE model of the Brazilian economy to assess the distributional effects following an expansion of tourism, providing means of answering the question of whether, and how, tourism can contribute to poverty reduction. Poverty is widespread across Brazil. While Brazil's economic growth has led to an overall increase in living standards in recent years, some 16 million people still live in extreme poverty, defined as having 70 reais (€28) or less per month. Blake et al. identified three channels by which tourism may reduce poverty, namely prices, earnings and the government.

The authors simulate a 10 per cent increase in tourism demand by foreign tourists and note that this will lead to a variety of effects in the Brazilian economy, including raising the prices that tourists pay for goods and services. This will lead to a fall in demand that counteracts part of the original 10 per cent increase. The tourism-demand expansion will also cause changes in production in all industries, changes in employment, earnings, household incomes, prices and other variables in the model.

The results from four simulations showing the effects that the tourism demand shock has on some key variables are presented in Table 14 below. The differences between these simulations can be seen in the way that the government allocates the additional tax revenues that it receives directly and indirectly from the tourism expansion (net of falls in revenue from other activities). In each of these simulations, additional government income is transferred to households – either through actual increases in transfer payments or through reductions in direct tax levels, as follows:

- Simulation 1: Additional revenue is transferred to households in proportion to their original receipts of government transfers;
- Simulation 2: Additional revenue is transferred according to a household's level of tax payments (for example, reducing income taxes);
- Simulation 3: Additional revenue is transferred in proportion to income levels;
- Simulation 4: All additional revenue is transferred to the poorest household group.

To better understand the economy-wide impacts of tourism expansion, the simulation results are reported in terms of tourism consumption, prices and expenditure, EV for Brazil as a whole, compensated equivalent variation for the four household groups, and the ratio of real income in the highest-income to the lowest-income households.

Table 14: Results from a 10 per cent increase in Brazil

Simulation Closure rule: additional government income is transferred in proportion to...	1 Original transfer receipts	2 Levels of income tax	3 Levels of income	4 Only to the poorest household
Percentage change in tourism consumption	8.484	8.484	8.484	8.484
Percentage change in tourism price	0.697	0.697	0.697	0.696
Percentage change in tourism expenditure	9.239	9.239	9.239	9.240
Change in tourism expenditure (R$bn)	0.680	0.679	0.680	0.680
Equivalent Variation ($bn)	0.106	0.106	0.106	0.104
equivalent variation as a percentage of original income	0.025	0.025	0.025	0.025
Compensated equivalent variation ($bn)				
Lowest income household	0.018	0.018	0.020	0.037
Low income household	0.038	0.036	0.038	0.033
Medium income household	0.010	0.011	0.008	0.004
High income household	0.040	0.041	0.040	0.030
Percentage change in Highest:Lowest real income	−0.035	−0.034	−0.039	−0.092
Household equivalent variation as percentage of total equivalent variation				
Lowest income household[a]	17	17	19	35
Low income household[a]	36	34	36	32
Medium income household[a]	9	10	7	4
High income household[a]	38	39	38	29

[a] Percentages.

Source: Blake et al. (2008)

Under Simulation 1, it is found that transferring revenues in proportion to their original receipts of transfer income essentially maintains the current system of government payments, but at a higher level. In case of the second simulation, transferring revenues in proportion to income tax payments is equivalent to the government choosing to spend the gains from tourism expansion on tax cuts. The welfare effect for the lowest income household is positive under simulation 3, and there is a greater reduction in income inequality (0.039 per cent). By allocating transfers to the lowest income household in the third simulation, the benefit of tourism expansion to lowest income household is doubled, and the poorest household gains around $1 for every $7 of additional foreign tourism spending in Brazil. In the first and second simulations the effects on the compensated equivalent variation of the lowest-income household and on the ratio of income levels for the highest- and lowest-income household (which fall by 0.035 per cent) are similar.

As would be expected, the 10 per cent increase in foreign tourism demand leads to increases in expenditure (9.2 per cent) and in prices (0.7 per cent). The changes in prices then influence tourism consumption, thereby resulting in a reduction in the growth in tourism consumption to around 8.5 per cent. The authors estimate that the welfare gain to Brazil of this additional expenditure is around $0.106 billion, implying that the country benefits by $45[37] for every $100 of additional tourism spending. Results suggest that the welfare gains accrue primarily to households with low (but not the lowest) income. On the whole, income distribution improves modestly. With regard to the redistributive effects of the different simulations, the results show that earnings and price channel effects of tourism expansion are modest for the lowest-income sections, whereas high- and medium-income households, followed by the low-income group, benefit most from the government channel effects (see Table 15).

Table 15: Distribution of Earnings by Households ($millions) resulting from a 10 per cent increase in tourism in Brazil

Household	1 Direct effect	2 Direct plus indirect effects	3	4 Total effects, simulation 1	5	6
	earnings	earnings	earnings	prices	government	firms
Lowest income household	11	15	12	1	0	5
Low income household	25	35	25	4	5	0
Medium income household	14	22	3	1	6	4
High income household	18	39	7	−6	11	29

Source: Blake et al. (2008)

A policy implication emerging from these simulations is that in order to make tourism specialisation pro-poor, policies directed specifically towards benefiting the lowest-income group are required. It was shown that directing the revenue from tourism expansion specifically towards the lowest income group could double the benefits for the lowest income households, giving them around one-third of all the benefits. On the whole, it can be concluded that tourism expansion has a serious impact on both

[37] This figure is quite high and might be explained by the size of the country.

income distribution and poverty and that the outcomes are, to a large extent, dependent on the way the government allocates additional revenue.

3.5.3. Other relevant (non-CGE) studies

Other empirical studies on the relationship between tourism development and poverty reduction in developing countries have been conducted (Aylward, 2003; Bah and Goodwin, 2003; Mbaiwa, 2004; Mitchell and Ashley, 2010; UNWTO 2002, 2005). Moreover, it has been acknowledged that tourism will play an important role in the achievement of the MDGs (UNWTO, 2005). Fair trade in tourism (Cleverdon and Kalisch, 2000) has also been investigated. Pro-poor tourism literature (Hall, 2007; Scheyvens, 2007; Schilcher, 2007; Mitchell and Ashley, 2010) has argued that tourism is not necessarily pro poor. Mitchell and Ashley (2010) find that in most destinations 10-30 per cent of in-country tourist spending accrues to poor people. They state that factors which help to shape the impact on the poor are most likely factors in the economic, political and cultural context, as well as the specific factors of implementation.

3.5.4. Tourism and crisis

Zhou et al. (1997) simulated the impacts on the Hawaii State economy of a 10 per cent projected decrease in visitor spending, using both a CGE model and an I-O analysis approach. They found that output is reduced in the tourism-related industries, such as restaurants, hotels and transportation, more than in other sectors in the economy for both models. In fact, the I-O results are larger in terms of percentage reduction in domestic output relative to the CGE model because the latter allows for resource reallocation among different sectors and accounts for effects of corresponding changes in prices of goods and factors. More precisely, a 10 per cent decrease in tourism expenditure results, in a CGE modelling, in reductions in Gross State Product (GSP); in the general level of prices; in imports; in the outputs and employment of the industries closely related to tourism, in traditional exports, manufacturing, construction and services; and in a fall in the balance of trade.

The effects of exogenous shocks, such as foot and mouth disease (Blake et al., 2003), the terrorist attacks of September 11, 2001 (Blake and Sinclair, 2003), the

Iraq War and SARS (Severe Acute Respiratory Syndrome) in 2003 are analysed using CGE models of the UK, US and Australian economies, respectively.

Using the Nottingham model, Blake et al. (2003) investigated the economy-wide effects of Foot and Mouth Disease (FMD) in the UK, with particular attention to the tourism sector. The CGE model is linked to a micro-regional tourism simulation (MRTS) model to analyse the economy-wide impacts of FMD in the context of inter-sectoral and interregional linkages in the economy. The authors highlight that FMD has considerable effects, not only on agricultural production and farming industries, but also on the tourism sector due to the inter-sectoral linkage and effects of the ways in which the UK government handled the outbreak. The tourism effects of FMD are quantified by inward-shifts of the downward-sloping tourism demand curves for (inbound) international tourism, domestic (overnight) tourism and domestic same-day visits. The results of the MRTS show that total tourism revenue in 2001 fell by almost £7.5 billion, of which 21 per cent, 49 per cent and 31 per cent are attributed to reductions in domestic (overnight) tourism, in day visit trips and in international tourism receipts, respectively. As a direct result of reductions in tourism expenditure, GDP decreased in 2001 by £1.93 billion. The simulations identify a total fall in GDP due to the FMD crisis for 2001 of £2.5 billion (around 0.28 per cent of GDP). Industries in the UK that rely heavily on sales to tourists (such as hotels, catering and air transport) experienced the largest declines in output and value-added, with reductions in real factor earnings of £978 million in 2001, £725 million in 2002, and smaller reductions in 2003 and 2004.

Blake and Sinclair (2003) use a CGE model to estimate the impact of the downturn in tourism, caused by the September 2001 events in the United States, on different sectors of the economy. The magnitude of the tourism downturn following September 11 was large, with percentage decreases in enplanements at this time, compared with the previous twelve months, of 34 per cent for domestic and 23 per cent for international travel. The authors simulate the effects of the downturn in tourism as well as the potential and actual policy responses to the crisis. The results of the economic impact of September 11, without any offsetting policy responses, show that the fall in tourism expenditures reduces GDP by almost $US30 billion; worsens the government budget by over $7 billion and causes a loss of employment at 383,000 full time equivalents. With policy interventions, the figures reduce to under $US10 billion (GDP) and to around 60 per cent of unemployment.

Employing the M2RNSW CGE model, Dwyer et al. (2006a) explore the economic effects of the tourism crises, namely the Iraq War and SARS (Severe Acute Respiratory Syndrome) in 2003 on the Australian economy. They recognize that, while these events resulted in less inbound tourism, they also resulted in less outbound tourism so that the net effect on Australia is not as severe as it might have been and depends upon the extent to which the cancelled or postponed outbound travel is allocated to savings, domestic tourism or other non-tourism consumption.

More recently, Yang and Chen (2009) have applied the CGE model to estimate the economic effects of a tourism crisis for the Taiwanese economy. They note that SARS has the greatest impact on output effects, income effects, and employment effects of tourism industry. The results show that the SARS epidemic has adverse effects on GDP with a reduction between 0.429 per cent and 0.774 per cent under various simulations; and a reduction in employment of between 0.528 per cent and 0.953 per cent. The results provide useful information for policy makers who need to manage the impacts of such shocks.

3.5.5. Tourism and trade

Sugiyarto et al. (2003), examining the interrelation between globalisation and the economic impacts of tourism, advocate the use of a CGE model, particularly in the age of a global economy, as it can handle such aspects as exchange rates and imports. Indonesia is an interesting case study, as it has experienced both trade liberalisation and tourism growth in recent decades. The authors employ a CGE model of the Indonesian economy to examine the effects of globalisation via tariff reductions, as a stand-alone policy and in conjunction with tourism growth. Two main macroeconomic policy scenarios were considered. Under the first scenario, termed ‘Partial globalisation’, they modelled partial globalisation through a reduction of 20 per cent in the tariffs on imported commodities. In the second scenario, termed ‘Far-reaching globalisation’, import tariff reductions (20 per cent) are combined with reductions in indirect taxation on domestic commodities. The increase in foreign tourism demand will improve welfare (as domestic absorption and household real consumption increase by 0.05 per cent and 0.15 per cent, respectively); create more production (GDP increases by 0.06 per cent); and employment (increases by 0.16 per cent). They show that the combined effects of the growth of foreign tourism and globalisation are beneficial everywhere, as tourism growth amplifies the positive effects of globalisation and lessens its adverse effects. The levels of GDP and employment are higher, whereas the trade balance is in deficit, but to a lesser extent than in the case of trade and tax liberalisation without tourism growth.

3.5.6. Tourism and taxation

Gooroochurn and Milner (2005) examine the effects of the reform of the current structure of indirect taxes in Mauritius, a relatively tourism-dependent economy. They use a CGE model to explore the relative efficiency of changing rates of indirect taxation on tourist and non-tourist related sectors, and allowing for equity considerations. A major innovation of their study is their having considered cases where tourist arrivals are exogenously set and where they endogenously adjust to changes in relative prices. The relative efficiency of tourism taxes is explored using the concept of Marginal Excess Burden of taxation (i.e. the incremental welfare cost of raising extra revenues from an already existing distortionary tax and holding other taxes constant) per additional dollar of tax revenue. The results suggest that the tourism sectors are currently under-taxed. They estimate that the Marginal Excess Burden of taxation is, in all sectors, lower for sales tax simulations than for the production tax simulations. The results further suggest that taxing tourism related sectors can potentially have positive income distribution effects. The authors note that Mauritius should be able to increase tax rates on tourism and reduce rates on other sectors, while increasing welfare without reducing tax revenue.

The findings by Gooroochurn and Milner (2005) are confirmed by Gooroochurn and Sinclair (2005), who examine the efficiency, equity, and economy-wide effects of tourism taxation in Mauritius using a CGE analysis. They found that a policy of taxing highly tourism-intensive sectors (such as restaurants, hotels, transport and communications) is efficient relative to taxing other sectors, such as primary goods production or manufacturing, in that there are relatively small effects on the welfare of domestic residents. The macroeconomic effects of taxation were investigated through two scenarios. The first involved a narrow policy where the hotel and restaurant tax rate is increased, and the second involved a broad policy, where the sales tax rate of all five sectors involved in tourism is increased at the same time. In both cases, there is a decrease in real GDP and increase in inflation. However, the narrow policy is more contractionary than the broad one because it entails a much higher increase. With regard to welfare, the effect under the narrow policy is larger than under the broader policy, mainly because of the higher terms of trade effects of the former policy. Higher terms of trade mean more imports can be funded by a fixed quantity of exports. Welfare increases because the higher consumption associated with higher terms of trade outweighs the reduction in consumption as a result of the lower GDP.

3.5.7. Tourism and environment

Tourism activities may have an impact on the quality of the local environment through construction of tourism infrastructure. It is therefore useful to incorporate environmental damage functions into the analysis of tourism impacts. In fact, there is a general recognition of the need to improve environmental performance of tourism by enhancing its beneficial – and reducing its harmful – environmental effects in order to ensure the sustainability of resource use.

Wattanakuljarus (2005) applies the CGE approaches to investigate the nationwide economic and environmental impact of tourism in Thailand, specifically on social welfare, industry outputs, labour market, income distribution and usages of land, forest and water. The author finds that tourism expansion in Thailand leads to an increase in real GDP; an improvement in the current account deficit; an appreciation in real exchange rates; and an increase in domestic inflation rates. However, tourism expansion tends to stimulate the economy-wide extra usages of water relatively more toward piped water for non-agriculture rather than irrigated water for agriculture. In addition, the net usages of piped water and the net wastewater discharges from manufacturing are higher than they otherwise would have been.

Alavalapati and Adamowicz (2000) provide a theoretical framework for studying the interactions between tourism, other economic sectors and the environment. They developed a two-sector and two-factor general equilibrium model, whereby the tourism sector is endogenized and modelled as a function of prices and environmental damage. Their study considered two scenarios: (1) environmental damage in the region is due to economic activity related to the resource sectors; and (2) economic activity from both the resource sectors and tourism affect the environment. The results of their simulation experiments indicate that the effect of policy change (i.e. an environmental tax on either the resource sector or the tourism sector) is not the same under the two scenarios. An increase in environmental tax on the resource sector benefits the regional economy under scenario (1). The converse holds if the damage occurs from both resource and tourism sector activities.

Yeoman et al. (2007) address the relationship between oil prices and the global economy and their relationship to Scottish tourism. The results suggest that very large shocks on oil and other energy prices (500 per cent over a decade for oil) on the Scottish economy would reduce tourism demand from a forecast 4 per cent p.a. to 2.2 per cent p.a.

3.5.8. Tourism and transportation

Using a CGE model with a focus on transportation and visitor spending, Konan and Kim (2003) measure the economic importance of transportation in Hawaii under a number of alternative scenarios. The authors conclude that a 15 per cent increase in tourism expenditures will generate an increase in the GSP of 1.8 per cent. A 1.8 per cent tourism-generated increase in GSP will lead to an increase in transportation-related output values by 6.5 per cent. This tourism generated growth also increases the value of restaurants and accommodations by 9.7 per cent, while other non-tourism services tend to decline in value. The growth in the tourism industry is projected to reduce certain residential transportation services (both in public transit as well as in the sales of motor vehicles) because of the increases in costs associated with their provision.

3.5.9. Tourism and special events

Special events can be defined as events that are primarily for celebration and occur once or infrequently outside of normal life activities (Getz 1997; p.4). Special events are typically regarded as major generators of economic activity and jobs (Dwyer et al. 2005). The prevalence assessments regarding the impact of events has increased in recent years, with programs using studies not just to prove the effectiveness of a special event, but also to improve it as well. However, the quality and the rigor of the economic impact assessments of special events vary greatly. Three common methods are the input-output model, the CBA and the CGE models. The input-output model, which for two decades has been the standard approach to assess the economic impacts of special events, has come under increasing criticism in the recent research literature (Dwyer and Forsyth, 2009). These critics argue that input-output models do not reflect contemporary developments in economic analysis and thus provide 'misleading information on the economic contribution of the event to the destination'. CGE techniques are gaining increased recognition as the more reliable method of calculating the economic impact of events (Dwyer et al., 2006b). It is also often argued that CGE modelling is too narrow in scope to provide policy-makers and government funding agencies with sufficient information because it focuses only on economic impact. These critics emphasize the importance of CBA as a comprehensive approach for exploring the economic impact of events, since it takes into account the importance of social and environmental impacts in addition to economic impact (Dwyer et al., 2010).

Studies on the economic impact of special events using CGE models include the following: (Narayan, 2003; Blake, 2005; Madden, 2002; Bohlmann and van Heerden, 2005; Dwyer et al., 2005; Dwyer et al., 2006b, Li et al. 2011). Dwyer et al. (2006b) show how CGE models can be adapted to estimate the displacement effects of events, their fiscal impact, intraregional effects, event subsidies, and multistate effects. They argue that since I-O models do not include key economic constraints (capital and labour) and price changes, they only measure the positive economic impact brought on by an event, and not the potential negative impact. They highlight that the economy-wide impact of a major event depends on how tourism crowds out other sectors.

Dwyer et al. (2005) estimate the economic impact of the Qantas Australian Grand Prix 2000 automobile race using both I-O analysis and CGE model and advocate the use of CGE over simple I-O based models in generating economic impact estimates. The authors find that CGE values are likely to be substantially less than I-O values for the same event. By the standard input-output analysis, the race increased real output by $A112 million of the state of New South Wales and $A120.1 million of the country as a whole while the CGE model presented much more modest figures of $56.7 million and $24.5 million for the state and country, respectively. The authors find that CGE values are likely to be substantially less than I-O values for the same event, concluding that I-O model estimates are 180 per cent to 500 per cent higher than CGE estimates.

Madden (2002) assesses the economic impacts of the 2000 Olympics on the New South Wales and Australian economy using a multiregional Computable General Equilibrium model. The model was employed to investigate the effects of Olympics over a 12-year period, under specific assumptions regarding the Australian labour market, capital supply constraints and Australian government policy on foreign debt. The author found that the Games had a strong impact on both the New South Wales and national economies, particularly in the four years ending in the Event Year. The study leads to the remarkable conclusion that New South Wales will experience an increase in its Gross State Product by almost $A490 million per year over a 12-year period ending in 2005/2006 and an increase in New South Wales jobs of almost 5,300 per year on average over the 12-year Olympic period. Nationally, the Olympics were estimated to increase Australian GDP by 0.12 per cent ($A6.5 billion) on average over the 12 years and create 7,500 jobs.

Bohlmann and van Heerden (2005) used a CGE model developed specifically for the South African economy to investigate the impact of the pre-event phase expenditure attributed to the hosting of the 2010 FIFA World Cup on the South African economy. In the pre-event phase, expenditure is mainly geared towards the construction and improvement of infrastructure required to successfully host the event. The results from the UPGEM model show that the pre-event phase of the World Cup will have a positive impact on the South African economy. This improvement in the infrastructure of the country will benefit productivity in the long term and may lead to an increase in the GDP of up to R10 billion and generate thousands of jobs annually.

Li et al. (2011) applied CGE modelling to assess the economic impact of international tourism brought by hosting the Beijing Olympics. The study includes two types of estimations: ex ante (three scenarios regarding international visitor expenditures per visitor per day, i.e. low, central and high) and ex post. The economic impact generated by each of the two types of estimations is compared. The projections of the macro-economic effects of the Beijing Olympic Games are presented in Table 16.

Table 16: Macro-economic impact of the Beijing Olympic Games

	Calculation	*Ex ante*			*Ex post*
		Low	Central	High	
Change in EV (US$ million)	A	118	177	236	–297
Change in international tourism demand (US$ million)	B	600	899	1,199	–1,238
Change in real tourism consumption (US$ million)	C	576	863	1,151	–1,188
Change in price of foreign tourism consumption (%)	D	0.06	0.09	0.12	–0.13
Change in tourism expenditure (US$ million)	E	593.6	889.3	1,186	–1,225
Change in EV per change in international tourism demand	A/B	0.20	0.20	0.20	0.24
Change in EV per change in real tourism consumption	A/C	0.21	0.21	0.21	0.25
Change in EV per change in tourism expenditure	A/E	0.20	0.20	0.20	0.24

Li et al. (2011)

Economic welfare, as measured by the equivalent variation increases in the ex-ante estimation (Row A) in all three scenarios. The ex post estimation shows that there would be a welfare loss of US$297 million brought by a US$1,238 million decrease in international tourism demand. This means that every US$100 decrease in tourism demand would cause US$25 decrease in welfare.

Blake (2005) uses two separate dynamic Computable General Equilibrium models – one for the UK and another for London – to weigh the probable economic benefits of hosting the Olympic Games against the weight of possible negative consequences. The macroeconomic results show that the London 2012 Olympics would have an overall positive effect on the UK and London economies, with an increase in GDP over the 2005-2016 period of £1,936 million (0.119 per cent of total UK GDP at 2004 prices) and an additional 8,164 full-time equivalent jobs created for the UK. The effects are concentrated in 2012 (£1,067 million GDP and 3,261 FTE jobs) and in the post-Games period 2013-2016 (£622 million GDP and 1,948 additional FTE jobs). Sensitivity analysis has shown that the overall impact of the Olympics is unlikely to be negative.

Narayan (2003) applied a CGE model to assess the economic impact of the 2003 South Pacific Games for Fiji. The results show that with every increase of 10,000 in visitor arrivals to Fiji, real GDP increases by 0.35 per cent, while real national welfare of Fijians increases by 0.51 per cent.

Other studies worth mentioning are Blake et al. (2006) on tourism forecasting. They apply a time-series forecasting (a conventional forecasting method) and a quantifiable forecast from CGE model to forecast the levels of tourism in Scotland and its contribution to the economy. Results are provided for changes in macro-economic variables, such as the exchange rates and gross national product of major origin countries, to demonstrate the integrated model's ability to take account of the multiple events that affect tourism destinations.

Pratt (2009) develops, in his doctoral dissertation, a multi-sector forward-looking CGE model, which incorporates risk, to estimate the economic impact of uncertain tourism demand in Hawaii. The method involves endogenizing uncertainty through different states of the world or paths that the economy may take. The risk is that one or more of the paths may experience an external shock. This is the first attempt to incorporate elements of risk and uncertainty into a tourism-based CGE model. One feature of this model is its ability to quantify the monetary value of the risk.

Model results indicate that, where there is an asymmetric shock (50 per cent probability of benchmark growth on path 1. 50 per cent probability of a 10 per cent negative tourism demand shock on path 2), the possibility of a future tourism demand shock creates a welfare loss. The model explores how the resident household's risk aversion affects their welfare, concluding that along the paths without shock the welfare increases. The welfare gains are a result of a household's risk aversion and its substitution of resources away from the shocked path. He argues that the difference in the monetary values of the welfare on the different paths can be interpreted as the 'price' of the risk. One policy implication emerging from this study is, in this case, to design tourism tax and policies to mitigate the impact of uncertainty. Thus, the ability of policy analysts and policy makers to understand these factors is crucial.

3.5.10. Tourism immiserization

Another strand of the literature (Hazari and Kaur, 1995; Chen and Devereux, 1999; Hazari and Nowak, 2003; Gooroochurn and Blake, 2005) has focused on the conditions under which a tourism boom can be immiserising (increasing poverty). These are mainly the assumptions of monopoly power in the exporting sector, repatriation of profits by foreign companies, increasing returns to scale in non-tourism export activities, crowding-out effects, trade tax distortions, such as the existence of import subsidies or export taxes (Gooroochurn and Blake, 2005).

3.5.11. Tourism and Dutch Disease

The Dutch Disease hypothesis posits that, due to a boom in the natural resource sector, the domestic currency appreciates due to increased export sales, but this adversely affects other, non-resource exporters, making them less competitive. In a theoretical paper, Copeland examines the impact of tourist boom on de-industrialisation (Dutch Disease) in a small, open economy (Copeland, 1991). He argues that a boom in inbound tourism tends to raise the demand for, and hence the price of, non-trade goods, expanding their production at the expense of the trade sectors and, in particular, the manufacturing sector. It should be noted that in the presence of tourism, non-tradable goods and services become partially tradable. Studies by Chao et al. (2006), Nowak and Sahli (2007) and Capó et al. (2007) support Copeland's view that the main channel, through which an increase in tourism alters national welfare, is the term of trade (exchange rate) of the host country. While previous studies have focused on the impact of a tourism boom on other industries, Forsyth et al. (2014) recently studied the impact of a boom in the Australian mining industry on tourism competitiveness. Using a CGE model, the authors found that Australian tourism is affected by the country's mining boom.

3.5.12. Tourism, unemployment and migration

In recent years, there has been a growing literature interested in labour market rigidities, such as unemployment, or wage rigidities in the form of minimum wages or sector/region specific wage rigidity. These specifications are interesting in that they allow studies on the effect of tourism specialisation on the unemployment rate.

For example, Stifel and Thorbecke (2003) build a CGE model of an archetype African economy to simulate the employment, migration and poverty impact of trade reforms. Mondher and Nowak (2007) point out that tourism expansion is likely to have significant effects on the labour market of developing context. They provide a richer description of unemployment and tourism-related labour migration, which is modelled along the lines suggested by Harris and Todaro (1970). In the Harris-Todaro model, unemployment, urban-rural migration and the real wage are linked. In this formulation workers base their migration decision on their expected incomes. In their approach, the rural (informal) wage is assumed to be flexible enough to guarantee that there is no rural unemployment. In the rural region, agriculture and tourism sectors are assumed to compete for the same production factors, and due to some political and institutional considerations, the real wage rate in the urban (formal) sector is rigid, so that unemployment prevails in equilibrium.

Thus, the authors incorporate a rural-urban labour migration into the model to examine the implications of changes in tourism expenditure on the rural region. Mondher and Nowak (2007) argue that, although it is well-known that tourism-induced migration is of substantial importance for labour markets, the issue has so far not been given enough attention in the context of tourism in developing countries. Previous (non-CGE) studies have reported that tourism development stimulated the influx of labour from other regions of the country (Vorlaufer, 1979; Gormsen, 1997, and Gössling and Schulz, 2005). For example, Gormsen (1997) found that as a result of tourism infrastructure development, the number of residents in Cancún, Mexico, had increased from 426 in 1970 to 177,300 in 1990. However, Mondher and Nowak (2007) point out that one of the limitations of the aforementioned studies is that they do not apply the formal theoretical model. Households endowed with semi-skilled and skilled labour decide on how much labour to supply at the given real wage rate.

3.6. CGE applied to Kenya

There is no CGE analysis of tourism in Kenya. Previous studies have used partial equilibrium techniques to highlight a number of issues, such as employment, training and domestic tourism (Sindiga 1994, 1996a, 1996b, 1999); or policy issues (Dieke, 1991; Mayaka and Prasad, 2012); or factors influencing tourists' destination choice (Summary, 1986; Mutinda and Mayaka, 2012). Mshenga et al. (2010) study the contribution of tourism to micro and small enterprise (MSE) growth in Kenya. Tourist spending and activities were found to have a significant effect on MSE growth. The results have implications for the role of tourism in economic development, small business growth and poverty alleviation. Sinclear (1991) studies the foreign currency leakages and retention which are associated with expenditure on different types of package holidays in Kenya, and concludes that the use of the national airlines and local ground transport by tourists plays a key role in the distribution of tourism earnings and benefits. Summary (1986) estimated the tourism output multiplier in Kenya in 1976 as 1.81 and the income multiplier as 0.64.

Previous applications of CGE modelling to the Kenyan economy were not concerned with tourism. During the 1980s several authors used CGE models to study the impact of economic reforms on the distribution of income. The pioneers in this area in Kenya were Gunning (1983) and McMahon (1990). McMahon (1990) examined the effects of unilateral tariff reduction in a dual economy (Kenya) using a dynamic CGE model. In his model, tariffs are distinguished by end-use of the imports and income distribution effects are analysed extensively. The results indicate that income distribution effects are regressive as the poorer classes do not consume imported goods or use them in production. However, in the long run there will be a trickle-down effect from tariff reduction (i.e. after 9 or 10 years).

Karingi and Siriwardana (2001) used a CGE model to analyse policies under structural adjustment programmes for Kenya. They considered three scenarios: (1) fiscal adjustment through expenditure cuts, indirect tax increases and direct tax increase; (2) trade liberalisation through tariff reduction with no mitigating measures, (3) accompanied by indirect tax increases or by increased foreign aid. The results suggest that options (1) and (3) achieve the best outcomes in terms of real GDP, investment and employment. The results of the three options on income distribution indicate that nominal incomes fall due to trade liberalisation, urban households experiencing larger falls than rural ones. The government's fiscal position is worst if trade liberalisation is carried out without any support. The policy implication from these findings is that since trade liberalisation imposes costs on the economy through falls in employment in the short run, and hence reductions in nominal incomes, tariffs should be lowered gradually and, where possible, with a safety net in place.

Karingi and Siriwardana (2003) applied CGE modelling to analyse the effects of macroeconomic stabilisation and structural adjustment policies implemented by Kenya in response to two major terms of trade shocks in the 1970s, namely, the oil price shock and the coffee export boom. They found that the policies (i.e. higher import tariffs and indirect taxes) that were intended to tackle these economic imbalances led to a reduction (albeit marginally) in the positive impact of the export boom (in terms of real GDP and balance of trade) that were being experienced by the economy at the time. They argued that higher tariffs had the effect of discouraging the export producing sectors like agriculture and therefore were not the best option. Unlike import tariffs, the negative effect of indirect taxes on real GDP and other variables are slightly greater. With regard to employment and income distributional effects, they highlighted that tariff policy appears to have resulted in an improvement in employment in the manufacturing and service industries and short-run job losses in the agricultural sector. Unlike the increase in import duties, the increase in indirect taxes produced more adverse effects on sectoral production and employment. In terms of policy recommendation, they argue that the instrument used for fiscal policy needs to be chosen depending on the outcome sought in terms of employment and income distribution in addition to other macro variables.

More recently, Balistreri et al. (2009) have employed a 55 sector small open economy CGE model of the Kenyan economy to assess the impact of services liberalisation on both domestic and multinational service providers in Kenya. The model incorporates foreign direct investment in business services and productivity effects in imperfectly competitive goods and services markets endogenously, through a Dixit–Stiglitz framework. The findings indicate that reduction of the barriers against potential providers would improve the productivity of labour and capital and could provide very substantial gains to the Kenyan economy. Moreover, the results show that Kenya will gain about 9.3 per cent of the value of Kenyan consumption in the medium run (or 8.8 per cent of GDP) from a full reform package that also includes uniform tariffs. The gains increase to 12.1 per cent of consumption in the long-run steady state model.

3.7. Rationale for a tourism-focused dynamic CGE research on Kenya

The rationale for a tourism-focused CGE research on Kenya relies on several aspects. Tourism is a large and growing service sector which requires less infrastructure compared to some other industries. Most importantly, the infrastructure needed for tourism (e.g. roads, sewerage, electricity) can benefit local people, too. Tourism is generally labour intensive compared to other non-agricultural sectors and can be less environmentally damaging than other industrial sectors. Thus, tourism is an export sector with a number of advantages, which can become a vehicle for a local economic development approach and poverty reduction in developing countries.

However, although we can be sure of the potential of the promising tourism sector, there is little understanding and no consensus on the impact tourism development has on poverty in developing nations. From a developing country standpoint, it would be useful to determine if the development of tourism is causing a widening gap of income levels between urban and rural residents, between educated and uneducated peoples, between rich and poor households, etc. Moreover, it would be extremely helpful if the results of estimated income distribution patterns caused by different development policies could be compared quantitatively. The question is whether a proposed tourism development project would have any superiority in poverty alleviation over other proposed non-tourism development projects, which can be the development of manufacturing facilities. Tourism impacts should be judged on the strength and scope of their local economic links, and the opportunities they create for poor producers. The focus should be on net benefits because engaging in tourism can involve costs or negative consequences.

On the other hand, as mentioned early, I-O, SAM and other partial analyses cannot explicitly examine the link between tourism, local economic development and poverty reduction. The tourism-focused CGE model developed here will help to understand the tourism sector in Kenya in general and the potential linkages that can be created between local people and the tourism sector in Kenya, together with the potential costs and benefits associated with tourism expansion in Kenya. The advantages of CGE models for tourism policy analysis, compared with other models, are now widely admitted. Particularly valuable are the insights in distributional effects and in longer-term structural mechanisms. By disaggregating households into different groups, the model can guide us to find answers to those issues quantitatively.

3.8. Chapter summary

This chapter investigated the links between tourism, growth and poverty relief as well as the techniques used to assess the economic impact of tourism expenditures. The chapter explained why CGE models should be used to analyse the impacts of tourism in Kenya. The previous discussion suggests that there are three techniques frequently employed in economic impact analysis. It has been noted that the two commonly used methods of estimating economy-wide impacts are I-O modelling and CGE modelling. I-O models have been widely used over the past five decades or so. CBA models are partial in their approach. It has also been found that the estimated economic impacts from I-O models will usually be most generous.

This chapter has given an overview of CGE modelling and outlined its superiority over I-O modelling. A CGE model is an analytical approach which intends to model all links (for example, among the incomes of industries, households, government, importers and exporters and the pattern of demand) within the economy that represent a transaction of money and goods. A CGE is flexible to handle a broad range of policy issues. Since the late 1990s, CGE models have become increasingly popular for analysing the consequences of tourism shocks or tourism policy decisions, covering a range of different scenarios and policy possibilities. CGE approaches are feasible or practical when one is interested in indirect effects and feedback impact on other sectors subject to shock and most importantly when one is interested in tacking the distributional impact of consumer income changes and welfare gains.

It should, however, be noted that the results of a tourism CGE model will depend very much on the extent to which the supply side of the model is specified and incorporated into the system, in addition to the estimated parameter/elasticity values used to define the behavioural relationships specified in the theoretical structure of the model. This will depend on the availability of data. Therefore, a rigorous assessment should include a sensitivity analysis, providing information on how changes in the models' specification, reflecting alternate assumptions, would affect the results. Moreover, in studies in which there are uncertainties associated with the elasticity parameters, either because values assumed in the model are from external sources or are guesstimates, a sensitivity test should be undertaken on the elasticity parameters.

CHAPTER 4. STRUCTURE OF DATABASE

4.1. Introduction

Chapter 3 laid the foundation for developing a CGE model which can be used to simulate the possible impact of tourism expansion on domestic industries and institutions at the national level. This chapter briefly discusses the database developed in this research. The CGE model is numerically calibrated to the SAM. A SAM represents an economy-wide accounting of expenditures and incomes of agents for a particular year. It differs from an input-output table[38] in that households are included and all accounts are fully balanced. Thus, in a balanced SAM there is an exact correspondence between columns and rows, implying that supply equals demand for all factors and goods, tax receipts equals tax payments, there are no excess profits in production, the value of each household expenditure equals the value of factor income plus transfers, and the value of government tax revenue equals the value of transfers (Rutherford and Paltsev 1999). This chapter is organised as follows. Section 4.2 of this chapter is devoted to the 2003 SAM for Kenya. Section 4.3 explains the construction of the tourism-based SAM. This is followed by an analysis of tourism's linkages with the domestic economy (Section 4.4) and tourism and income distribution (Section 4.5). The chapter closes with a summary and some concluding remarks (Section 4.6).

4.2. 2003 Social Accounting Matrix for Kenya

It is important to have some knowledge of the structure of the database underpinning the Kenyan CGE model before understanding its theoretical structure. The CGE model is calibrated to the 2003 Kenyan Social Accounting Matrix. The base year 2003 has been chosen purely because of data availability. The year 2003 was neither a particular good nor a particular bad year for Kenya, with an inflation rate of 9.8 per cent as compared to 11.2 per cent in 1997 and 2 per cent in 2002 and a GDP growth rate of 1.8 per cent in relation to 1.1 per cent in 2000 and 1.2 per cent in

[38] An input-output table can be defined as a system of economic accounts that shows, in value terms, the supply of disposal commodities and services produced within an economy over one year.

2002. Most employment depends on agriculture, which accounts for about 24 per cent of GDP and continues to dominate the Kenyan economy. Kenya's industrial sector has grown substantially over the years and contributed about 18 per cent of GDP. The earning by tourism sector grew by 4.4 per cent from KSh[39] 21,734 million in 2002 to 22,698 million in 2003. Kenya is the second largest exporter of tea, which, together with horticultural products, contributed 50.8 per cent of total export earnings for the year 2003 (KNBS, 2005).

Some key economic indicators of Kenya for the years 2002 and 2003 are presented in Table 17. Total government expenditure as a share of GDP increased from 24.5 per cent in 2001/02 to 26.1 per cent in 2002/03, mainly due to free primary schools. Annual average inflation fell from 11.2 per cent in 1997 to 2 per cent in 2002, but rose to 9.8 per cent in 2003. As a reflection of high levels of expenditure, the government mobilizes a higher level of tax revenue to GDP than the average for sub-Sahara Africa. Revenues, like expenditure, have been declining as a percentage of GDP. The fiscal deficit has been rising after being brought under control at the end of the 1990s. This was 4 per cent of GDP in 2002/03 as compared to 2.4 per cent in 2001/02 (KNBS, 2005).

Table 17: Selected Key economic indicators (as percentage of GDP) of Kenya 2002/2003

	2002	2003
Investment	13.1	16.5
Savings	13.6	14.9
Government expenditure	24.5	26.1
Fiscal deficit	2.4	4
Domestic debt	25.2	28.4
External debt	Na	39.3
Total public debt	Na	67.7

Source: Doing Business World Bank Report (2004)

The database of the model is the Kenyan SAM for 2003, jointly developed by the Kenya Institute for Public Policy Research and Analysis and the International Food

[39] Kenyan Shilling is the official currency of Kenya. One Euro is equivalent to approximately 112 Kenyan Shillings.

Policy Research Institute (Kiringai et al., 2006). The structure of the Kenyan macrosam is presented in Tables 18 and 19. There are five main accounts in a SAM: (i) production activities (the entities that carry out production); (ii) commodities (representing markets for goods and non-factor services); (iii) factors of production; (iv) institutions (represented by households, enterprises, the government, and the rest of the world.); and (v) accumulation. Each account can be further disaggregated to reflect the socio-economic structure of the economy being studied and particular policy modelling needs. SAM flows are measured in producer prices in the activity accounts and at market prices in the commodity accounts (including indirect commodity taxes and transaction costs).

Table 18: The structure of the Kenyan Macro SAM

Receipts	Expenditures								
	Activities	Commodities	Factors	Households (HHs)	Enterprises	Government (Gvt)	Savings investment	Rest of the world	Total
Activities		Marketed output		Home consumption					Activity income
Commodities	Intermediate input	Marketing margins		Private consumption		Government consumption	Investment change in stock	Exports	Total demand
Factors	Value-added								Factor income
Households			Factor income to HHs	Surplus to HHs	Transfers to HHs			Transfers to HHs from RoW	Household income
Enterprises			Factor income to enterprises			Transfers to enterprises		Transfers to enterprises from RoW	Enterprise income
Government	Indirect taxes, factor use taxes	Sales taxes, import tariffs	Factor income to gvt	Direct HH taxes	Surplus to gvt, enterprise taxes			Transfers to gvt from RoW	Government income
Savings investment				Household savings	Enterprise savings	Government savings		Balance of payments	Savings
Rest of the world		Imports			Surplus to RoW	Government transfers to RoW			Foreign exchange outflow
Total	Activity expenditures	Total supply	Factor expenditures	Household expenditure	Enterprise expenditure	Government expenditure	Investment	Foreign exchange inflow	

Source: Adapted from Kiringai et al. (2006)

Table 19: Kenya Macro Social Accounting Matrix (Millions of 2003 Kenyan Shilling)

Receipts	Expenditures											
	Activities	Commodities	Labour	Capital	Enterprises	Households	Taxes	Government	Investment	Stocks	Rest of the World	Total
Activities		1,793,765				92,484						1,886,249
Commodities	909,674	97,623				756,000		199,034	179,109	17,444	281,116	2,440,000
Labour	430,332											430,332
Capital	546,242											546,242
Enterprises				494,960				43,575			4,938	543,473
Households			430,332	47,007	289,280			11,829			101,111	879,559
Taxes		131,721			35,809		33,613					201,143
Government				4,276	7,264			201,143			5,677	218,360
Investment					204,069		-2,539	-36,255			31,279	196,554
Stocks									17,444			17,444
Rest of the World		416,892			7,052			176				424,120
Total	1,886,248	2,440,001	430,332	546,243	543,474	848,484	31,074	419,502	196,553	17,444	424,121	

Source: Adapted from Kiringai et al. (2006)

4.2.1. Production activities, commodities and factors of production

A production activity is a domestic industry engaged in the production of a good or a service. An activity's column account describes all of its expenditures on the inputs used in its production. A commodity, on the other hand, is an economy's total supply of a good or service from domestic and imports combined (Burfisher, 2011). Sales taxes and import tariffs are paid on commodities. Activities produce goods and services by combining the factors of production (value-added comprising of the sum of wages, rents, and tax expenditures) and intermediate inputs. As illustrated in Table 20, the Kenyan microsam is disaggregated across 50 activities and commodities (22 agricultural sectors, 18 industrial sectors and 10 services). Table 20 shows industry codes used in microsam. Sectoral value-added is disaggregated by labour, capital and land (utilized only for the fifteen crop sectors). The 2003 SAM also accounts for disaggregation of labour into three skill groups (i.e., skilled, semi-skilled and unskilled). This classification is used to investigate the impacts of policy measures on "factorial" income distribution. The labour classification in the 2003 SAM was based on information on education level: (i) professional and managerial workers are classified as skilled; (ii) clerical, technical and manual workers (excluding agricultural workers) are classified as 'semi-skilled'; and the remaining occupational categories (including agricultural and elementary workers) are classified as 'unskilled'. Institutions account is divided among households, enterprises and government.

Table 20: Accounts of the 2003 microsam for Kenya

Account	Code	Description	Account	Code	Description
Agriculture sectors (activities)					
1	AMAIZ	Growing of maize	12	AFRUI	Growing of fruits
2	AWHEA	Growing of wheat	13	AVEGE	Growing of vegetables
3	ARICE	Growing of rice	14	ACUTF	Growing of cut flowers
4	ABARL	Growing of barley	15	AOCRP	Growing of other crops
5	ACOTT	Growing of cotton	16	ABEEF	Beef
6	AOGRN	Growing of other cereals	17	ADAIR	Dairy
7	ASUGR	Growing of sugarcane	18	APOUL	Poultry
8	ACOFF	Growing of coffee	19	AOLIV	Sheep, goat and lamb for slaughter
9	ATEA	Growing of tea	20	AGOAT	Other livestock
10	AROOT	Growing of roots & tubers	21	AFISH	Fishing and fish farms
11	AOILS	Growing of pulses & oil	22	AFORE	Forestry
Manufacturing sectors					
23	AMINE	Mining	32	APRNT	Wood & paper
24	AMEAT	Meat & dairy	33	APETR	Printing and publishing
25	AMILL	Grain milling	34	ACHEM	Chemicals
26	ABAKE	Sugar & bakery & confectionary	35	AMACH	Metals and machines
27	ABEVT	Beverages & tobacco	36	ANMET	Non-metallic products
28	AOMFD	Other manufactured food	37	AOMAN	Other manufactures
29	ATEXT	Petroleum	38	AWATR	Water
30	AFOOT	Textile & clothing	39	AELEC	Electricity
31	AWOOD	Leather & footwear	40	ACONS	Construction

Table 20: Accounts of the 2003 microsam for Kenya – continued

Account	Code	Description	Account	Code	Description
Services sectors					
41	ATRAD	Wholesale and retail trade	46	AHOTL	Hotels & restaurants
42	ATRANS	Transport	47	ACOMM	Communication
43	AFSRV	Finance	48	AREST	Real estate
44	OSRV	Other services	49	ADMN	Administration
45	AHEAL	Health	50	EDUC	Education
The same disaggregation as activities applies to the respective commodities accounts. Furthermore, three trade accounts are specified under commodities (accounts 51-100).					
Trade margins					
101	TRCD	Domestic transaction costs	103	TRCM	Import transaction costs
102	TRCE	Export transaction costs			
Factors of production					
104	LAB1	Skilled labour	107	CAP	Capital
105	LAB2	Semi-skilled labour	108	LND	Land
106	LAB3	Unskilled			
Households by Expenditure decile (0-9) group: 0 Low; 9 High					
109	HRUR0	Rural household (0)	119	HURB0	Urban household (0)
110	HRUR1	Rural household (1)	120	HURB1	Urban household (1)
111	HRUR2	Rural household (2)	121	HURB2	Urban household (2)
112	HRUR3	Rural household (3)	122	HURB3	Urban household (3)
113	HRUR4	Rural household (4)	123	HURB4	Urban household (4)
114	HRUR5	Rural household (5)	124	HURB5	Urban household (5)
115	HRUR6	Rural household (6)	125	HURB6	Urban household (6)
116	HRUR7	Rural household (7)	126	HURB7	Urban household (7)
117	HRUR8	Rural household (8)	127	HURB8	Urban household (8)
118	HRUR9	Rural household (9)	128	HURB9	Urban household (9)
Other institutional accounts					
129	ENT	Enterprises	130	GOV	Government
131	STAX	Sales taxes	134	S-I	Savings and investment
132	DTAX	Direst taxes	135	DSTK	Change in stocks
133	MTAX	Import tariffs	136	ROW	Rest of the world
137	DVISITOR	Domestic visitor	138	FVISITOR	Foreign visitor

4.2.2. Final demand

Final demand for commodities consists of household consumption spending (C), government consumption (G), investment demand (I), export demand (X) plus a tourism (T) component to capture tourists' demand. The difference between final demand and supply is the intermediate input requirement, which is defined as the product of the I-O matrix (A) and domestic gross product (Y). The gross supply is the sum of (Y) and imports (M). In equilibrium, the relationship is given as follows:

$$Y + M = AY + C + G + I + X + T$$

which can be rearranged to give $Y = (I' - A)^{-1}[C + G + I + T + X - M]$

where I' is the identity matrix.

4.2.3. Households

An important feature of the 2003 SAM is the disaggregation of households into twenty different types, based on their location (urban or rural) and their expenditure decile (10 deciles for both rural and urban households). These estimates are very useful for calibrating models having to do with monitoring poverty and income distribution. These are important measures in the development of low-income countries. There is a need to know whether the expansion of a given industry is likely to advance or retard the broader development goal of poverty alleviation, and through which mechanisms. The present research pays explicit attention to the complexity of the micro-macro interrelationships by investigating the impact of changes in tourism spending on factor incomes and household income distribution. Households consume both marketed commodities and their own produced commodities, whose price formation is not affected by taxes and transaction (trade and transportation) costs or trade margins. As owners of the production factors, households receive the incomes earned by factors during the production process. They also receive transfer payments from the government, the enterprises and from the rest of the world.

4.2.4. Government

The government sector comprises all institutions mainly financed and controlled by the government. Public expenditures consist of the goods and services purchased to maintain the government function. The government is disaggregated into a core government account and three different tax collection accounts, from which the government generates revenue.

4.2.5. Taxes

Tax accounts are separated into direct taxes, sales taxes and tariffs. The Kenyan SAM does not provide any data about labour taxes (includes social insurance, social security and unemployment insurance). Direct tax includes household (income tax) and corporate taxes. Tax on capital includes corporation income tax and property tax. Sales taxes (which represent 55 per cent of total taxes) are levies on marketed commodities, while tariffs (10 per cent of total) are applied to the price of imported goods. The income tax system in Kenya is based on the commonly used PAYE (Pay As You Earn) system. The income tax rates for 2003 are given in Table 21 below, and we can see that, as in most income tax systems, they are progressive. Total income tax amounts to KSh 33,613 million and this represents 15 per cent of total government revenue and 17 per cent of total tax revenue. This shows the relatively low importance of income tax in the government budget, as is the case in most developing countries.

As shown in Table 21 and Table 22, tax revenue is the main source of the income of the government (92 per cent). Education (41 per cent) and administration (43 per cent) expenditures, such as salaries to civil servants or expenditures on equipment account for the largest shares of government expenditures.

Table 21: Households tax rates (per cent)

Household types	Tax rates (per cent)	Household types	Tax rates (per cent)
Rural household (decile 0)	0.02	Urban household (decile 0)	0.00
Rural household (decile 1)	0.14	Urban household (decile 1)	0.00
Rural household (decile 2)	0.63	Urban household (decile 2)	0.01
Rural household (decile 3)	0.65	Urban household (decile 3)	0.02
Rural household (decile 4)	0.81	Urban household (decile 4)	0.11
Rural household (decile 5)	1.55	Urban household (decile 5)	0.88
Rural household (decile 6)	2.03	Urban household (decile 6)	3.01
Rural household (decile 7)	2.53	Urban household (decile 7)	5.43
Rural household (decile 8)	3.18	Urban household (decile 8)	18.93
Rural household (decile 9)	5.42	Urban household (decile 9)	54.63

Source: Author's estimates from the 2003 Kenya SAM

Table 22: Government tax revenues

	Value (millions of KSh)	Income share (per cent)
Tariffs	20,783	10.33
Indirect taxes	110,938	55.15
Direct taxes	69,422	34.51
of which		
- income tax	33,613	48.42
- corporate tax	35,809	51.58
Total	201,143	100.00

Source: Author's estimates from the 2003 Kenya SAM

Investment demand includes both private and public capital formation. It consists of gross domestic fixed formation plus changes in inventories and the respective proportions are 92 per cent and 8 per cent. A large share of total investment (78 per cent) represents investment in construction works, whereas the rest is from machinery and other manufactures, which are mostly imported. With regard to exports, the Kenyan microsam distinguishes the following major sources of export: tea (18 per cent); transport (14 per cent); cut flowers (8 per cent); printing and publishing (6.4 per cent) and metals and machines (6 per cent). Other significant exports products are coffee, pulses & oil seeds, vegetables, mining, meat & dairy, beverages & tobacco, leather & footwear, chemicals and other manufactures.

4.2.6. Trade margins

The SAM explicitly contains transaction costs for domestic and international trade flows. For each commodity, the SAM incorporates trade margins that are associated with domestic supply, import, and exports. For domestic trade flows, the trade margins represent the transport cost and insurance which are incurred when commodities are moved overland from the producer to the domestic consumer. For imports, they represent the freight charges which are incurred when commodities are shipped by sea, air, or overland from the border to the domestic market, while for export they show the cost of moving the commodity from the producer to the border. These costs raise the price of imports relative to the price received by the exporters. The importer's margin-inclusive price is called the cif price, whereas the exporter's margin exclusive-price is called the fob price. The difference between the fob and cif values of imports is the trade margin (Burfisher, 2011).

Moreover, trade margins for domestic supply are of great importance, as they are used to capture the extreme differences between producer and consumer prices due to high transportation and trade costs in an economy with poor infrastructure and long transit distances. For example, in 2003, Kenya spent KSh 8.5 billion on margin services to move agricultural products worth KSh 223.9 billion. It spent a total of KSh 5 billion on trade margin charges on its total exports.

4.2.7. Enterprise

The enterprises earn gross profits on account of capital (reflecting their ownership of capital) and also receive transfers from government and other institutions. Their incomes are used for corporate taxes, enterprise savings, and transfers to households, government and other institutions.

4.3. Structure of the Kenyan economy in 2003

A structure table is used to provide an overview of the Kenyan economy, using detailed information available in the 2003 SAM. The table uses the microeconomics data in the SAM to describe the economy in terms of shares. The data from shares can be used to make quick comparisons and identify the most important features of the economy (Burfisher, 2011). Table 23 highlights a structure table for Kenya in 2003.

Table 23: Structure table for Kenya in 2003

	Industry GDP KSh million	Industry shares in GDP	Factor shares in industry factor costs			Industry shares in factor employment		
			Land	Labour	Capital	Land	Labour	Capital
Agriculture	234,183	21	20	54	25	100	29	12
Manufacturing	333,894	30	0	34	66	0	17	28
Services	540,218	49	0	44	56	0	54	60
Total	1,108,295	100	na	na	na	100	100	100

Source: 2003 Kenyan SAM

GDP for a specific industry is equal to factor payments by that industry plus taxes on factor use, output, sales, and trade of that industry. Using agriculture as an example, it can be seen from Table 23 that the GDP for Kenyan agriculture amounted to KSh 234,183 million in 2003. The relative size of an industry in total GDP (i.e. the share of an industry in total GDP) is among its most important economic characteristics. The greater its size relative to other industries, the greater is the impact of a shock in that industry on the rest of the economy (Burfisher, 2011, p.61). Given the large size of services (49 per cent) in the Kenyan economy, a policy shock, such as the reduction of taxes on services, would have significant effects on the Kenyan economy.

Factor cost shares describe which factors are most important in an industry's total factor costs. An industry's factor costs include the wages and rents that it pays directly to each factor plus factor use taxes. For example, the factor cost share for labour employed in the Kenyan manufacturing industry accounts for 34 per cent of total factor costs in Kenyan manufacturing. Factor cost shares in an industry matter when there are shocks that change the relative price or the productivity of a factor. Industry shares in factor employment describe where an economy's labour, capital and land endowments are employed. For example, most Kenyan capital is employed in services (60 per cent) and only 12 per cent is employed in agriculture. A knowledge of industry shares in factor employment is useful, because the larger an industry's employment share, the larger is the impact on the economy-wide wage and rent when there is a change in the production and factor demand (Burfisher, 2011, p. 62). For instance, with 54 per cent of Kenyan labour employed in the service sector, a decline in the production of services would be likely to have a larger effect on national employment and wages than would a decline of similar proportion in manufacturing output.

Table 24 presents industry shares in factor employment according to the type of labour. Semi-skilled labour accounts for 47.6 per cent of total labour employed in Kenya, with the highest share employed in agriculture. Almost 90 per cent of all unskilled labour is employed in the service sector.

Table 24: Industry shares in factor employment by type of labour

	Skilled labour	Semi-skilled labour	Unskilled labour	Total industry share in labour employment
Agriculture	8.7	20.2	0.2	29.0
Manufacturing	2.0	12.0	3.0	17.0
Services	11.0	15.4	27.7	54.0
Sum	21.7	47.6	30.9	100.0

Source: 2003 Kenyan SAM

Table 25 presents the share of commodities in domestic demand and in trade.

Table 25: Commodity shares in domestic demand and trade

	Commodity shares in domestic demand				Commodity shares in trade			
	Intermediate demand	Private household consumption	Government consumption	Investment demand	Exports	Imports	Import share of domestic consumption	Export share of domestic production
Agriculture	22	15	5	2	26	6	6	33
Manufacturing	37	45	1	17	30	75	34	13
Services	41	40	94	81	44	19	6	4
Total	100	100	100	100	100	100	17	12

Source: 2003 Kenyan SAM

As can be seen from Table 25, consumption patterns differ among agents. For example, manufactured commodities account for 45 per cent of all household spending, 17 per cent of spending by investors. Expenditures on agriculture and services account for 15 per cent in total household spending, while the corresponding share in investor purchases is 2 per cent. As a result of the difference in consumption patterns, the same shock is likely to affect each agent in different ways (Burfisher, 2011, p.63). For example, if the same sales tax is levied on agriculture, the impact on households will be proportionally greater than the impact on investors, because households consume more agriculture than investors, as a share of their spending.

Commodity shares in the value of total exports and total imports describe the commodity consumption of trade. Manufactured accounts for most of Kenyan imports of goods and services (75 per cent), while services account for most of its exports (44 per cent).

The share of imports in the total value of total consumption of a commodity by agents determines the strength of the linkage between events in world markets and domestic consumers. Using Kenyan manufacturing from the 2003 Kenyan SAM, it can be seen that imports constitute a large part of aggregate Kenyan demand for manufacture. In other words, the import share in domestic consumption is found to account for 34 per cent of the manufactured commodity.

Similar to the case of imports, the share of exports in the total value of production of a good determines the strength of the linkage between world markets and domestic producers. Kenya farmers export 33 per cent of their output. Because exports represent a very large share of the Kenyan production, Kenyan farmers are likely be significantly affected by policies/shocks that adversely affect foreign demand.

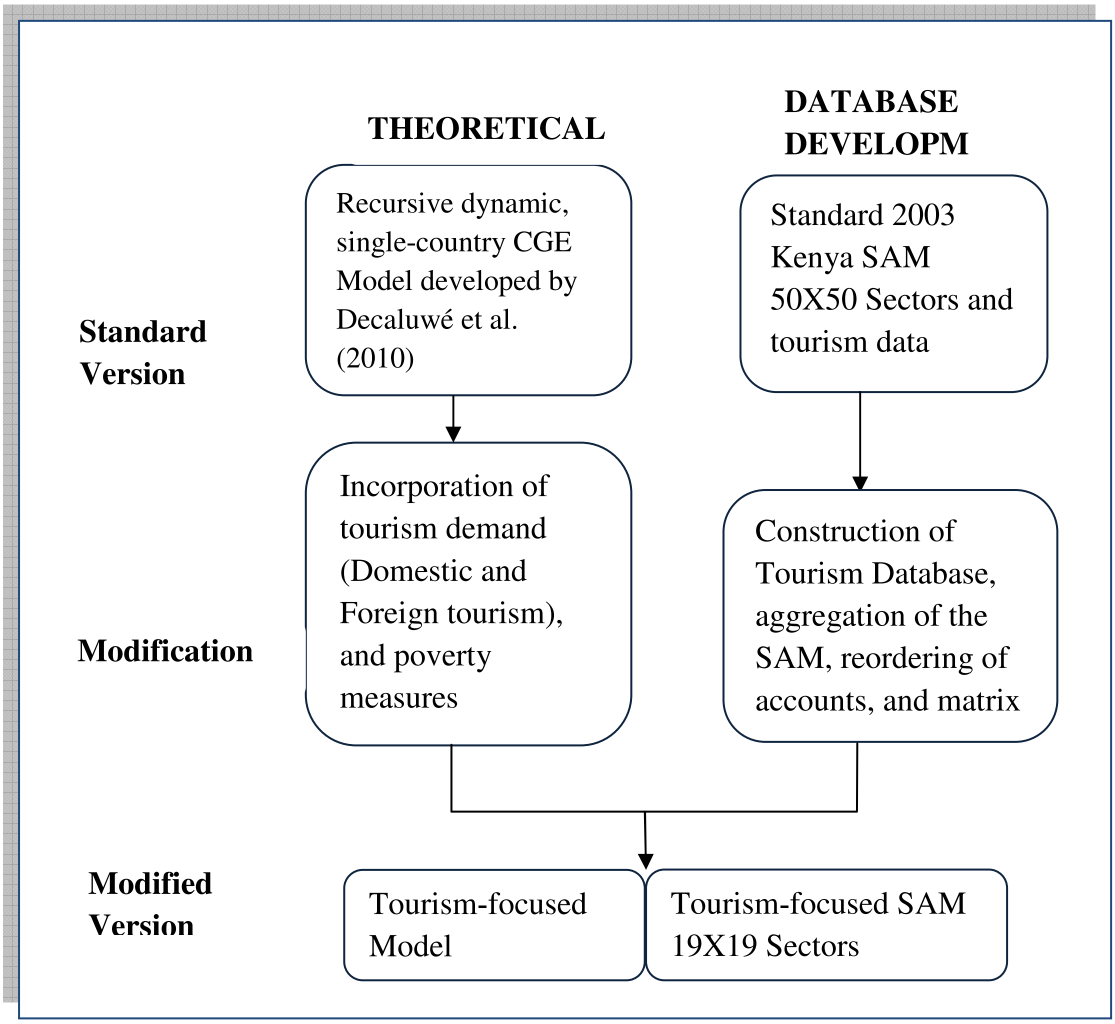
4.4. Construction of a Kenyan tourism-based SAM

In this section, we describe the construction of a tourism-SAM for Kenya for 2003. The transformation of the original data to fit the objectives of the research is systematically analysed. An overriding feature of a SAM is that it can be easily extended to include other flows in the economy. This is done simply by adding more columns and rows, once the standard national account flows have been set up

(Dwyer et al., 2010). This section describes the incorporation of tourism in the standard Kenyan SAM. The Kenyan SAM includes neither tourism sectors nor air transport activities, two features that are essential in tourism policy research. Therefore, as shown in Figure 26, a major modification of the standard SAM is made, namely the incorporation of two tourism sectors. In fact, it should be noted that, unlike most economic sectors, such as agriculture, tourism is a sector that is not well defined and whose activities are, in most countries, included under other sectors in the national accounts. Moreover, with regard to tourism, the defining element is not the type of commodity produced, as is the case in many other industries, but the type of consumer. Therefore, tourism is not treated in the standard national accounts as a homogenous production sector and is best seen statistically as a “demand” side activity. The demand-side approach of tourism can clearly be seen in the definition provided by the United Nations World Tourism Organisation:

> “Tourism is a social, cultural and economic phenomenon which entails the movement of people to countries or places outside their usual environment for personal or business/professional purposes. These people are called visitors (which may be either tourists or excursionists; residents or non-residents) and tourism has to do with their activities, some of which imply tourism expenditure.”

Figure 26: Development Process of the Kenyan Tourism-based dynamic CGE model (own illustration)



In order to analyse in detail all the aspects of demand for products associated with the activity of visitors, some countries have developed or are developing Tourism Satellite Accounts (TSA). These are extensions to the conventional national accounting framework and represent internationally recognized and standardized methods of assessing the scale and impact of tourism spending and its links across different sectors. Furthermore, since they are compiled using a combination of visitor expenditure data, industry data, as well as supply and use relationships in the system of national accounts supply, they are useful in understanding the size and role of tourism. Since there is not yet a TSA for Kenya, an alternative is to develop a tourism-focused SAM. The main advantage of using a SAM approach is that SAM is useful in calibrating a range of economic models, such as CGE models.

In its standard form, SAM cannot adequately describe the expenditure patterns of travellers. The tourism-focused SAM is a considerably modified version of the standard SAM developed for our specific purpose. We modify the core SAM by explicitly incorporating two types of tourism demand. It should be noted that the new accounts have been created simply by separating and relabeling some elements of the old accounts. Because of this, the real structure of SAM is not altered. The tourism expenditure in the new SAM was extracted from the full range of activities, where it was attributed and aggregated into new tourism categories.

Moreover, no detailed consumption pattern of tourists in Kenya is available. In order to estimate total tourism expenditure, tourism data from different sources including, among others, the Kenya Tourism Board to the World Bank (2010) were collected. The data were used to construct tourism consumption vectors for the domestic and foreign tourism sector within the CGE setting. The expenditure categories in the World Bank survey are quite aggregated and they are illustrated in Table 26 below.

Table 26: Tourists expenditures in Kenya (US$/per person/per bed night), 2007

Expenditure Categories	Wildlife Safari		Premium Wildlife Safari		Beach (All Inclusive)	
	$/day	per cent of total	$/day	per cent of total	$/day	per cent of total
Accommodation	33,35	18,1	168,3	46,6	36,85	20,3
Food/beverage	36,65	19,9	83,44	23,1	18,81	10,4
Excursions and park fees	40,71	22,1	22,98	6,4	5	2,8
Inland transport	50,36	27,4	51,62	14,3	13,35	7,4
Out-of-pocket expenditure	16	8,7	35	9,7	41,43	22,9
Miscellaneous	6,84	3,70	0,00	0,00	65,83	36,30
Total expenditure/bed night	183,91	100	361,35	100	181,27	100
Average length of stay (nights)	3		7		7-9	

Source: World Bank (2010)

The expenditure of tourists given in Table 26 represents those incurred while they were actually in Kenya. However, there is also some expenditure that they have incurred prior to coming to Kenya, such as the cost of round-trip airfare and commission payments to foreign tour operators. According to World Bank (2010) studies, the total in-country expenditure of, for example, a beach package in Kenya represents 51.7 per cent of total expenditure; a significant part of which (36.7 per cent) constitute taxes and other charges levied on tourism products.

Besides being much aggregated, the expenditure categories do not compare exactly with the I-O table of the sectors classification and consequently, some amendment is needed. "Accommodation", "inland transport" and "Excursions and park fees" are quite straightforward and are allocated to the Hotel and Restaurants, the Transport & and Communication and the other services sector, respectively. "Food and beverage", "Out-of-pocket expenditure" and "Miscellaneous" are quite problematic. The latter is so because it is undefined. "Food and beverages" can actually remain in hotels & restaurants, in other manufacturing or in wholesale and retail trade. Part of "Out-of-pocket expenditure" will go to the wholesale and retail trade sector, but the rest can go to any of the other sectors. "Food and beverage" is thus allocated to wholesale & retail trade and other manufacturing.

Different commodities were apportioned across households (for domestic tourism) and exports depending (upon foreign tourism), following closely the approach of TSAs, which distinguish between tourism-related activities (e.g. hotel and accommodation) and those that are not. The choice of the two tourism sub-types has been dictated by data availability and the relative significance of domestic tourism in Kenya. Additionally, this approach was chosen to reflect differences in the pattern of expenditure between the two categories in the model. For example, foreign tourists devote a larger share (62 per cent) of their consumption to tourism-related commodities as compared to domestic tourists (52 per cent).

The breakdown of tourism spending into different categories and the corresponding amounts are given Table 27.

Table 27: Database structure of the Kenyan CGE model

	Industry J1 J2 J3 … Jn	Final demands Dtour	Ftour	HH	INV	GOV	EXP	Total supply
C1	C_{11}	HH_{1T}	F_{1T}	HH_{1NT}			F_{1NT}	**TS_1**
C2	C_{21} C_{22} ………………………… C_{2n}	HH_{2T}	F_{2T}	HH_{2NT}			F_{2NT}	**TS_2**
	. . . .	. . . .	. . . .	. . . .			. . . .	. . . .
Cn	C_{n1}	HH_{nT}	F_{nT}	HH_{nNT}			F_{nNT}	**TS_n**
Dtour		0	0	Tot_Dtour			0	**Tot_Dtour**
FTour		0	0	0			Tot_FTour	**Tot_FTour**
	T1: Other institutions							
	Value added							
	P1: Compensation of employees (COE)	0	0		(Not available)			**COE**
	P2: Gross operating surplus & mixed income	0	0		(Not available)			**GOS**
	P3: Net taxes on products (PTAX)							**PTAX**
	P4: Net taxes on production (CTAX)	0	0		(Not available)			**CTAX**
	P6: Imports (M)							**M**
	T2: Kenyan production							
Total	**TC1 .. TC3 …………………TCn**	**Tot_Dtour**	**Tot_FTour**	**HHC**	**I**	**G**	**E**	

Note: T = tourism; NT = non-tourism; HHC= household consumption; I = investment; G = government; E = export; Tot Dtour = total domestic tourism; Tot Ftour = total foreign tourism; C = commodities; GOS = Gross operating surplus.

Source: Pham et al. (2013).

These spending categories were attributed to various sectors in the 2003 SAM table, according to the proportions of consumer expenditure reflected in SAM. This approach is in line with the concept of the tourism which is defined as a multifaceted industry that affects several sectors in the economy. In the standard database, tourism consumption data are embedded in the final demand components, namely the household and the export demand. Tourists are viewed as purchasing and consuming a range of composite products designed to meet their needs. Since the focus is on tourism, the 22 agricultural accounts were aggregated into one account, whereas the 18 industrial sectors were aggregated into 7 accounts. All the 10 main services available in the I-O table were included. Thus, the tourism-focused SAM (see Table 28) developed for this research contains 19 accounts.

The construction of the tourism database underwent a four-step procedure:

- Collection of data on foreign and domestic tourism expenditure;
- Mapping of tourism expenditure data with 50 sectors of the core database;
- Extracting the domestic tourism expenditure (from household consumption) and foreign tourism expenditure (from exports);
- Merging the two databases.

All in all, the tourism-SAM, thus in place, can be applied to estimate the economic impact of changes in tourism demand to a country or the effects of policies and regulations which affect tourism activity directly or indirectly.

As shown in Table 28, two commodities are identified as closely related to tourism: Hotel and Restaurant and Transport. Their ratio, measured as the proportion of total tourism demand out of the total, is given in the last column of Table 28. It is further assumed that the demand by tourists for non-characteristic commodities accounts for 2 per cent of the total consumption of commodities. These calculations are based on statistics provided by the World Travel and Tourism Council and the Kenya National Bureau of Statistics[40], which estimates tourism revenues at 4.1 per cent of GDP at market prices for the year 2003 (See Figure 28).

[40] http://www.tourism.go.ke/ministry.nsf/doc/Facts

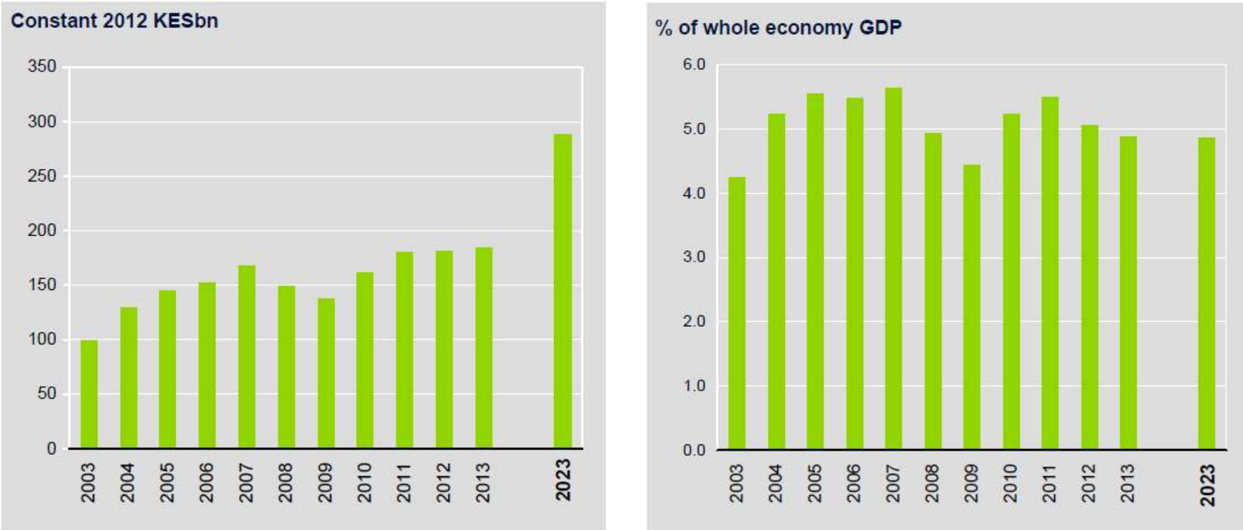
Table 28: Allocation of gross commodity sales by tourism types (Millions of KSh)

	Tourism			Economy	
	Foreign	Domestic	Total	Total	Per Cent Tourism
Characteristic commodities	34,821.0	23,104.0	57,925.0	254,126.0	23.0
Hotels & restaurants	11,000.0	1,191.0	12,191.0	35,857.0	36.0
Transport	23,821.0	21,913.0	45,734.0	218,269.0	21.0
Non-characteristic commodities	21,764.0	21,253.0	43,017.0	2,185,873.0	2.0
Agriculture	132.0	2,236.0	2,363.0	451,500.0	0.5
Manufactured food	1,206.0	13,842.0	15,048.0	153,591.0	9.8
Textile & clothing	26.0	85.0	111.0	41,560.0	0.3
Printing and publishing	0.0	0.0	0.0	205,788.0	0.0
Metals and machines	0.0	0.0	0.0	114,387.0	0.0
Chemicals	0.0	0.0	0.0	136,185	0.0
Other manufactures	1,202.0	1,219.0	2,421.0	154,606.0	1.6
Public utilities	0.0	0.0	0.0	34,407.0	0.0
Construction	0.0	0.0	0.0	164,160.0	0.0
Trade	7,473.0	0.0	7,473.0	138,392.0	0.5
Communication	0.0	0.0	0.0	49,813	0.0
Finance	0.0	0.0	0.0	104,273.0	0.0
Real estate	96.0	584	680	74,480.0	0.9
Other services	10,000	3,287	13,287.0	138,408.0	9.6
Administration	0.0	0.0	0.0	93,289.0	0.0
Health	151.0	0.0	151	30,179.0	0.5
Education	1,504.0	0.0	1,504.0	100,855.0	1.5
TOTAL TOURISM	113,196.0 (56 per cent)	88,714,0 (44 per cent)	201,905		
TOTAL ECONOMY				2,879,998	4.1

Source: Author's estimates from the 2003 Kenya SAM, World Bank data and data from Ministry of Tourism - Kenya

According to WTTC (2013) domestic travel spending generated 45.6 per cent of direct travel and tourism GDP in 2012 compared with 54.4 per cent for visitor exports (i.e. foreign visitor spending or international tourism receipts). We allocated 56.05 per cent of spending to foreign spending and 44.95 per cent to domestic travel spending. Other services in Table 28 may consist of tour agency and operation services, sport and recreational services, support activities to transportation by road, sea and air, etc. According to WTTC's estimates in Figure 27, the direct size of the tourism sector was KSh100bn in 2003.

Figure 27: Direct contribution of travel and tourism to the Kenyan GDP



Source: WTTC (2013)

4.5. Linkages between tourism and the local economy

How integrated is the tourism sector with other sectors in Kenya? Whether or not tourism expansion can work as a factor in growth and in poverty reduction depends on the range of linkages between tourism and the local economy. As with any other economic activity, the contribution of tourism to development and poverty reduction critically depends on the nature and interactions of tourism-related activities, involving both suppliers and consumers in the provision of services and commodities that tourists desire (Ashley et al., 2005). Consequently, strong backward and forward linkages are often highlighted as having the potential to enhance the local benefits of tourism.

To analyse the sectoral interdependencies in the Kenyan economy, we compute the multiplier product matrix (MPM), which we obtain from the SAM multiplier matrix. The MPM identifies the first order change in the sum of all cells of the inverse matrix caused by changes in the technical coefficients (Parra and Wodom, 2009). The theoretical starting point is the linkage concept, developed by Hirschman (1958) and Rasmussen (1957). There are two kinds of linkages: backward linkages and forward linkages. Backward linkages measure the relative importance of the tourism sector, as a purchaser, to all other sectors in the economy, whereas forward linkages measure the relative importance of the tourism sector, as a supplier, to all other sectors in the economy. If the backward linkage of sector 'i' is greater than one (100 per cent in per cent age terms), a unit change in the final demand of that sector will generate an increase above the average in the global activity of the economy. If the forward linkage of sector 'i' is greater than one, a unit change in all the sectors of the final demand will generate an increment above the average of that sector. A *key sector* is defined as one with both backward and forward linkages greater than one.

In fact, as mentioned above, total demand in each of the i-th sectors of the SAM is the sum of intermediate input demand, household consumption demand and other exogenous sources of demand. By dividing the intermediate transactions matrix by the total input, we define the matrix of endogenous accounts coefficients A_n, which represents the average expenditure propensities of the endogenous accounts. If x is the exogenous components of demand, I the identity matrix and y_n the vector of endogenous income, the equation of the unconstrained multiplier formula can be expressed as follows[41]:

$$y_n = A_n y_n + x = (I - A_n)^{-1} x = M_a x \quad . \tag{1}$$

The matrix M_a is called the accounting matrix because it estimates the total direct and indirect effect of exogenous injections on the endogenous accounts of the SAM.
Let M_{i*} and M_{*j} denote the sum of the i-th row and the j-th column of the inverse matrix, respectively, then

$$MPM = \frac{1}{v}\left|M_{i*} \cdot M_{*j}\right| \quad , \tag{3}$$

where $v = \sum_i \sum_j M_{ij}$.

Then the Hirschman-Rasmussen backward linkage index of sector i is given by

$$BL_i = \frac{n \cdot M_{*i}}{v} \quad , \tag{4}$$

and the forward linkage index is given by *i*

[41] Please refer to Pyatt and Round (1979), Stone (1985), Lewis and Thorbecke (1992) and Breisinger et al. (2010) for details on the derivation of various SAM multipliers.

$$FL_i = \frac{n \cdot M_{i*}}{v} \quad . \qquad (5)$$

In order to capture tourism's linkages with the local economy, only service industries are considered, whereby the numbers in brackets represent the ranks for backward and forward linkage coefficients. Table 29 presents a classification of service industries, according to the size of their values added, backward and forward linkages and relative position.[42]

Table 29: Features of the service industries from the 2003 Kenya Social Accounting Matrix

	Value added (sum of factor incomes)	Labour earnings (percentage of factor incomes)	Capital earnings (percentage of total earnings)	Capital/ labour ratio	Backward linkages (Rank)	Forward linkages (Rank)	Relative position (*)
Water	90	36	54	1.52	1.067	0.651	0.2165
Electricity	65	18	47	2.61	0.916	0.644	0.2948
Construction	32	6	26	4.28	0.787	0.394	2.4397
Trade	46	13	33	2.43	1.021	0.964	2.0449
Hotels and restaurants	32	18	14	0.76	1.198 (15)	0.899 (13)	0.4588
Transport	41	20	20	1.00	1.124 (19)	2.881 (2)	2.4491
Communication	61	23	39	1.69	1.079	1.126	0.7403
Finance	69	18	51	2.85	1.087	1.718	1.4281
Real estate	84	36	48	1.33	1.123	1.393	0.9968
Other services	68	28	40	1.40	1.025	3.389	2.0569
Public administration	53	11	42	3.72	0.932	0.356	1.3864
Health	70	68	2	0.03	1.175	0.605	0.4485
Education	74	52	22	0.43	1.173	0.677	1.4988

(*): The relative position matrix indicates the share of aggregate income going to each single account of the SAM.

Source: Author's estimates based on 2003 Kenyan SAM using SimSIP SAM (developed by Parra and Wodom, 2009)

Value-added is defined as the sum of factor incomes (labour and capital) and value added taxes. Returns to labour (18 per cent) and capital (14 per cent), makes up 32

[42] The model is calibrated to the 2003 Kenyan SAM, the most recent database available for Kenya. The database was developed by Kiringa et al. (2006).

per cent of the value added of the hotel and restaurant industry. The ratio of capital to labour for the hotel and restaurant industry, in terms of earnings, is equal to 0.76, indicating that the industry is relatively labour intensive. According to the 2003 Kenya SAM, hotels and restaurants, a sector catering directly to tourists, is not a key sector. The hotel and restaurant sector has a weak forward linkage coefficient (0.895) with the local economy and a medium-level backward linkage (1.198). In other words, a growth of the Kenyan economy as a whole by 1 per cent will lead to an increase in the activities of hotels and restaurants by 0.895 per cent. Similarly, a 1 per cent increase in the final demand of hotels and restaurants will generate an increase in the global activity of the Kenyan economy of 1.198 per cent. This implies that the hotel and restaurant sector has a relatively strong backward linkage with the local economy. The hotel and restaurant sector ranks 15th in backward linkages and 13th in forward linkages. In general, service industries have medium-level backward linkages.

This finding is slightly different from Blake (2008), who found that hotels and restaurants is a key sector with higher backward linkages (1.277) and a forward linkage coefficient of 0.995. This slight deviation may be attributed to data reorganisation required before conducting the analysis. The relative position in the last column indicates the share of aggregate income going to each sector. For example, the hotel and restaurant industry receives 0.4588 per cent of the aggregate income in the economy.

4.6. Tourism and income distribution in Kenya

An important feature of the 2003 SAM is the disaggregation of households into twenty different types, based on their location (urban or rural) and their income decile (10 deciles for both rural and urban households). By disaggregating households into different groups, the model appears as a useful tool for investigating the economic benefit of tourism and for guiding policy-makers in designing strategies for inclusive growth. The income distribution and multiplier effects are shown in Table 30 below.

Table 30: Income distribution and multiplier effects in Kenya, 2003, percentages

Rural					Urban				
	Aggregate income	Hotels and restaurants	Transport	Agricultural exports		Aggregate income	Hotels and restaurants	Transport	Agricultural exports
hrur0	1.0945	0.0143	0.3072	1.6519	hurb0	0.0005	0.0000	0.0000	0.0001
hrur1	1.7319	0.1095	0.0409	1.9321	hurb1	0.0182	0.0046	0.0068	0.0036
hrur2	2.3923	0.2514	0.1196	1.9692	hurb2	0.0579	0.0035	0.0119	0.0440
hrur3	2.7567	0.0792	0.0942	2.0942	hurb3	0.0420	0.0229	0.0013	0.0365
hrur4	3.2940	0.4208	0.3046	2.4973	hurb4	0.1897	0.0481	0.0377	0.1423
hrur5	4.0181	0.3370	0.4111	2.7392	hurb5	1.1801	0.0269	0.0360	0.0319
hrur6	4.5338	0.3784	0.4569	2.7940	hurb6	3.3476	0.3622	0.2527	0.5938
hrur7	5.2634	0.3995	0.5623	2.2995	hurb7	4.7058	0.4697	0.3463	0.2491
hrur8	6.3145	0.4047	0.6375	3.0366	hurb8	10.1187	1.1529	1.4881	0.8850
hrur9	8.8521	1.1269	1.1191	3.1546	hurb9	40.0882	2.2475	4.1862	3.2793

Source: Author's estimates based on 2003 Kenyan SAM using SimSIP SAM
hrur = rural household; hurb = urban household; 0-9 refers to the expenditures deciles.

The second column of Table 30 presents the share of aggregate income going to each household category. For example, rural households at the bottom decile (hrur0) receive 1.0945 per cent (row 3, column 1) of the aggregate income, whereas 40.0882 per cent of income goes to urban households at the highest decile (hurb9) (row 12, column 7). A comparison of income between subgroups shows that, although urban households make up 20 per cent of the total household population (2003), they earn 60 per cent of the country's income.

Columns 2 to 5 (rural households) and columns 7 to 10 (urban households) of Table 30 show the size of the redistribution between the sectors and the households. Then, for the policy analysis, it is useful to identify the interactions between the sectors and each household category in terms of redistribution. For example, a 1 per cent increase in the demand for hotels and restaurants would yield an income multiplier effect of 0.4208 per cent (row 7, column 3) and 0.0481 per cent (row 7, column 8) for hrur4 and hurb4, respectively.

The same interpretation can be used for transport and agriculture. It can be seen from column 5 of Table 30 that agricultural exports provide substantially higher returns to poor rural households than tourism activities (hotels and restaurants and transport). The urban poor, on the other hand, are less involved in both tourism activities and agricultural exports. For example, a 1 per cent increase in the demand for agricultural exports would yield an income multiplier effect of 1.6519 per cent (row 3, column 5) and 0.0001 per cent (row 3, column 10) for rural household at lowest expenditure decile (hrur0) and its urban counterpart (hurb0), respectively. The low values of income for urban households at the lower decile reflect the fact that few urban households fall into the bottom end of the national income distribution. Therefore, when estimating the impact of tourism and non-service exports on the poor, the lower income households in rural areas are the key.

According to the Kenyan SAM 2003, the highest total consumption expenditure shares in rural areas are found in agricultural products (32 per cent), followed by transport (12.8 per cent). The richest rural household spends more on services than on agricultural and manufactured goods. The urban households spend a large percentage of their budget on services, such as transport (17.7 per cent) and restaurants (11.9 per cent). The poorest urban deciles, on the other hand, spend 51 per cent of their consumption expenditure on food.

Kenya also has one of the world's highest rates of population growth below the age of 25 at 2.6 per cent (on average per annum), with approximately three quarters of the population living in rural areas. Using poverty indicators in 2003 as a baseline estimate, this research investigates the impact of sustained tourism growth on poverty since 2003.

4.7. Chapter summary

This chapter has provided a detailed description of the SAM for Kenya for the year 2003. The 2003 Kenya SAM consists of 50 sectors, 20 household groups, 3 types of labour and two types of capital. This SAM has been aggregated into 19 sectors. Further, two types of tourism demand have been incorporated into the standard SAM. Households are classified according to expenditure deciles, whereas labour is divided into unskilled, semi-skilled and skilled categories. The SAM also distinguishes between three types of taxes. Another important feature of this chapter is its description of the steps involved in the incorporation of tourism categories with the appropriate allocation of consumption of domestically produced goods.

The compilation of the SAM requires extensive data searching and manipulation to reconcile conflicting objectives like balancing the rows and the columns. I-O/SAM remains at the heart of CGE modelling, which is deterministic by structure. The concept of the SAM goes further than just an improvement of the statistical representation of the national account statistics. By disaggregating households into twenty groups, SAM can guide a researcher to quantify the distributional effects of tourism expansion. The next chapter describes the CGE model for Kenya, and it can be seen that the structure of the model is very similar to the SAM described in this chapter.

The chapter has estimated the effects of tourist expenditure on the economy using an economic model that identifies and quantifies the linkages between the different sectors of the local economy. Results have shown that some tourism-related sectors form key sectors of the Kenyan economy.

CHAPTER 5. THEORETICAL STRUCTURE OF THE MODEL

5.1. Introduction

With the Kenyan economic backdrop outlined in the previous chapter, the following section discusses the specification of the Kenyan CGE model developed to analyse the economic impact of changes in tourist expenditures. The model allows for detailed analysis of economic and social policy options, such as income policy and anti-poverty programs and other economy-wide effects. The model is neo-classical in structure. Its main features involve profit maximisation by producers, utility maximisation by households, and competitive markets. It is a dynamic, single-country CGE model, extended to incorporate domestic and foreign tourism as well as welfare and poverty analysis. The model follows the SAM disaggregation of factors, activities, commodities and institutions described in the previous chapter. The model is developed to assist the planners and policy-makers of the country to evaluate the trade-off of various policies in terms of economic benefits and costs. It can identify changes in the sectoral composition of output, changes in relative prices and their consequences as well as distributional issues. The chapter begins by explaining the specification of model equations (Section 5.2), thereby explicitly specifying the modelling of tourism demand, labour market and welfare. Following this, Section 5.3 presents the three alternative types of model closure and explains how the model is closed. Section 5.4 provides an overview of the model calibration as well as the estimation of free parameters (i.e. elasticities) used in the simulation. Section 5.5 briefly outlines the measurements of poverty, thereby introducing micro- simulation models and explaining the links between CGE and micro-simulation models. The chapter concludes with a chapter summary (Section 5.6).

5.2. Specification of model equations

The model draws upon the contributions to recursive dynamic CGE models and poverty analysis within CGE models by Dervis et al. (1982), Robinson et al. (1999), Decaluwé et al. (1999a, 1999b and 2010), Cockburn (2001) and Savard (2003), on the one hand; and, on the other hand, the contributions to tourism-based dynamic

CGE model by Blake (2008, 2009). The model involves specification of a CGE model in terms of non-linear algebraic equations and addressing them directly with numerical solution techniques. It also includes equations on intra group income distributions, whereby poverty is endogenously determined. The equations of this model are presented in the following order: production and factor demand, foreign trade, demand for goods and services as well as tourism demand, income and savings of households and other institutions, price equations, equilibrium conditions and dynamic equations. The basic structure of the production of the domestic and composite commodities, domestic supply and demand is laid out in Figure 28 (more on the figure).

The algebraic specification of the model begins with the supply equations that define the underlying production system of the model.

Figure 28: Production of the domestic and composite commodities, domestic supply and demand

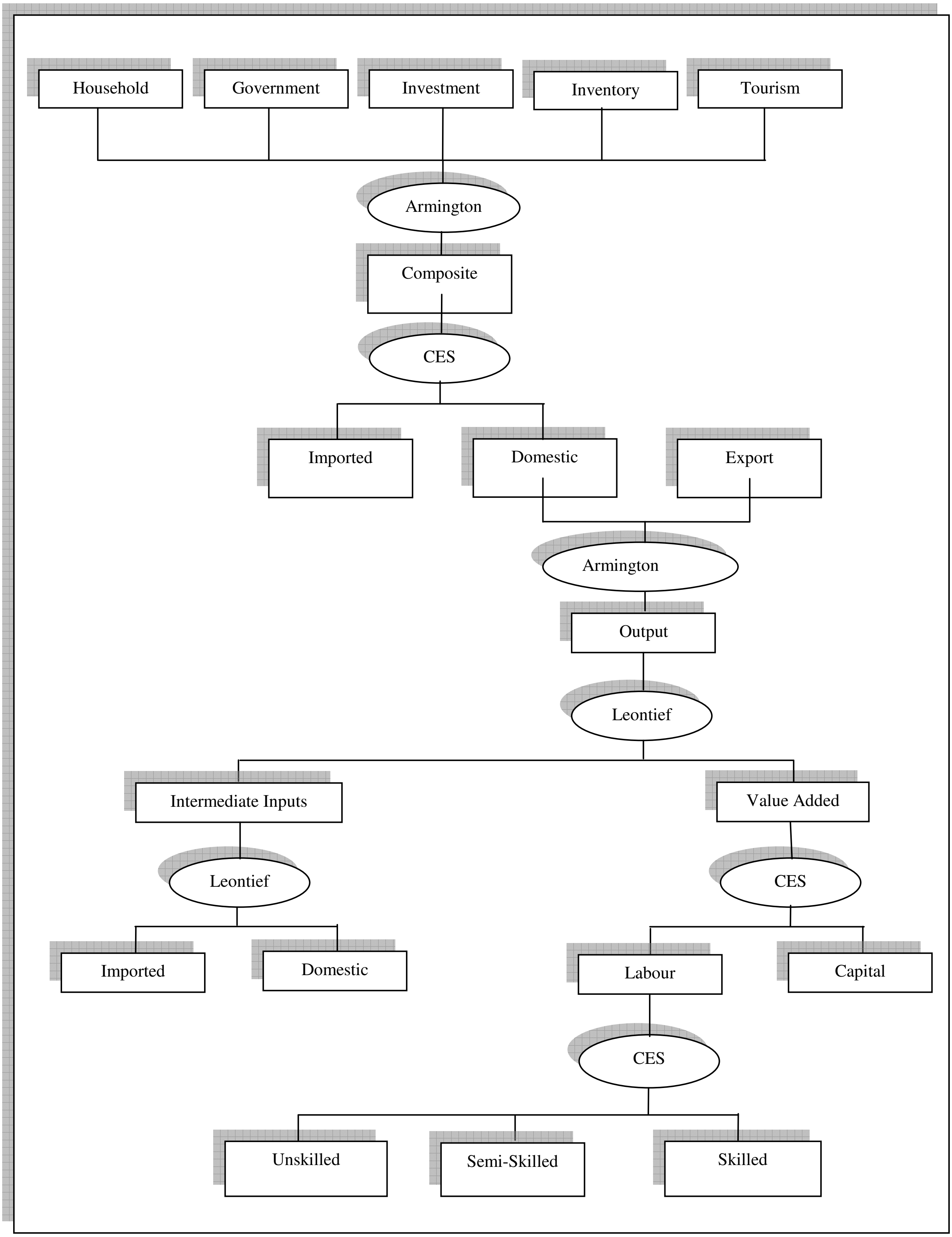


Table 31 summarises the notation principles. Endogenous variables are those determined within the model, whereas exogenous variables can be considered external to the model. Upper-case Latin letters are used to refer to endogenous variables, unless they have a bar on top, in which case they refer to exogenous variables. Lower-case Latin and Greek letters are used for parameters and indices.

Table 31: Notational principles

Items	Notation
Endogenous variables	Upper-case Latin letters without a bar
Exogenous variables	Upper-case Latin letters with a bar
Parameters	Lower-case Latin letters or lower-case Greek letters
Set indices	Lower-case Latin letters as subscripts to variables and parameters

The basic sets used in this model include the following:

Indices

$a \in A$ activities

{ agriculture and other primary industries, food and beverages, chemincals, textiles and clothing, printing and publishing, metals and machines, other manufactures, water and electricity, construction, trade, hotels and restaurants, transport, communication, finance, real estate, other services, public administration, health, education}

$c \in C$ *commodities {same industries as in activities, each activity produces only one commodity}*

$x \in X(\subset C)$ exported commodities

{ agriculture and other primary industries, food and beverages, chemicals, textiles and clothing, printing and publishing, metals and machines, other manufactures, hotels and restaurants, transport, communication, real estate, other services}

$m \in M(\subset C)$ imported commodities

{ agriculture and other primary industries, food and beverages, chemicals, textiles and clothing, printing and publishing, metals and machines, other manufactures, transport, finance, real estate }

$k \in K$ capital categories

{capital, land}

$l \in L$ labour categories

{skilled labour, semi-skilled, unskilled labour}

$i \in I$ institutions *{10 rural households by expenditure decile (0-9), 10 urban households by expenditure decile (0-9), firm, government, rest of the world}*

$j \in J$ tourism categories

{domestic tourism, foreign tourism}

$h \in H(\subset I)$ households

{10 rural households by expenditure decile (0-9), 10 urban households by expenditure decile (0-9)}

$f \in F$ firm

$t \in T$ time

5.2.1. Production

Production is assumed to be competitive, and technology is specified by constant returns to scale. Consequently, producers are assumed to maximize profits subject to their technology constraints, thereby taking the prices of output, input and factors as given. The production technology is described in a multi-level nesting structure. Goods are produced according to a nested Leontief-Constant Elasticity of Substitution (CES) technology.[43] CES functions are specified to represent substitution among primary factors of production in each sector – capital, land and labour. The choice of behavioural functions has been guided by several

[43] Introduced by Arrow et al. (1961), the CES function allows for non-unitary, but constant, price elasticticies and non-nil, but constant, substitution elasticities. It can be used to model commodities that are either substitutes for one another, or complements for one another.

considerations: (i) the characteristics of the sectors and products under study and consequently the values of the related elasticities; and (ii) the restrictions of general equilibrium theory, according to which the function chosen must be non-negative, continuous and homogenous of degree zero in the prices and, furthermore, Walras' law must be fulfilled.

Production equations

Output of each activity a (Leontief)

$$XAT_{a,t} = f(VAD_{a,t}, IRD_{a,t}) = \min\left[\frac{VA_{a,t}}{v_a}, \frac{IRD_{a,t}}{ivc_a}\right] \qquad (EQ1)$$

CES between of composite labour and capital

$$VA_{a,t} = B_a^{VA}\left[\delta_a^{VA} LDC_{a,t}^{-\rho_a^{VA}} + \left(1-\delta_a^{VA}\right) KDC_{a,t}^{-\rho_a^{VA}}\right]^{-\left(1/\rho_a^{VA}\right)} \qquad (EQ2)$$

Intermediate consumption of commodity c by activity a (Leontief)

$$IRM_{c,a,t} = ica_{c,a} IRD_{a,t} \qquad (EQ3)$$

CES between labour categories

$$LDC_{a,t} = B_a^{LD}\left[\sum_l \delta_{l,a}^{LD} LD_{l,a,t}^{-\rho_a^{LD}}\right]^{-\left(\frac{1}{\rho_a^{LD}}\right)} \qquad (EQ4)$$

Demand for type l labour by activity a (CES)

$$LD_{l,a,t} = B_a^{LD}\left[\frac{\delta_{l,a}^{LD} WC_{a,t}}{WTI_{l,a,t}}\right]\left(B_a^{LD}\right)^{\sigma_a^{LD}-1} LDC_{a,t} \qquad (EQ5)$$

CES between capital categories

$$KDC_{a,t} = B_a^{KD}\left[\sum_k \delta_{k,a}^{KD} KD_{k,a,t}^{-\rho_a^{KD}}\right]^{-\left(\frac{1}{\rho_a^{KD}}\right)} \qquad (EQ6)$$

Demand for type k capital by activity a (CES)

$$KD_{k,a,t} = B_a^{KD}\left[\frac{\delta_{l,a}^{KD} RC_{a,t}}{RTI_{k,a,t}}\right]\left(B_a^{KD}\right)^{\sigma_a^{KD}-1} KDC_{a,t} \qquad (EQ7)$$

where

B_a^{KD} Scale parameter (CES - composite capital)

B_a^{LD}	Scale parameter (CES - composite labour)
B_a^{VA}	Scale parameter (CES - value added)
$\delta_{k,a}^{KD}$	Share parameter (CES - composite capital)
$\delta_{l,a}^{LD}$	Share parameter (CES - composite labour)
δ_a^{VA}	Share parameter (CES - value added)
ivc_a	Input volume necessary to produce one unit of good
$ica_{c,a}$	Input-output coefficient
ρ_a^{KD}	Elasticity parameter (CES - composite capital)
ρ_a^{LD}	Elasticity parameter (CES - composite labour)
ρ_a^{VA}	Elasticity parameter (CES - value added)
σ_a^{KD}	Elasticity (CES - composite capital)
σ_a^{LD}	Elasticity (CES - composite labour)
σ_a^{VA}	Elasticity (CES - value added)
$IRD_{a,t}$	Total intermediate consumption of activity a
$IRM_{c,a,t}$	Intermediate consumption of commodity c by activity a
$KD_{k,a,t}$	Demand for type k capital by activity a
$KDC_{a,t}$	Activity a demand for composite capital
$LD_{l,a,t}$	Demand for type l labour by activity a
$LDC_{a,t}$	Activity a demand for composite labour
$RC_{a,t}$	Rental rate of activity a composite capital
$RTI_{k,a,t}$	Rental rate paid by activity a for type k capital including capital taxes
v_a	Coefficient (Leontief - value added)
$VA_{a,t}$	Value added by activity a
$WC_{l,t}$	Wage rate of activity a composite labour
$WTI_{l,a,t}$	Wage rate paid by activity a for type l labour including payroll taxes
$XAT_{a,t}$	Total aggregate output of activity a

At the top level of the nest (Equation 1), the output of each activity (a) is a combination of aggregate value-added and aggregate intermediate in fixed shares according to a Leontief function. In other words, aggregate intermediates and aggregate primary inputs are characterized as strict complements.

In the second stage, value-added is generated through the combination of composite capital and composite labour, following a CES specification (Equation 2). Profit maximisation by the producers requires that capital and labour be employed up to the point where the value marginal product of each is equal to its price. In other words, the optimal combinations of each factor are determined by first order conditions based on relative factor prices. Thus, the producers want to choose the level of $LDC_{a,t}$ and $KDC_{a,t}$ so as to minimize

$$RC_{a,t}KDC_{a,t} + WC_{a,t}LDC_{a,t} \text{ subject to Equation (2).}$$

Also, in the second stage, but on the intermediate consumption side, aggregate intermediate consumption is made up of various goods and services. Equation 3 states that for each activity, the demand for aggregated intermediate inputs is determined as the quantity (level) of activity times a fixed quantity of input necessary to produce that activity. Intermediate inputs are provided by the domestic market.

At the bottom level of the value added, the three different set of labour skills: skilled, semi-skilled and unskilled labour, indexed $l \in L = \{L_1, ..., L_l\}$, are combined according to a CES function (Equation 4). The optimal mix between the different types of labour for each activity is influenced by the elasticity of substitution, initial shares and especially relative prices, subject to the CES technology (Equation 5). Likewise, composite capital is a CES combination of different types of capital, indexed $k \in K = \{L_1, ..., K_k\}$ (Equation 6). As in the case of labour, the different categories of capital are considered to be imperfect substitutes. Equation 7 defines the demand for each type of capital which is based on cost minimisation to satisfy the aggregate capital requirement in the sector.

5.2.2. International trade

In this section, trade relationships are modelled using the Armington assumption that goods are differentiated by country of origin. Domestically produced commodities and imports are thus imperfect substitutes for each other.

5.2.2.1. Export

Aggregate domestic output is allocated between domestic and export markets. This is done under the assumption that suppliers maximize sales revenue for any given aggregate output level, subject to imperfect transformability between exports and domestic sales, expressed by a constant elasticity of transformation (CET) function. Differentiation between exports and domestically consumed goods may arise because of differences in quality. Producers' supply behaviour is represented by nested CET functions.

International trade equations

CET between different commodities produced by activity a

$$XAT_{a,t} = B_a^{AT}\left[\sum_c \delta_{a,c}^{AT} XA_{a,c,t}^{\rho_{(a)}^{AT}}\right]^{\frac{1}{\rho_a^{AT}}} \qquad (EQ7)$$

Activity a production of commodity c (CET)

$$XA_{a,c,t} = \frac{XAT_{a,t}}{B_a^{AT}}\left[\frac{P_{a,c,t}}{\delta_{a,c}^{AT} PT_{a,t}}\right]^{\sigma_a^{AT}} \qquad (EQ8)$$

CET between exports and local good

$$XA_{a,x,t} = B_{a,x}^{X}\left[\delta_{a,x}^{X} EX_{a,x,t}^{\rho_{a,x}^{X}} + \left(1-\delta_{a,x}^{X}\right)DS_{a,x,t}^{\rho_{a,x}^{\prime X}}\right]^{\frac{1}{\rho_{a,x}^{X}}} \qquad (EQ9)$$

Relative supply of exports and local goods (CET)

$$EX_{a,x,t} = \left[\frac{1-\delta_{a,x}^{X}}{\delta_{a,x}^{X}}\frac{PE_{x,t}}{PL_{x,t}}\right]^{\sigma_{a,x}^{X}} DS_{a,x,t} \qquad (EQ10)$$

Equivalence between XA and DS for goods only sold locally

$$XA_{a,nx,t} = DS_{a,nx,t} \qquad a \in A, nx \in C \not\subset X, t \in T \qquad (EQ11)$$

World demand for exports of product x

$$EXD_{x,t} = \left(\overline{EXD}_x + \overline{CFTOU}_x\right)pop_t\left[\frac{e_t PWX_{x,t}}{PE_{x,t}^{FOB}}\right]^{\sigma_x^{XD}} \qquad (EQ12)$$

CES between imports and local production

$$Q_{m,t} = B_m^{M}\left[\delta_m^{M} IM_{m,t}^{-\rho_m^{M}} + \left(1-\delta_m^{M}\right)DD_{m,t}^{-\rho_m^{M}}\right]^{-\left(\frac{1}{\rho_m^{M}}\right)} \qquad (EQ13)$$

Equivalence between Q and D for non-importable

$$Q_{nm,t} = DD_{nm,t} \qquad nm \in C \not\subset M, t \in T \qquad (EQ14)$$

Demand for imports (CES)

$$IM_{m,t} = \left(\frac{PD_{m,t}}{PM_{m,t}} \frac{\left(1-\delta_m^M\right)}{\delta_m^M} \right)^{\sigma_m^M} DD_{m,t} \qquad (EQ15)$$

where

B_m^M	Scale parameter (CES - composite commodity)
$B_{a,x}^X$	Scale parameter (CET - exports and local sales)
B_a^{AT}	Scale parameter (CET - total output)
δ_m^M	Share parameter (CES - composite commodity)
$\delta_{a,x}^X$	Share parameter (CET - exports and local sales)
$\delta_{a,c}^{AT}$	Share parameter (CET - total output)
$\overline{FVtou}$	Volume of foreign visitors
pop_t	Population index
ρ_m^M	Elasticity parameter (CES - composite good)
$\rho_{a,x}^X$	Elasticity parameter (CET - exports and local sales)
ρ_a^{AT}	Elasticity parameter (CET - total output)
σ_m^M	Elasticity (CES - composite good)
$\sigma_{a,x}^X$	Elasticity (CET - exports and local sales)
σ_a^{AT}	Elasticity (CET - total output)
σ_x^{XD}	Price elasticity of the world demand for exports of product x
$DD_{m,t}$	Domestic demand for commodity m produced abroad
$\overline{CFtou_{c,t}}$	Consumption of foreign tourism by sector
e_t	Exchange rate (price of foreign currency in local currency)
$EX_{a,x,t}$	Quantity of product x exported by activity a
$EXD_{x,t}$	World demand for exports of product x
$IM_{m,t}$	Quantity of product m imported
$P_{a,c,t}$	Basic price of activity a's production of commodity c
$PD_{m,t}$	Price of imported product m sold on the domestic market
$PE_{x,t}$	Price received for exported commodity x (excluding export taxes)
$PE_{x,t}^{FOB}$	FOB price of exported commodity x (in local currency)
$PL_{x,t}$	
$PM_{m,t}$	Price of imported product m (including all taxes and tariffs)

$PT_{a,t}$	Basic price of activity a's output
$PWX_{x,t}$	World price of exported product x (expressed in foreign currency)
$Q_{m,t}$	Quantity demanded of importable composite commodity
$XA_{a,c,t}$	Activity a production of commodity c

Note: the $\rho - values$ take on a value between -1 and ∞ ; the $\sigma - values$ take on a value between 0 and ∞ ; v_a , ivc_a , $ica_{c,a}$, δ_a , take on values between 0 and 1, $B_a \succ 0$.

Equation 7 describes how producers, on the upper level, combine inputs to produce total aggregate output by means of a CET function that describes how easily the product-mix can be adjusted in response to price changes. The first order conditions for revenue maximisation define the individual product supply functions in relation the relative prices of activities (Equation 8).

On the lower level, the supply of each product is distributed between the domestic market and exports as specified in Equation (9). The optimal allocation of domestic output between domestic and export markets is derived from the first order condition of the supplier's optimisation problem. Solving this problem by ways of CET functions yields Equation (10). Thus, Equation (10) defines the optimal mix between domestic sales and exports, which depends on relative prices $\left(\frac{PE_{x,t}}{PL_{x,t}}\right)$. It is apparent from the equation that an increase in the export-domestic price ratio generates an increase in the export-domestic supply ratio (that is, a shift toward the destination that offers the higher return). Equation 11 is defined over a set of domestically produced commodities that do not have exports. It allocates the entire output volume to the domestic market.

In this model, the country is assumed to be a price-taker on all export and import markets. This suggests that the country is small in world markets, facing a perfectly elastic demand for its imports and exports and can import or export an unlimited quantity of a product at constant world prices. However, selected export commodities can be deemed to face downward sloping export functions. Moreover, it is assumed that producers of tourism-related products have some market power. For instance, a

Wildlife safari tour in Kenya is likely to be unique and therefore may face relatively inelastic demand. The inclusion of the export demand Equation (12) accommodates this feature, which states that a local producer can increase its share of the world market by offering a price PE_x^{FOB} that is advantageous relative to the world (exogenous) price PWX_x. Thus, Equation (12) defines the world export demand function for sectors in which the economy is assumed to have some market power. The ease with which the country's share of the world market can be increased depends on the price-elasticity of export demand, i.e. the degree of substitutability of the proposed product to competing products. Equation (12) allows for the simulation of an exogenous variation in the world demand for the product through a change in the variables $\overline{EXD}_x$ and $\overline{CFTOU}_x$, which are assumed to grow each period at the same rate as population index.

5.2.2.2. Import

We assume that the institutions in the economy consume a composite good, made up of domestic goods and imports. It is assumed that imports and domestic goods in the same sector are imperfect substitutes, an approach called Armington assumption. The composite good is given by CES aggregation function of imports and domestic goods (in line with the Armington assumption) controlled by the share parameter δ_m^M, the substitution parameter ρ_m^M and the efficiency parameter B_m^M (Equation 13). In this CES function the composite commodity that is supplied domestically is produced by domestic and imported commodities entering this function as inputs.

The Armington function is replaced by Equation (14) for the set of commodities with no competition from imports. Thus, the demand for the composite commodity is the demand for the domestically produced good. The optimal mix between domestic outputs and imports is obtained as derived demands by minimizing the cost of obtaining the composite commodity (Equation 15). The first order conditions determine the optimum ratios of imports to domestic demand in relation to the relative prices of imported and domestically supply commodities.

5.2.3. Demand

The demand for goods and services, whether domestically produced or imported, consists of household consumption demand, investment demand, demand by government, tourist consumption demand and demand as transport or trade margins.

Households consume both marketed commodities and their own produced commodities whose price formation is not affected by taxes and transaction (trade and transportation) costs or marketing margins. For many farmers in Kenya, especially the poorest in rural areas, home production and home consumption represents represent a major component of their incomes and expenditures. Those farmers produce primarily for own consumption, with small and irregular surpluses being made available on the markets. Therefore, the mechanisms that determine the prices of commodities they buy on the market are different from the prices of the home consumed commodities (Kiringai et al., 2006).

Demand equations

Home consumption (non-marketable) of activity a by type of h households

$$PP_{a,t}C1_{a,h,t} = \theta_{a,h}CTH_{h,t} \qquad (EQ16)$$

Consumption of commodity c by type h households

$$PC_{c,t}C_{c,h,t} = PC_{c,t}C^{\min}_{c,h,t} + \beta^{LES}_{c,h}\left(CTH_{h,t} - \sum_{ca} PC_{c,t}C^{\min}_{ca,h,t}\right) \qquad (EQ17)$$

Gross fixed capital formation

$$GFCF_t = IT_t - \sum_{c} PC_{c,t}VSTK_{c,t} \qquad (EQ18)$$

Final demand of commodity c for private investment purposes

$$PC_{c,t}INV^{pri}_{c,t} = \gamma^{invpri}_{t}IT^{pri}_{t} \qquad (EQ19)$$

Final demand of commodity c for public investment purposes

$$PC_{c,t}INV^{pub}_{c,t} = \gamma^{invpub}_{t}IT^{pub}_{t} \qquad (EQ20)$$

Total final demand of commodity c for investment purposes

$$INV_{c,t} = INV^{pri}_{c,t} + INV_{c,t} \qquad (EQ21)$$

Public final consumption of commodity c

$$PC_{c,t}CG_{c,t} = \gamma^{gvt}_{t}G_{t} \qquad (EQ22)$$

Total intermediate demand for commodity c

$$IRT_{c,t} = \sum_a IRM_{c,a,t} \qquad (EQ23)$$

Demand for commodity c as a trade or transport margin

$$MRGN_{c,t} = \sum_x EXD_{x,t} tmrg^x_{c,x} + \sum_m IM_{m,t} tmrg_{c,m} + \sum_{ca} DD_{ca,t} tmrg_{c,ca} \qquad (EQ24)$$

where

$\beta^{LES}_{c,h}$	marginal share of commodity c in type h household consumption budget (show how consumers allocate their discretionary expenditures)
γ^{GVT}_c	share of commodity c in total current public expenditures on goods and services
γ^{INVPRI}_c	share of commodity c in total private investment expenditures
γ^{INVPUB}_c	share of commodity c in total public investment expenditures
$\theta_{a,h}$	share of household consumption spending on activity a
$tmrg_{c,ac}$	rate of margin c applied to commodity ac
$tmrg_{c,x}$	rate of margin c applied to exported commodity x
$C1_{a,h,t}$	home consumption of activity a by h households at time t
$C_{c,h,t}$	consumption of commodity c by type h households at time t
$CG_{c,t}$	public final consumption of commodity c
$C^{\min}_{c,h,t}$	minimum consumption of commodity c by type h households
$CTH_{h,t}$	consumption budget of type h households
$GFCF_t$	gross fixed capital formation
$INV_{c,t}$	total final demand of commodity c for investment purposes
$IRM_{c,a,t}$	intermediate consumption of commodity c by activity a
$IRT_{c,t}$	total intermediate demand for commodity c
IT_t	total investment expenditures
IT^{PRI}_t	total private investment expenditures
IT^{PUB}_t	total public investment expenditures
$MRGN_{a,t}$	demand for commodity c as a trade or transport margin

$PC_{c,t}$	purchaser price of composite commodity c (including all taxes and margins)
$PP_{a,t}$	activity a unit cost including taxes directly related to the use of capital and labour but excluding other taxes production
$VSTK_{c,t}$	inventory change of commodity i

We use the Cobb-Douglas utility function[44] for the value of household consumption of non-marketed commodities (Equation 16). Households are assumed to choose the consumption of different marketed commodities according to a linear expenditure system (Equation 17) of demand functions derived from maximisation of a Stone-Geary utility function subject to the budget constraint. The linear expenditure system (LES) is the most frequently used system in CGE models. The advantage in choosing this functional form is that it is not bound up with income elasticities of one pair or with cross-price elasticities between all pairs of goods of zero.[45] What is most important is that the minimum and discretionary consumptions are distinguishable, making it particularly appropriate for welfare analyses.

Furthermore, as Equation (17) shows, a household-specific minimum consumption level is postulated which represents the quantity of each commodity that the different household groups must consume to maintain a certain minimum standard of living. Discretionary income (also known as supernumerary or residual income) spent on each respective commodity $\left(CTH_{h,t} - \sum_{c} PC_{c,t} C_{c,h,t}^{\min}\right)$ is determined endogenously as the difference between total household consumption and minimum consumption.

Domestic investment consists of gross fixed capital formation (GFCF) and changes in inventories. Inventory changes are determined exogenously and GFCF

[44] For this type of function form, price and income elasticities, as well as the elasticity of substitution between each pair of goods, are equal to one, whereas the cross price elasticity is nil.

[45] However, in the LES, demand equations are assumed to be linear in all prices and incomes. In other words, its additive nature allows little flexibility in the price coefficients and assumes that all goods are net substitutes. Further, the LES does not allow for inferior goods (Annabi et al., 2006).

endogenously, where total investment expenditure is determined by the savings-investment equilibrium constraint (Equation 100). Equation (18) defines GFCF expenditures, which are obtained by subtracting the cost of change in inventories from total investment expenditure. The quantity demanded of each commodity for investment purposes (Equation 21) is defined as the sum of the quantity demanded for private investment (Equation 19) and for public investment (Equation 20)[46]. Both private and public investment demand by sector of origin is a fixed share of total investment. Furthermore, the quantity demanded of each commodity for investment purposes is inversely related to its purchase price ($PC_{c,t}$). The same logic applies to government current expenditures on commodities (Equation 22).

Total intermediate demand for a given commodity aggregates the input requirements for that commodity by the various sectors of the economy (Equation 23).

Finally, some services, such as transport, are used to distribute commodities to buyers. Therefore, transport margins are applied to the value of domestic production, imports and exports to capture the quantities of these margin services (Equation 24). Thus, trade inputs is the sum of the demands for these inputs that are generated by imports (from moving commodities from the borders to domestic demanders), exports (from moving commodities from domestic producers to the border), and domestic market sales (from moving commodities from domestic producers to domestic demanders).

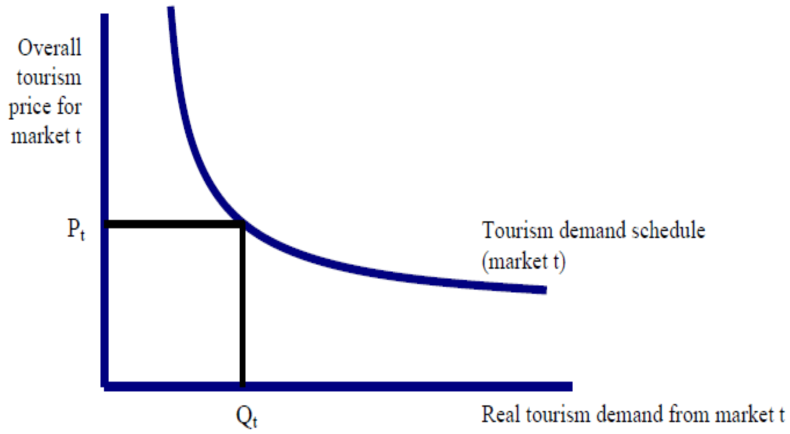
5.2.4. Modelling the demand for tourism

It is assumed that Kenya faces a downward sloping demand curve for its tourism. The standard theory suggests that tourism demand and price have an inverse relationship. Figure 29 shows the relationship between aggregate tourism demand and prices. Hence, aggregate tourism demand in each market varies according to the price of the product. If, for instance, the price of tour services in a tourism market falls, this will not only lead to tourists consuming more tour services as a share of

[46] Note that $\gamma_c^{INVPRI} + \gamma_c^{INVPUB} = 1$.

their total expenditure, but it will also lead to a fall in the aggregate price that the tourist faces. This fall in price will cause an increase in the quantity demanded of tourism along the demand curve in Figure 29.

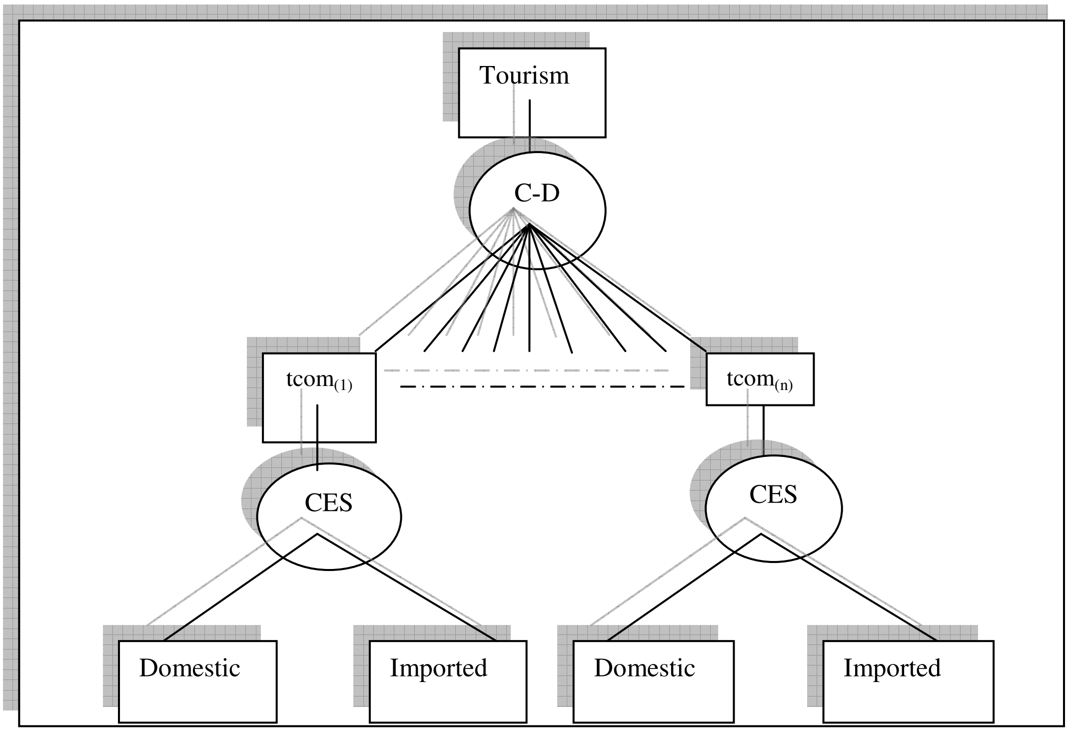
Figure 29: Overall tourism demand by market



Source: Blake, Sinclair and Sugiyarto (2003)

It seems apparent that an increase in aggregate demand will lead to an increase in the demand of each commodity through the structure given in Figure 30. The degree to which these changes will affect each individual tourism market will depend on the demand shares for different markets. For example, a tourism market, where a large share of expenditure is spent on tour services would be affected more by these changes than tourism markets where tour services expenditure share is lower (Dwyer et al. 2010).

Figure 30: Basic Structure of Tourism Consumption



From the modelling point of view, two categories of tourism demand (domestic tourism demand and foreign tourism demand) were considered, assuming that there are differences in their expenditure structure. Hence, the assumption is that there are two categories of tourism demand accounting for the consumption of a certain quantity of a composite good and service at an aggregated tourism price level, $(PTOU_t)$. Analogous to household demand, tourism demand is obtained by maximizing the utility function of the individual tourist function to its budget constraint. Following Blake et al. (2008), the demand for domestic tourism can be formulated as specified in Equation 25.

Tourism demand equations

Demand for domestic tourism

$$CDD_t = \chi \cdot \overline{CDD_t} \cdot \left(\frac{PTOU_t}{PIXCON_t} \right)^{\varsigma_d} \qquad (EQ25)$$

Demand for foreign tourism

$$CDF_t = \chi \cdot \overline{CDF_t} \cdot \left(\frac{PTOU_t}{e_t} \right)^{\varsigma_F} \qquad (EQ26)$$

Aggregate tourism consumption by foreign and domestic tourism

$$CTOU_{j,t} = \omega_j \prod_c TCOM_{c,j,t}^{\varepsilon_{c,j}} \qquad (EQ27)$$

Foreign tourism consumption and domestic tourism consumption by activity

$$TCOM_{c,j,t} PC_{c,t} = \varepsilon_c CTOU_{j,t} \cdot PTOU_t \qquad (EQ28)$$

where

$CTOU_{(i,t)}$ aggregate tourism consumption by *i.* category of tourism

ω shift parameter that is calibrated to ensure the model replicates the benchmark

$\varepsilon_{(c,i)}$ share of commodity com in tourism consumption and

$PTOU_{(t)}$ average price paid by tourists

$TCOM_{(c,i,t)}$ tourism consumption by sector.

$\overline{CDD_t}$ is a parameter equal to the base level of domestic tourism consumption, except where tourism demand shocks are introduced into the modelling system by means of changing this parameter. The price elasticity of demand for domestic tourism is captured by the parameter (ς_d) with $(\varsigma_d \succ 1)$, while (χ) is a shift parameter $(\chi = 1)$ in the base year. Domestic tourists are concerned with how the composite price changes relative to the consumer price index $(PIXCON_t)$.

With regard to foreign tourists, they are concerned with how their composite price changes relative to a real exchange rate. Thus, foreign tourism demand is modelled similar to export demand and is assumed to be inversely related to the price of foreign exchange in the domestic market (equation 26). The utility of the two categories of tourist is a Cobb-Douglas function, determining how they substitute between commodities as defined in Equation 27.

Following Blake et al. (2008), consumption by activity can be specified as in Equation 28.

Thus, the total value of total tourist expenditure of each tourism category $\left(CTOU_{j,t} \cdot PTOU_t\right)$ must equal the total expenditure of each tourism category of on different commodities $\left(TCOM_{c,j,t} \cdot PC_{c,t}\right)$.

5.2.5. Income and savings

After describing the supply and demand side, the income flows have to be specified. This section describes the main features and equations of the income and savings for each category of institution in the domestic economy: households, enterprises and the government.

5.2.5.1. Households

Households aim to sell all their endowed factors to the producers to earn income. More specifically, the receipts of households are composed of returns to labour, capital and land, as well as transfers from government and enterprises. Equation 29 captures the flow of income from value added, government transfer payments that is distributed to households as well as remittances from abroad.

Household's income equations

Total income of type h households

$$YH_{h,t} = YHL_{h,t} + YHK_{h,t} + YHTR_{h,t} \qquad (EQ29)$$

Labour income of type h households

$$YHL_{h,t} = \sum_{l} \lambda_{h,l}^{WL} \left(w_{l,t} \sum_{a} LD_{l,a,t} \right) \qquad (EQ30)$$

Capital income of type h households

$$YHK_{h,t} = \sum_{k} \lambda_{h,k}^{RK} \left(\sum_{a} RTI_{k,a,t} KD_{k,a,t} \right) \qquad (EQ31)$$

Transfer income of type h households

$$YHTR_{h,t} = \sum_{i} TR_{h,i,t} \qquad (EQ32)$$

Disposable income of type h households

$$YDH_{h,t} = YH_{h,t} - TDH_{h,t} - TR_{i,h,t} \qquad (EQ33)$$

Consumption budget of type h households

$$CTH_{h,t} = YHD_{h,t} - SH_{h,t} - \sum_{i} TR_{i,h,t} \qquad (EQ34)$$

Savings of type h household

$$SH_{h,t} = PIXCON_t^{\eta} sh0_{h,t} + sh1_h YDH_{h,t} \qquad (EQ35)$$

where

$\lambda_{i,k}^{RK}$	share of type k capital income received by institution i
$\lambda_{h,l}^{WL}$	share of type l labour income received by type h households
$PIXCON_t$	chained consumer price index
$SH_{h,t}$	savings of type h households
$sh0_{h,t}$	intercept (type h household savings)
$sh1_{h,t}$	slope (type h household savings)
$TDH_{h,t}$	Income taxes of type h households
$TR_{i,i',t}$	transfers from agent i to agent i'
$YDH_{h,t}$	disposable income of type h households
$YH_{h,t}$	total income of type h households
$YHK_{h,t}$	capital income of type h households
$YHL_{h,t}$	labour income of type h households
$YHTR_{h,t}$	transfer income of type h households

Total factor earnings are distributed between agents, including households, in fixed proportions (Equations 30 and 31). Transfer income is simply the sum of all transfers received by type h households (Equation 32).

Household h's disposable income (Equation 33) is equal to its total income minus direct income taxes and transfers to government, while household *h's* consumption budget (Equation 34) is equal to household disposable income minus savings and transfers to other agents. Unlike most CGE models which specify household savings as being proportionate to household disposable income, Decaluwé et al. (2010) define household savings as a linear function of disposable income, as shown in Equation 35. Equation 35 allows the marginal propensity to save to be different from the average propensity to save. Also known as saving ratio, the average propensity to save is the percentage of income that is saved rather than spent on goods and services. If the average propensity to save is calibrated on negative observed savings, as it is the case for certain categories of households in the Kenyan SAM, and if it is assumed that the marginal propensity to save is equal to the average propensity, then a fall in the income of these households would increase their savings, or a rise in income would lead to more indebtedness. This arrangement helps to remedy these deficiencies. That way, when a non-zero intercept is applied, the marginal rate of saving is different from the average rate. Another advantage of Equation 35 is that it makes it possible to test the model's homogeneity by setting price elasticity η equals to 1.[47]

5.2.5.2. Firms

Enterprises derive income from returns on capital and transfers received from other agents (Equations 36-38).

Enterprises income equations

Total income of type f businesses

$$YF_{f,t} = YFK_{f,t} + YFTR_{f,t} \qquad (EQ36)$$

Capital income of type f businesses

$$YFK_{f,t} = \sum_{k} \lambda_{f,k}^{RK} \left(\sum_{a} R_{k,a,t} KD_{k,a,t} \right) \qquad (EQ37)$$

Transfer income of type f businesses

$$YFTR_{f,t} = \sum_{i} TR_{f,i,t} \qquad (EQ38)$$

Disposable income of type f businesses

$$YDF_{f,t} = YF_{f,t} - TDF_{f,t} \qquad (EQ39)$$

Savings of type f businesses

$$SF_{f,t} = YDF_{f,t} - \sum_{i} TR_{i,f,t} \qquad (EQ40)$$

where

SF_{ft}	Savings of type f businesses
$YDF_{f,t}$	Disposable income of type f businesses
$YF_{f,t}$	Total income of type f businesses

[47] Please refer to Decaluwé et al. (2010) for a detailed description of the properties of Equation 35.

$YFK_{f,t}$	Capital income of type f businesses
$YFTR_{f,t}$	Transfer income of type f businesses

Firm *f's* disposable income (Equation 39) is equal to its total income less corporate tax paid from its income. Firm savings are residually determined after the transfers to other agents from disposable income (Equation 40).

5.2.5.3. Government

There are four sets of tax instruments in the model that are dependent upon expenditure on commodities. These include household and business income taxes, taxes on products and on imports, and other taxes on production. Taxes on products consist of indirect taxes on consumption, import tariffs and export taxes, while taxes on production consist of taxes on production factors and other taxes on production. Total government revenue is obtained as the sum of total tax collection plus the government income from capital and government foreign borrowing (Equations 41 to 53).

Government income equations

Total government income

$$YG_t = YGK_t + TDHT_t + TDFT_t + TPRODN_t + TPRCTS_t + YGTR_t \qquad (EQ41)$$

Government capital income

$$YGK_t = \sum_k \lambda^{rk}_{i,k} \left(\sum_a R_{k,a,t} KD_{k,a,t} \right) \qquad (EQ42)$$

Total government revenue from household income taxes

$$TDHT_t = \sum_h TDH_{h,t} \qquad (EQ43)$$

Total government revenue from business income taxes

$$TDFT_t = \sum_f TDF_{f,t} \qquad (EQ44)$$

Total government revenue from other taxes on production

$$TPRODN_t = TIWT_t + TIKT_t + TIPT_t \qquad (EQ45)$$

Total government receipts of indirect taxes on wages

$$TIWT_t = \sum_{l,a} TIW_{l,a,t} \qquad (EQ46)$$

Total government receipts of indirect taxes on capital

$$TIKT_t = \sum_{k,a} TIK_{k,a,t} \qquad (EQ47)$$

Total government revenue from production taxes

$$TIPT_t = \sum_{a} TIP_{a,t} \qquad (EQ48)$$

Total government revenue from taxes on products and imports

$$TPRCTS_t = TICT_t + TIMT_t + TIXT_t \qquad (EQ49)$$

Total government receipts of indirect taxes on commodities

$$TICT_t = \sum_{c} TIC_{c,t} \qquad (EQ50)$$

Total government revenue from import duties

$$TIMT_t = \sum_{m} TIM_{m,t} \qquad (EQ51)$$

Total government revenue from export taxes

$$TIXT_t = \sum_{x} TIX_{x,t} \qquad (EQ52)$$

Government transfer income

$$YGTR_t = \sum_{i} TR_{i,i',t} \qquad i \in I, i' \subset i, t \in T \qquad (EQ53)$$

Income taxes of type h households

$$TDH_{h,t} = PIXCON_t^{\eta} ttdh0_{h,t} + ttdh1_{h,t} YH_{h,t} \qquad (EQ54)$$

Corporate tax of type f businesses

$$TDF_{f,t} = PIXCON_t^{\eta} ttdf0_{f,t} + ttdf1_{f,t} YFK_{f,t} \qquad (EQ55)$$

Government revenue from payroll taxes on type l labour in activity a

$$TIW_{l,a,t} = ttiw_{l,a,t} W_{l,t} LD_{l,a,t} \qquad (EQ56)$$

Government revenue from taxes on type k capital used by activity a

$$TIK_{k,a,t} = ttik_{k,a,t} R_{k,a,t} KD_{k,a,t} \qquad (EQ57)$$

Government revenue from taxes on activity a production

$$TIP_{a,t} = ttip_{a,t} PP_{a,t} XAT_{a,t} \qquad (EQ58)$$

Government revenue from indirect taxes on product nm

$$TIC_{nm,t} = ttic_{nm,t} \left(PL_{nm,t} + \sum_{c} PC_{c,t} tmrg_{c,nm} \right) DD_{nm,t} \qquad nm \subset C \not\subset M \qquad (EQ59)$$

Government revenue from indirect taxes on product m

$$TIC_{m,t} = ttic_{m,t}\left[\begin{array}{l}\left(PL_{m,t} + \sum_c PC_{c,t} tmrg_{c,m}\right) DD_{m,t} \\ + \left(\left(1 + ttim_{m,t}\right) PWM_{m,t} e_t + \sum_c PC_{c,t} tmrg_{c,m}\right) IM_{m,t}\end{array}\right] \qquad (EQ60)$$

Government revenue from import duties on product m

$$TIM_{m,t} = ttim_{m,t} PWM_{m,t} e_t IM_{m,t} \qquad (EQ61)$$

Government revenue from export taxes on product x

$$TIX_{x,t} = ttix_{x,t}\left(PE_{x,t} + \sum_c PC_{c,t} tmrg^{X}_{c,x}\right) EXD_{x,t} \qquad (EQ62)$$

Government savings

$$SG_t = YG_t - \sum_i TR_{i,i',t} - G_t \qquad (EQ63)$$

where

$ttdf0_{(f,t)}$	intercept (income taxes of type f firms)
$ttdf1_{(f,t)}$	marginal income tax rate of type f firms
$ttdh0_{(h,t)}$	intercept (income taxes of type h households)
$ttdh1_{(h,t)}$	marginal income tax rate of type h households
$PP_{(a,t)}$	activity a unit cost, including taxes directly related to the use of capital and labour, but excluding other taxes on production
$ttik_{(k,a,t)}$	tax rate on type k capital used in activity a
$ttip_{(a,t)}$	tax rate on the production of activity a
$ttiw_{(l,a,t)}$	tax rate on type l labour used in activity a
$ttic_{(c,t)}$	tax rate on commodity c
$ttim_{(m,t)}$	duties on imports of commodity m
$ttix_{(x,t)}$	export tax rate on exported commodity x
$G_{(t)}$	government savings
$R_{k,a,t}$	rental rate of type k capital in activity a
$SG_{(t)}$	current government expenditures on goods and services
$TDHT_{(t)}$	total government revenue from firm income taxes

$TDFT_{(t)}$ total government revenue from household income taxes

$TIC_{(c,t)}$ government revenue from indirect taxes on commodity c

$TICT_{(t)}$ total government receipts of indirect taxes on commodities

$TIK_{(k,a,t)}$ government revenue from taxes on type k capital used by activity a

$TIKT_{(t)}$ total government revenue from taxes on capital

$TIM_{(m,t)}$ government revenue from import duties on commodity m

$TIMT_{(t)}$ total government revenue from import duties

$TIP_{(a,t)}$ government revenue from taxes on activity a production (excluding taxes directly related to the use of capital and labour)

$TIPT_{(t)}$ total government revenue from production taxes (excluding taxes directly related to the use of capital and labour)

$TIW_{(l,a,t)}$ government revenue from payroll taxes on type l labour in activity a

$TIWT_{(t)}$ total government revenue from payroll taxes

$TIX_{(x,t)}$ government revenue from export taxes on commodity x

$TIXT_{(t)}$ total government revenue from export taxes

$TPRCTS_{(t)}$ total government revenue from taxes on products and imports

$TPRODN_{(t)}$ total government revenue from other taxes on production

$W_{l,t}$ wage rate of type l labour

$YG_{(t)}$ total government income

$YGK_{(t)}$ government capital income

$YGTR_{(t)}$ government transfer income.

Household income taxes (Equation 54) as well as firm income taxes (Equation 55) follow the same logic as was demonstrated with household savings, i.e. they are described as a linear function of total income. With respect to tax on factors of production, note that tax rates are activity and factor specific. The tax rates in the base solution are defined as parameters, and the time subscripts allow for simulating scenarios in which fiscal policy changes through time. Each rate then applies to the corresponding transactions (Equations 56 and 57). Furthermore, a tax may be applied to the total value of production (Equation 58).

Equations (59) and (60) describe how these taxes on products are levied in the cases of non-imported and imported products. In accordance with Equations (59) and (60), indirect taxes are applied to domestic sales of local production, evaluated at producer prices, including margins and custom duties whenever they exist. Tariffs (Equation 61) and export taxes (Equation 62) are modelled as a fixed proportion of the value of imports and exports, respectively. Government savings are obtained as the difference between government revenue and government consumption and transfers to institutions (Equation 63).

5.2.5.4. Rest of the world

Rest-of-the-world incomes come from payments for the value of imports, part of the income of capital and transfers from domestic agents (Equation 64), while foreign spending in the domestic economy consists of the value of exports and transfers to domestic agents. Rest-of-the-world savings are the difference between foreign income and spending (Equation 65). Rest-of-the-world savings are equal in absolute value to the current account balance, but of opposite sign (Equation 66).

Rest-of-the-world income equations

Rest-of-the-world income

$$YROW_t = e_t \sum_m PWM_{m,t} IM_{m,t} + \sum_k \lambda_{i,k}^{rk} \left(\sum_a r_{k,a,t} KD_{k,a,t} \right) + \sum_i TR_{i,i',t} \qquad (EQ64)$$

Rest-of-the-world savings

$$SROW_t = YROW_t - \sum_x PE_{x,k}^{FOB} EXD_{x,t} - \sum_i TR_{i,i',t} \qquad (EQ65)$$

Equivalence of current account balance and rest-of-world savings

$$SROW_t = -CAB_t \qquad (EQ66)$$

where

$CAB_{(t)}$ current account balance

$SROW_{(t)}$ rest-of-the-world savings

$YROW_{(t)}$ rest-of-the-world income.

5.2.5.5. Transfers

Household transfers to non-government agents (Equation 67) and firm transfers (Equation 69) are proportional to the disposable income of households and firms, respectively. Household transfers to government (Equation 68) are treated the same way as household income taxes. Equations (70) and (71), i.e. government transfers to non-governmental agents and rest-of-the-world transfers to domestic agents, respectively, are initially set equal to their SAM values, and they grow each period at the same rate as the population index and are indexed to the consumer price index.

Inter-institutional transfer equations

Transfers from household h to agent i

$$TR_{i,h,t} = \lambda_{i,h}^{TR} YDH_{h,t} \qquad (EQ67)$$

Transfers from household h to government

$$TR_{i,h,t} = PIXCON_t^{\eta} tr0_{h,t} + tr1_{h,t} YH_{h,t} \qquad (EQ68)$$

Transfers from type f businesses to agent i

$$TR_{i,f,t} = \lambda_{i,f}^{TR} YDF_{f,t} \qquad (EQ69)$$

Public transfers

$$TR_{i,i',t} = PIXCON_t^{\eta} \overline{TR}_{i,i'} pop_i \qquad (EQ70)$$

Transfers from abroad

$$TR_{i,i't} = PIXCON_t^{\eta} \overline{TR}_{i,i'} pop_t \qquad (EQ71)$$

where

$\lambda_{(ag,aga)}^{TR}$	share parameter (transfer functions)
$tr0_{(h,t)}$	intercept (transfers by type h households to government)
$tr1_{(h,t)}$	marginal rate of transfers by type h households to government.

5.2.6. Modeling the welfare impact

One purpose of this research is to explore the extent to which changes in tourist spending lead to an improvement or a worsening of welfare. In most CGE studies, welfare is measured using compensations and equivalent variations, as first proposed by Hicks. Equivalent variation is defined as the maximum amount of income the consumer is willing to pay as to be free of the price change. In others words, it measures, in money, the difference between consumer expenses before and after the change. The difference between the equivalent and the compensated welfare measures is that the equivalent variation is based on initial prices and, consequently, the initial equilibrium, while the compensated variation uses the final equilibrium and, therefore, the new prices. Hence, the compensated variation measures how much money the consumers should be given to compensate for the utility change that has happened in the new scenario.

In this research, changes in total welfare are measured by means of household and producer surplus and government revenue (Equations 72 and 73). For a household, the welfare impact of a price change can be measured using the consumer surplus (CS). We define CS to be negative when the price increases as follows:

$$CS_{c,h,t} = -C_{c,h,t}\left(P_{c,t} - \overline{P_c}\right) = -C_{c,h,t}\Delta P \; ,$$

where Δp is the change in price and qd is the original quantity demanded.

The equation above is the welfare impact of a price change assuming that the consumer cannot respond to the change by adjusting consumption. The equation below takes into account the response of consumers to the higher price. It is very likely that the demand for tourism-related commodities is larger for rich households than poor households, so the relative impact of an increase in the price of those commodities on a rich household would be greater than for a poor household. Thus Consumers lose, as they consume less at a higher price.

$$CS_{c,h,t} = -C_{c,h,t}\Delta P_c - 0.5(\Delta P_c)(\Delta C_c) \; ,$$

Where, $\Delta C_c = C_{c,h,t} - \overline{C_c}$

$$CS_{c,h,t} = -\left(\overline{C_{c,h,t}}\,\overline{PC_c}\left(\frac{\Delta PC_c}{\overline{PC_c}}\right)\right) - 0.5\varepsilon_c\left(\overline{C_{c,h,t}}\,\overline{PC_c}\left(\frac{\Delta PC_c}{\overline{PC_c}}\right)\right)^2 \qquad (EQ72)$$

Producer surplus is defined as follows:

$$PS_{a,t} = \left(\overline{XAT_a} \, \overline{PT}_a \left(\frac{\Delta PT_a}{\overline{\overline{PT_a}}} \right) \right) + 0.5\varepsilon_a \left(\overline{XAT_a} \, \overline{PT}_a \left(\frac{\Delta PT_a}{\overline{\overline{PT_a}}} \right) \right)^2 \qquad (EQ73)$$

This is because a price increase has a positive effect on the welfare of a producer. Producers gain, as they sell more at a higher price. The overall welfare impact of a tourism shock is determined by summing up gains and subtracting losses for the three agents. The government gains through increased tax revenue (TICT), assuming government spending constant.

Total welfare is defined as follows: $Welfare = \sum_{c,h} CS_{c,h,t} + \sum_{a} PS_{a,t} + TICT$.

5.2.7. Modelling the labour market

It is assumed that labour is fully employed and perfectly mobile across sectors. Labour is divided into three categories which are provided by the 2003 SAM database: skilled, semi-skilled and skilled labour. However, there is no disaggregation between urban and rural labour, making it difficult to capture the migration of workers between regions. Labour supply evolves exogenously over time and is function of population growth and the elasticity of labour supply (Pratt, 2009).

Labour supply is given by Equation (74):

$$LS_{l,t} = \overline{LS_l} \left(\frac{W_{l,t}}{PIXCON_t} \right)^{\beta w_l} , \qquad (EQ74)$$

$LS_{(l,t)}$ Supply of type *l* labour

βw_l Supply response elasticity by labour type $(\beta w_l \succ 0)$

This specification says that an increase in relative wages will result in an increase in the labour supply, all else being equal. Workers will offer to work more hours at higher wages. Furthermore, the larger the supply response elasticity, the larger the impact of shocks on labour supply.

5.2.8. Prices

In this section, the price equations that define the underlying price system of the model are presented. These constitute the core of any CGE model because CGE models solves for relative prices. The different prices depend on the hypotheses and functional forms already stated. It is noteworthy that in aggregations, the price of an aggregate is a weighted sum of the prices of its components. The weights are determined by equating the value of the aggregate to the sum of the values of its components, given the quantity of the aggregate. Thus, the weight assigned to the price of each component is the ratio of its quantity to the quantity of the aggregate. With the exception of Leontief fixed-proportions aggregations, where the weights are invariant to relative price changes, component proportions, and, consequently, component price weights, change in response to relative price changes. Further, they change more or less sharply, depending on the elasticity of substitution or transformation.

5.2.8.1. Production

Equation (75) defines the unit cost of an activity's output (including taxes directly related to the use of capital and labour, but excluding other taxes on production) as the weighted sum of the prices of value added and aggregate intermediate consumption. The model explicitly describes the relationship between prices before taxes and prices including taxes. As Equation (76) shows, the basis price of production is obtained from the unit cost by adding taxes on production (other than taxes on labour or capital, already included in the unit cost). Likewise, wages and rental rate of capital paid by activity differ from wages and rental rate of capital received by agents by the amount of payroll/capital taxes (Equations 80 and 82). For each activity, the intermediate consumption price index is a weighted sum of the price of intermediate consumption of commodity (c) by activity (a) (Equation 77). Likewise, Equation (78) defines the value added as the weighted sum of the prices of aggregate labour and capital. Note also that factor prices are factor-specific and activity specific, which means that the allocation of finite supplies of factors between competing activities depends upon relative factor prices via first order conditions for optima (Equations 79 to 82).

Production price equations

Activity a unit cost

$$PP_{a,t}XAT_{a,t} = PVAD_{a,t}VAD_{a,t} + PIRD_{a,t}IRD_{a,t} \qquad (EQ75)$$

Basic price of activity a's production of commodity c

$$PT_{a,t} = (1 + ttip_{a,t})PP_{a,t} \qquad (EQ76)$$

Intermediate consumption price index of activity a

$$PIRD_{a,t}IRD_{a,t} = \sum_{c} PC_{c,t}IRM_{c,a,t} \qquad (EQ77)$$

Price of activity a value added

$$PVAD_{a,t}VAD_{a,t} = wc_{a,t}LDC_{a,t} + rc_{a,t}KDC_{a,t} \qquad (EQ78)$$

Wage rate of activity a composite labour

$$wc_{a,t}LDC_{a,t} = \sum_{l} WTI_{l,a,t}LD_{l,a,t} \qquad (EQ79)$$

Wage rate paid by activity a for type l labour including payroll taxes

$$WTI_{l,a,t} = (1 + ttiw_{l,a,t})w_{l,t} \qquad (EQ80)$$

Rental rate of activity a composite capital

$$rc_{a,t}KDC_{a,t} = \sum_{k} RTK_{k,a,t}KD_{k,a,t} \qquad (EQ81)$$

Rental rate paid by activity a for type k capital including capital taxes

$$RTI_{k,a,t} = (1 + ttik_{k,a,t})R_{k,a,t} \qquad (EQ82)$$

where

$PT_{(a,t)}$ basic price of the output of activity a

$PIRD_{(a,t)}$ intermediate consumption price index of activities

$PVAD_{(a,t)}$ payments to factors (value added) (including taxes on production directly related to the used of capital and labour) import tariff rate.

5.2.8.2. International trade

Equation (83) represents the price of the aggregate production of the output sold domestically and internationally. This price is a weighted sum of the price obtained on each market; thus, the weight assigned to each market is proportional to the quantity sold on that market. The basic price of exports (Equation 84) obtained by each activity is a weighted sum of its basic price on the domestic market and its basic price on the export market. The FOB (free on board) price of exports paid by purchasers is different from the one received by the producer, since export taxes and margins must be added on (Equation 86). For not exported commodities, the price obtained is equal to the domestic price (Equation 85).

Commodities price equations

Total producer price

$$PT_{a,t}XAT_{a,t} = \sum_{c} P_{a,c,t}XA_{a,c,t} \qquad (EQ83)$$

Basic price of the production of commodity x by activity a

$$P_{a,x,t}XA_{x,t} = PE_{x,t}EX_{a,x,t} + PL_{x,t}DS_{a,x,t} \qquad (EQ84)$$

Equivalence between P and PL for non-exportable

$$P_{nx,t} = PL_{nx,t} \qquad (EQ85)$$

Price received for exported commodity x (excluding export taxes)

$$PE_{x,t}^{FOB} = \left(PE_{x,t} + \sum_{c} PC_{c,t}tmrg_{x,t}^{X} \right)\left(1 + ttix_{x,t}\right) \qquad (EQ86)$$

Price of local product c sold on the domestic market (including all taxes and margins)

$$PD_{c,t} = \left(PL_{c,t} + \sum_{ca} PC_{ca,t}tmrg_{ca,c} \right)\left(1 + ttic_{c,t}\right) \qquad (EQ87)$$

Price of imported product m (including all taxes and tariffs)

$$PM_{m,t} = \left(\left(1 + ttim_{m,t}\right)e_{t}PWM_{m,t} + \sum_{c} PC_{c,t}tmrg_{c,m} \right)\left(1 + ttic_{m,t}\right) \qquad (EQ88)$$

Purchaser price of composite commodity m

$$PC_{m,t}Q_{m,t} = PM_{m,t}IM_{m,t} + PD_{m,t}DD_{m,t} \qquad (EQ89)$$

Equivalence between PC and PD for non-imported commodities

$$PC_{nm,t} = PD_{nm,t} \qquad (EQ90)$$

The domestic import price is similar in structure to the export price definition. Equation (89) defines the domestic import price as the world price transformed into the local currency, including taxes, tariffs and margins. Equation (89) describes the price for the composite commodities, which is defined as the sum of spending on domestically produced and imported commodities, divided by composite supply. Equation (87) defines the price of local commodities sold on domestic market, including indirect taxes and margins. Commodity prices for which there are no competing imports are simply the price paid for local product as defined in Equation (90).

5.2.8.3. Tourism

Additionally, the price paid by tourists in each category can be related to the prices of the individual commodities as indicated in Equation 32.

$$TOUP_{j,t} = \prod_{c} PC_{c,t}^{\varepsilon_{c,j}} \qquad (EQ91)$$

The impact of changes in the rest of the economy on the tourism sector can be captured through how these changes affect prices using Equation (91), onto how they affect the aggregate price that each tourist category pays. The way in which tourism shocks affect the economy is by changing initial demand for domestic and foreign tourism. These changes lead to changes in demand for an individual commodity. For example, an increase in demand for domestic and foreign tourism would lead to increases in the demand for commodities that tourists consume, which in turn would lead to changes in the prices of these commodities.

5.2.8.4. Price indexes

Five price indexes are defined. A price index is a measure of the average level of prices for some specified set of goods and services, relative to the prices in a specified year. Equation (92) defines the overall level of prices of goods and services included in GDP, i.e. the GDP deflator using a Fisher index (the geometric averages of Laspeyres and Paasche Price Indexes). Equation (93) is a Laspeyres index, which is used to measure the consumer price index. Finally, the private investment price index (Equation 94), the public investment price index (Equation 95) and the public current expenditures price index (Equation 96) are exact price indices, dual to the Cobb-Douglas functions, which describe the commodity demand for investment purposes and for public consumption.

Price indices equations

GDP deflator (Fischer index)

$$PIXGDP_t = \left[\frac{\sum_a PVAD_{a,t} \overline{VAD}_a \sum_a PVAD_{a,t} VAD_{a,t}}{\sum_a \overline{PVAD}_{a,t} \overline{VAD}_a \sum_a \overline{PVAD}_{a,t} VAD_{a,t}} \right]^{\frac{1}{2}} \qquad (EQ92)$$

Consumer price index (Laspeyres)

$$PIXCON_t = \frac{\sum_c PC_{c,t} \sum_h \overline{C}_{c,h}}{\sum_{ca} \overline{PC}_{ca,t} \sum_h \overline{C}_{ca,h}} \qquad (EQ93)$$

Private investment price index

$$PIXINV_t^{pri} = \prod_c \left(\frac{PC_{c,t}}{\overline{\overline{PC}}_c} \right)^{\gamma_c^{invpri}} \qquad (EQ94)$$

Public investment price index

$$PIXINV_t^{pub} = \prod_c \left(\frac{PC_{c,t}}{\overline{\overline{PC}}_c} \right)^{\gamma_c^{invpub}} \qquad (EQ95)$$

Public expenditures price index

$$PIXGVT_t = \prod_c \left(\frac{PC_{c,t}}{\overline{\overline{PC}}_c} \right)^{\gamma_c^{gvt}} \qquad (EQ96)$$

where

$PIXGDP_{(t)}$	GDP deflator
$PIXINV_{(t)}^{pri}$	private investment price index
$PIXINV_{(t)}^{pub}$	public investment price index
$PIXGVT_{(t)}$	public expenditures price index
$KS_{(k,t)}$	supply of type k capital.

5.2.9. Market clearance, income balance and closures

The market-clearing equations ensure the simultaneous clearing of all markets. While recognizing that the model is a general equilibrium system, with all endogenous variables jointly determined, it is useful to think in terms of matching each of these equilibrium conditions with an ‘equilibrium variable’ (Robinson et al. 1995). In a general equilibrium competitive market economy, variations in the prices or in the returns to factors ensure satisfaction of market-clearing conditions for each market. In the model specified here, there are five relevant markets: factor and commodity markets and government, land and capital and rest-of-world accounts.

Equation (97) imposes equality between quantities supplied and demanded each commodity, and thus defines market-clearing on the domestic market.

Market-clearing equations

Domestic absorption

$$\begin{aligned} Q_{c,t} &= IRT_{c,t} + \sum_h C_{c,h,t} + CG_{c,t} + INV_{c,t} \\ &+ VSTK_{c,t} + MRGN_{c,t} + CDTOU_{c,t} \end{aligned} \qquad (EQ97)$$

Labour supply equals labour demand

$$LS_{l,t} = \sum_l LD_{l,a,t} \qquad (EQ98)$$

Capital supply equals capital demand

$$KS_{k,t} = \sum_k KD_{k,a,t} \qquad (EQ99)$$

Total investment equals total savings

$$IT_t = \sum_h SH_{h,t} + \sum_f S_{f,t} + SG_t + SROW_t \qquad (EQ100)$$

Private investment equals total investment less public investment

$$IT_t^{pri} = IT_t - IT_{(t)}^{pub} - \sum_c PC_{c,t} VSTK_{c,t} \qquad (EQ101)$$

Supply of domestic production equals demand

$$DD_{c,t} = \sum_a DS_{a,c,t} \qquad (EQ102)$$

International demand for exports equals supply

$$EXD_{x,t} + CFTOU_{x,t} = \sum_a EX_{a,x,t} \qquad (EQ103)$$

Total quantities demanded and total quantities supplied for each factor are balanced according to Equations (98) and (99). Equation (100) defines the equilibrium between total investment and total saving. Further, as shown in Equation (101) the sum of the different forms of investment expenditure must be equal to total investment. The form of Equation (101) reflects the fact that the public investment expenditures and changes in inventories are exogenously set. Also, the sum of supplies of each commodity by domestic producers must be matched by domestic demand for that commodity locally produced (Equation 102). Likewise, Equation (103) specifies that supply to the international market of each good must equal demand.

5.2.10. Gross domestic product

Equation (104) defines the GDP at basic prices as the sum of the value of value-added, inclusive total government revenue from production taxes. On the other hand, GDP at market prices exceeds GDP at basic prices by exactly the amount of taxes on products and imports (Equation 105). Further, Equation (106) states that GDP at market prices by income approach is obtained by adding up the sum total of income, i.e. operating surplus and remuneration received by factor of production, plus taxes on products and imports. Finally, GDP at market prices from the final demand perspective is the sum of household consumption, government spending, investment expenditures, tourist expenditure, plus the value of export, minus the value of imports (Equation 107).

Gross domestic product equations

GDP at basic prices

$$GDP_t^{BP} = \sum_a PVAD_{a,t} VAD_{a,t} + TIPT_t \qquad (EQ104)$$

GDP at market prices

$$GDP_t^{MP} = GDP_t^{BP} + TPRCTS_t \qquad (EQ105)$$

GDP at market prices (income-based)

$$GDP_t^{IB} = \sum_{l,a} W_{l,t} LD_{l,a,t} + \sum_{k,a} r_{k,a,t} KD_{k,a,t} + TPRODN_t + TPRCTS_t \qquad (EQ106)$$

GDP at purchasers' prices from the perspective of final demand

$$GDP_t^{FD} = \sum_c PC_{c,t}\left[\sum_h C_{c,h,t} + CG_{c,t} + INV_{c,t} + VSTK_{c,t} + CDTOU_{c,t}\right]$$
$$+\sum_a PT_{a,t}\sum_a C1_{a,h,t} + \sum_x PE_{x,t}^{fob}\left(EXD_{x,t} + CFTOU_{x,t}\right) \qquad (EQ107)$$
$$-\sum_m e_t PWM_{m,t} IM_{m,t}$$

Where

$GDP_{(t)}^{BP}$ GDP at basic price

$GDP_{(t)}^{MP}$ GDP at market price

$GDP_{(t)}^{IB}$ GDP at market price (income-based)

$GDP_{(t)}^{FD}$ GDP at purchasers' prices from the perspective of final demand

5.2.11. Dynamic set-up

Until recently, most tourism-focused CGE models were static in nature. In these models, it is assumed that changes in tourism spending has no time dimension, and therefore changes that may occur years after the change in spending has taken place are not considered (Blake, 2009). Clearly, many of the questions that tourism-based CGE models are designed to answer are dynamic questions for at least two reasons. First, because, as Blake (2009) points out, what is often meant by a change in tourism spending is a change over time, or a change in growth rate, and second, because the economic reaction to a change in tourism expenditure will have dynamic effects. Moreover, the impact of supply and demand shocks or policy changes include dynamic aspects, such as the inter-period effects of changes in population and labour force growth, capital accumulation and changes in government expenditures. This section describes the extension of the static model to a dynamic recursive model.

Dynamic assignments amount to adding a time subscript to all prices and demand and supply functions of the static model. In this research, we adopt a sequential dynamic model that takes into account accumulation and growth effects. As mentioned earlier, a sequential dynamic model assumes myopic (short-sighted) behaviour by economic agents. The dynamic (i.e. the inter-temporal linkages) is established through lagged variables and updating exogenous variables and parameters that are either fixed or absent in the base-year solution (Equations 108 to 115). The dynamic-recursive adjustment is solved recursively from the base year 2003 to the year 2015.

Moreover, there is a population index pop_t, which is updated exogenously and grows each period at a rate η_t. This index is used in the model to update the values of variables, parameters and constants that are assumed to grow at the same rate η_t as the population index pop_t. In the model, the population is assumed to grow at a rate of 0.03 per year. Total labour supply becomes an endogenous variable and is assumed to grow at the exogenous rate η_t, which is the labour force growth rate.

$LS_{l,t} = \overline{LS}_l\, pop_t$, where $pop_t = (1+\eta_t)$

Other variables that grow at the population growth rate η_t include: the current account balance; government current expenditures; public investment by category and by public sector industry; changes in inventories; and finally the minimum level consumption within the LES function.

$$CAB_t = \overline{CAB} \cdot pop_t$$

$$G_t = \overline{G} \cdot pop_t$$

$$IND_{k,pub,t} = \overline{IND}_{k,pub} \cdot pop_t$$

$$C^{\min}_{c,h,t} = \overline{C}^{\min}_{c,h} \cdot pop_t$$

$$VSTK_{c,t} = \overline{VSTK}_c \cdot pop_t$$

Although assuming that exogenous variables grow at the same rate as labour supply is by no means a realistic scenario, it makes it possible for the model to simulate a balanced growth path (Decaluwé et al., 2010). Along a balanced growth path, the economy experiences capital widening, but all quantities grow at a constant rate, whereas relative prices remain constant.

Unlike in the static model, capital stock is endogenous in the dynamic model. In every period, capital stock is the stock of the preceding period, minus depreciation, plus the volume of new capital investment in the preceding period (Equation 108).

Capital growth

$$KD_{k,a,t+1} = (1-\delta_{k,a})KD_{k,a,t} + IND_{k,a,t} \qquad (EQ108)$$

Total public investment

$$IT_t^{pub} = PK_t^{pub} \sum_{k,pub} IND_{k,pub,t} \qquad (EQ109)$$

Equilibrium on the private investment market

$$IT_t^{pri} = PK_t^{pri} \sum_{k,pri} IND_{k,pri,t} \qquad (EQ110)$$

Aggregate private price of capital

$$PK_t^{pri} = \frac{1}{A^{K\_pri}} \prod_c \left[\frac{PC_{c,t}}{\gamma_c^{INVPRI}}\right]^{\gamma_c^{INVPRI}} \qquad (EQ111)$$

Aggregate public price of capital

$$PK_t^{pub} = \frac{1}{A^{K\_pub}} \prod_c \left[\frac{PC_{c,t}}{\gamma_c^{INVPUB}}\right]^{\gamma_c^{INVPUB}} \qquad (EQ112)$$

Investment demand by private activity

$$IND_{k,bus,t} = \phi_{k,bus} \left[\frac{IR_{k,bus,t}}{U_{k,bus,t}}\right]^{\sigma_{k,bus}^{INV}} KD_{k,bus,t} \qquad (EQ113)$$

User cost of capital (private sectors)

$$U_{k,bus,t} = PK_t^{pri}\left(\delta_{k,bus} + IR_t\right) \qquad (EQ114)$$

User cost of capital (public sectors)

$$U_{k,pub,t} = PK_t^{pub}\left(\delta_{k,pub} + IR_t\right) \qquad (EQ115)$$

where

$IND_{(k,pub,t)}$ Volume of new type k, capital investment to public sector

$IND_{(k,a,t)}$ Volume of new type k, capital investment to sector a

$PK_{(t)}^{pub}$ Price of new public capital

$PK_{(t)}^{pri}$ Price of new private capital

$IND_{(k,pub,t)}$ Volume of new type k, capital investment to private business sector

A^{K_pub}	Scale parameter (price of new public capital)
A^{K_pri}	Scale parameter (price of new private capital)
$\phi_{(k,a)}$	Scale parameter (allocation of investment to activities)
$IR_{(t)}$	Interest rate (is set exogenously and equal to 0.04 in the model)
$U_{(k,a,t)}$	User cost of type k, capital in industry a
$\sigma^{INV}_{(k,bus)}$	Elasticity of private investment demand relative to Tobin's "q" (where q = market value of the firm (or stock market capitalisation divided by the replacement cost of the capital)
$\delta_{(k,a)}$	Depreciation rate of capital k in activity a

The amount of public investment expenditures is determined in Equation (109) as the price of public investment times the aggregate volume of new type k, capital investment to public sector. The same assumption is made regarding private investment expenditures as shown in Equation (110).

The prices of new private and public capital are given by Equations (111) and (112). These prices are obtained from the investment demand functions defined above, whose forms imply that the production function of new capital is Cobb-Douglas. There is a single price for new private capital and another one for new public capital. Moreover, it is assumed that when the investment expenditure is incurred, the aggregate quantity of new private capital produced may be frictionlessly transformed into any type k capital, destined to any private sector. However, once the new capital has been allocated, it is fixed. This implies that the price of one unit of capital stock is the same, regardless of its type k or the private activity in which it is installed. The same specification applies to public investment.

The investment demand function (Equation 113) is described as a function of Tobin's 'q', the ratio of the market value of capital to its replacement cost (for details see Lemelin and Decaluwé, 2007). In other words, the volume of new capital allocated to a sector is proportional to the existing stock of capital in the benchmark data. The proportion varies according to the ratio of the rental rate to the user cost of that capital. The investment demand follows a modified version of Bourguignon et al. (1989). When Tobin's 'q' is equal to one, Equation (113) is equal to $IND_{k,bus,t} / KD_{k,bus,t} = \phi_{k,bus}$. Since Tobin's theory states that investment should proceed to the point where q = 1, $\phi_{k,bus}$ may be interpreted as the growth equilibrium rate to investment. The capital user cost in the private and public sectors (Equations 114 and 115) depends on the price of new capital (the replacement cost of capital), the rate of depreciation and the interest rate.

5.2.12. Closing the model

A closure is the choice of exogenous and endogenous variables to solve the model. Mathematically, a model closure is a matter of ensuring that the number of variables and Equations are consistent. In other words, a solution will require the same number of Equations as there are unknown variables. Model outcomes will be sensitive to which variables are considered to be within the model and which are considered external to the model (Thiessen, 1998). While there is no general consensus as to which one is the best approach, selecting incorrect closures could lead to misleading conclusions, thereby causing wrong policy recommendations. Moreover, model closure rules outline fundamental differences in perceptions on the workings of an economic system (Sen, 1963).

From an economic perspective, closures of static CGE models can be viewed as determining the elements of the factor market closure and the macro-economic assumptions relating to investment and government spending. Therefore, we need to specify how aggregate investment is to be equated with aggregated savings (savings-investment balance) as well as the workings of government balance and trade balance (Hosoe et al. 2010).

The choice of the proper macroclosure remains a fundamental problem in the construction and implementation process of CGE models. CGE modellers generally differentiate between five types of macro-economic closure rules (Decaluwé et al. 1988; Thiessen, 1998):

1. Keynesian closure: In this model, nominal wage is fixed and employment is the adjustment variable. The Keynesian macroclosure assumes no labour full-employment and a fixed nominal wage; as such employment responds to changes in demand to bring about equilibrium by adjusting the real wage rate. Thiessen (1998) points to the role of the government, which may intervene to bring about full-employment. This is achieved by endogenous government spending or taxes.

2. Johansen closure: In the Johansen closure, investment is exogenous and consumption is the adjustment variable. In this closure, it is now the public consumption volume which becomes endogenous. It is an investment-driven model where the total value of investment is determined within the model and the balance identity determines savings. In this case, full employment is brought about by adjustments in private consumption.

3. Noeclassical closure: In this model, prices and wages are the adjustment variables and investment becomes endogenous and adjusts to the total savings available. With the neoclassical closure, the real investment target is abandoned. The volume of saving, which is now endogenous, varies with total available investment to achieve the savings-investment balance. It is a savings-driven model and the most common closure rule used in CGE models (Thiessen, 1998).

4. Kaldorian closure: Under Kaldorian (neo-Keynesian) closure, factors of production are not remunerated according to their marginal productivity. The nominal wage rate is fixed while production is a function of labour and capital supplies. The wage productivity is achieved by introducing a distortionary parameter for individual factor markets and hence wage is not equal to value-marginal productivity.

5. Kaleckian or structuralist closure: Under Kaleckian specification, production is primarily fixed due to the assumption that firms operate with excess capacity

in oligopolistic goods. There are two price components: market-driven and some mark-ups. The aim of the structuralist model is to investigate, among others, income distribution, sectoral growth and trade balance changes. Moreover, the prime idea of this model is to examine the institutional specifics of the economy under consideration (Thiessen, 1998; Eromenko, 2010).

Finally, there are the foreign exchange account closure rules which specify a set of assumptions about the external sector, i.e. the equilibrium between domestic savings, investment and the current account balance. One strand of the external closure fixes foreign capital inflow; the real exchange serves the role of an equilibrating variable in the current-account balance. Alternatively, one could fix the exchange rate and unfix the foreign capital inflow. In the former case, the trade deficit is fixed (since all items except imports and exports are fixed) while in the latter it is free to vary.

In this research, a neoclassical model closure is adopted. Furthermore, simulations are carried out under assumptions of constant levels of direct and indirect tax rates, as well as real government consumption. Consequently, the balance on the government budget is assumed to be adjusted to ensure that public expenditures equal receipts. With respect to the savings–investment account, real investment adjusts to changes in savings (savings-driven investment). As such, the model makes it possible to capture the negative crowding-out effects of public expenditures on private consumption according to the current tax incidence.

For the external balance it is assumed that the current account is fixed[48] and the real exchange serves the role of equilibrating variable to the current account balance. A. The results of the simulation should therefore be interpreted as representing the economic effect of a policy for a given level of foreign borrowing and domestic savings. . For factor markets, it is assumed that all types of labour are fully employed, meaning that the supply of labour is fixed, and flexible wages adjust to equalize supply and demand. Following Decaluwé et al (2010), it is assumed that there is

[48] In developing countries, foreign credit may be limited; therefore a fixed current account is likely to reflect economic reality.

perfect mobility of labour and capital within agricultural (informal sector) and non-agricultural sectors (formal sectors) or, in other words, between rural and urban areas. This implies that the model has three specific prices for payment for factors, namely, wages, return on agricultural capital (land) and on other capital.[49] It is assumed that land is fully used and fixed in supply, while the overall returns from land vary.

Finally, the model is homogenous of degree zero in prices, implying that a doubling of all prices does not alter the real allocation of resources. It is only the relative prices which are determined, and the nominal exchange rate is chosen to be the numéraire.

5.2.13. Parameterisation and solution models

The implementation of CGE models relies on the principle of calibration. Calibration consists of estimating the numerical values of the various parameters of functions compatible with the equilibrium of the initial SAM. These include the share and efficiency parameters in the production and consumption functions, and the elasticities of substitution. Some of these parameters can be derived from SAM, whereas others required an external estimation. Although the use of econometric estimates is the preferred method, we will not pursue this approach due to data limitations and to the considerable cost involved in gathering the data necessary for the econometric estimation of all parameters. We will therefore borrow the values of free parameters from other studies conducted on Kenya or countries with similar characteristics as Kenya. We will later conduct sensitivity tests to explore the robustness of the research with respect the parameter estimates. This section briefly describes the calibration of some parameters and presents the values of the parameters that are determined exogenously (refer to Annabi et al., 2006 for a detailed calibration of each parameter).

[49] We do not explicitly model labour migration between rural and urban due to the structure of data. Thus, the data does not provide information about the spatial location of different types of labour. However, the assumption of perfect mobility within agriculture (industries mainly classed as urban) and non-agriculture (industries mainly classed as rural) sectors may be considered as a proxy for rural-urban labour mobility.

5.2.13.1. Calibration of the parameters of the production block

The parameters (B_a^{VA} and δ_a^{VA}) of the value added can be obtained from Equations (3) or (4). In this process, VAD_a, LDC_a and KDC_a are the initial quantities obtained from SAM, and all the prices are set to unity. Following Harberger (1962), the 'unit convention' is used, whereby a value of unity is chosen for all factor and commodity prices as well as exogenous prices in the base year. In this way, the benchmark solution is expected to reproduce the state of the economy in real terms.

$$\delta_a^{VA} = \left(\frac{wc_a}{PVAD_a}\right)\left(\frac{LDC_a}{VAD_a}\right)^{\frac{1}{\sigma_a^{VA}}}$$

Notice that $\sigma_a^{VA} = \dfrac{1}{1+\rho_a^{VA}}$

Since prices are set to unity in the base solution the previous equation becomes

$$\delta_a^{VA} = \left(\frac{LDC_a}{VAD_a}\right)^{\frac{1}{\sigma_a^{VA}}}$$

With the value of δ_a^{VA} determined, B_a^{VA} is defined as follows

$$B_a^{VA} = \frac{VAD_a}{\left[\delta_a^{VA} KDC_a^{-\rho_a^{VA}} + \left(1-\delta_a^{VA}\right) LDC_a^{-\rho_a^{VA}}\right]^{\frac{1}{\rho_a^{VA}}}}$$

The same procedure is also used to estimate the scale and distribution parameter values for the Armington and CET functions. Notice that δ_a^{VA} and B_a^{VA} can be determined only after σ_a^{VA} has been exogenously supplied or econometrically estimated. This problem does not arise in the cases where Cobb-Douglas or Leontief functions are used because their elasticities of substitution are unity and zero, respectively. Therefore, their parameters are uniquely determined from base data.

We rely on a literature search for the elasticities used for calibration. These are presented in Table 32. They are the elasticities in value added σ_a^{VA}, the elasticities in composite labour σ_a^{LD}, the elasticities in composite capital σ_a^{KD}, the elasticities in imports σ_m^{M}, the elasticities of transformation $\sigma_{a,x}^{X}$ and price elasticity of world demand of exported commodity σ_x^{XD}. The trade elasticities and elasticities of substitution between labour and capital, as well as demand elasticities and Frisch parameters used for calibration and sensitivity analysis are based on Annabi et al. (2006), Njuguna Karingi and Siriwardana (2003), Bevan et al. (1987), McMahon (1986) and Maitha (1973). Annabi et al. (2006) provide a database of estimates for developing countries of the free parameter. Their analysis shows that the economically estimated trade elasticities for developing countries range from 0.20 (for Armington) and 0.56 (for CET) to 3.44 (for Armington) and 2.79 (for CET) for several sectors. Most studies on developing countries, including studies on Kenya by McMahon (1986) and Maitha (1973), use values of the elasticities between labour and capital which range from 0.09 to 1.72 for several sectors.

Table 32: Elasticities used for calibration

	Agriculture	Manufactured food	Manufacturing	Private services	Public services
Elasticity in value added	0.5	0.6	0.7	0.6	0.6
Elasticity in composite labour	0.5	0.5	0.5	0.5	0.5
Elasticity in composite capital	0.8	0.8	0.8	0.8	0.8
Elasticity in import CES	1.5	1.3	0.8	0.4	0.4
Elasticity in export CET	1.5	1.3	0.8	0.4	0.5
Price elasticity of world demand of exported commodity				2.0	

Source: Based on the estimates found in the literature and are similar to those used for Kenya by Njuguna Karingi and Siriwardana (2003)

5.2.13.2. Calibration of a linear expenditure system (LES)

The other parameters required before the model can be solved are those of the consumer demand system. The LES does not assume unit income elasticity. The calibration of a LES function is not as easy as that of a C-D function or a CES function, as minimal consumption levels must also be determined. Two methods can be used, depending upon the availability of estimates for income and price elasticities and upon estimates for Frisch parameters (Annabi et al., 2006). Frisch parameters measure the ratio of total consumption to discretionary (see Annabi et al., 2006 for details). From Equation (19), the income elasticity is given respectively by

$$\sigma^{Y}_{c,h} = \frac{\partial \ln C_{c,h}}{\partial \ln CTH_h} \Rightarrow \sigma^{Y}_{c,h} = \beta^{LES}_{c,h} \frac{CTH_h}{PC_c C_{c,h}}$$

This implies

$$\beta^{LES}_{c,h} = \frac{\sigma^{Y}_{c,h} PC_c C_{c,h}}{CTH_h}$$

The income elasticity is greater than zero, meaning that there are no inferior goods, whereas the cross-price elasticity is less than zero, showing that all goods are substitutes for each other. This substitutability between goods arises mainly from the additive nature of the utility functions underlying LES. Another drawback of the Stone-Geary utility function is the absence of complementarity between goods.

It is readily verified from Equation (19) that the household budget constraint $\sum_c PC_c C_{c,h} = CTH_h$ implying that $\sum_c \beta^{LES}_{c,h} = 1$. This requires the elasticities to fulfil the condition $\frac{\sigma^{Y}_{c,h} PC_c C_{c,h}}{CTH_h} = \sum_c \beta^{LES}_{c,h} = 1$

As the assigned values of income elasticities may not satisfy this condition a priori, the elasticities are adjusted proportionally as follows:

$$\sigma^{Y}_{c,h} = \frac{\overline{\sigma^{Y}_{c,h}} CTH_h}{\sum_{ca} \overline{\sigma^{Y}_{ca,h}}\, \overline{PC_{ca}}\, \overline{C_{ca,h}}} \Rightarrow \beta^{LES}_{c,h} = \frac{\sigma^{Y}_{c,h} \overline{PC_c}\, \overline{C_{c,h}}}{\overline{CTH_h}}$$

The Frisch parameter is defined as

$$Frisch = -\frac{CTH_h}{CTH_h - \sum_c PC_c C_c^{\min}}$$

To estimate $\left(C_c^{\min}\right)$, we need to derive total committed consumption, which we assume to be 67 per cent and 60 per cent for rural and urban households, respectively. This amounts to assuming a Frisch parameter value of -3.0 and -2.5 for the rural and urban households. Annabi et al. (2006) found that Frisch parameters estimated for developing countries range from -2.94 to -7.57. Income elasticites from econometric estimation for developing countries are found to be, for instance, 0.47 and 0.71 for agricultural products in Madagascar and Ghana, respectively, and approximately 1.41 for non-food.

So from Equation (19)

$$PC_c C_{c,h} = PC_c C_{c,h}^{\min} + \beta_{c,h}^{LES} \frac{CTH_h}{-Frisch} = PC_c C_{c,h}^{\min} - \beta_{c,h}^{LES} \frac{CTH_h}{Frisch}$$

$$PC_c C_{c,h}^{\min} = PC_c C_{c,h} + \beta_{c,h}^{LES} \frac{CTH_h}{Frisch}$$

The calibration is then

$$\overline{C_{c,h}^{\min}} = \overline{C_{c,h}} + \beta_{c,h}^{LES} \frac{\overline{CTH_h}}{\overline{PC}_c Frisch}$$

The estimated LES and the associated elasticities used in the simulations are presented in Table 33 below.

Table 33: Parameters of the Linear Expenditure System: income elasticity and Frisch parameter

	Rural Households		Urban Households	
	Income elasticity		Income elasticity	
	Low income	High income	Low income	High income
Agriculture	0.90	0.60	0.7	0.50
Manufactured food	0.50	0.60	0.7	0.80
Manufacturing	1.20	1.60	1.10	1.40
Private services	0.90	1.20	0.80	1.10
Public services	0.6	0.8	1.3	1.5
Frisch parameter	-4.0	-3.0	-3.0	-2.0

Source: Based on the estimates found in the literature and are similar to those used for Kenya by Njuguna Karingi and Siriwardana (2003)

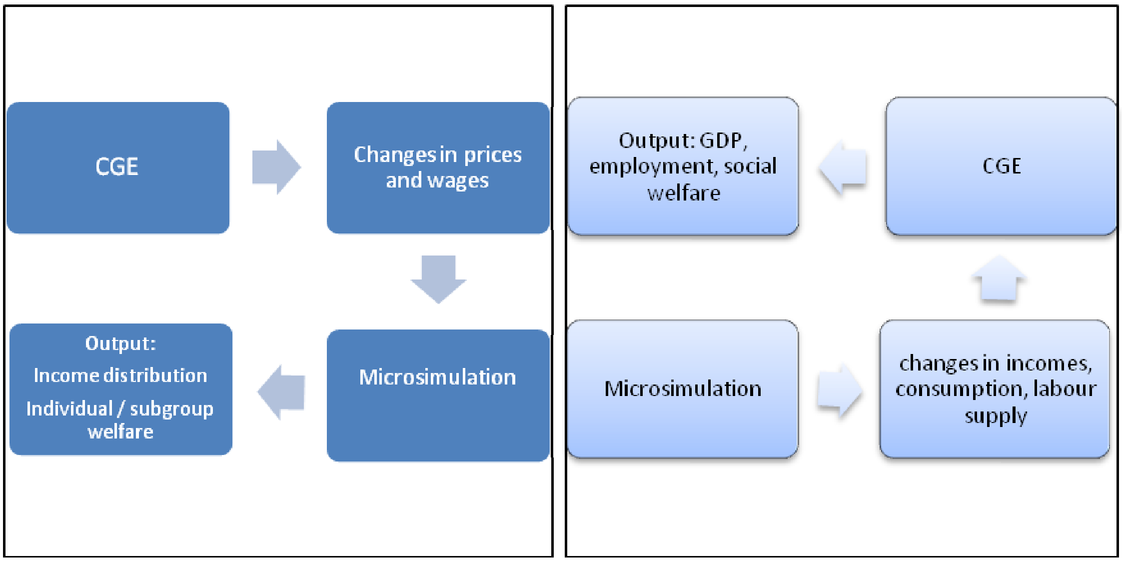
5.3. Micro-simulation and the analysis of poverty

5.3.1. Introduction

In this section micro data from a household survey are linked to the CGE model developed in the previous section to analyse the impact of change in tourism spending upon poverty in Kenya. CGE models for poverty and income distribution analysis can be classified in three categories: (1) representative household approach; (2) integrated multi-household approach and (3) macro (CGE)-sequential micro simulation approach. The third approach is used to investigate whether or not tourism growth contributes to the reduction of poverty in Kenya. The use of CGE-Micro simulation is motivated by the failure of the first two approaches to account for within-group inequality and for the behaviour of individual agents. Micro simulation makes it possible to account for the impact of policy change in terms of changes in the income distribution as well as in the distribution of gains and losses, and to account for, in a dynamic framework, the accumulation effect of capital with respect to time and the household income resulting from this. Davies (2009) argues that while micro-simulation is essential in capturing distributive effects of policy changes, it is limited by the fact that it is often non-behavioural and by its inability to model prices, wages and macro variables. CGE models, on the other hand, lack the rich distributional detail found in the micro-simulation. Consequently, combining the two approaches is necessary to get an accurate distributional and poverty analysis.

Micro simulation can be defined as a method that works with the characteristics (and behaviour) of microeconomic units (individuals or households) and examines the impact of policy at the micro level. The link between CGE and micro simulation is made by mapping changes in wages and employment, and product prices, from the CGE to the micro simulation. Two basic types of micro simulation models exist: (1) the fully integrated micro-macro approaches, which integrate the household survey into the CGE model; (2) the top-down models, which consist of simulating a policy at the macro-level, based on some aggregate representation of household behaviour, possibly using representative households (Figure 31). The simulated changes in prices, wage rates, and self-employment incomes are then passed down to a micro-simulation module.

Figure 31: Top-down (left panel) and bottom-up (right panel) approaches to macro-micro simulation (own illustration)



There has been, during the last twenty years, a growing interest in linking macro-economic CGE models to micro-simulation models based on individual data. These models have been widely applied to study the distributional impact of fiscal and tariff reforms, subsidies and transfers, public spending on education and health and employment programs. The ability of these so-called CGE-MS models to take into account micro-macro linkages makes them well suited for the analysis of the poverty impact of economic policies upon poverty. Some of the important contributions to the literature on CGE-MS models include Bourguignon et al. (2003), Cockburn (2001), Cogneau and Robilliard (2001 and 2004), Boccanfuso et al. (2003), Decaluwé et al. (1999a and 1999b) and Savard (2003).

5.3.2. An integrated CGE micro simulation model

We apply the integrated micro simulation approach as described by Cockburn and Decaluwé (2006). The methodology employs both a standard representative-household CGE model and data from a nationally representative household survey with complete information on household incomes and expenditures. This implies a reorganisation and reconciliation of the household survey data with the SAM underlying the initial CGE model.

This process entails the following three steps:

> "(i) Reorganisation of the household survey data into household-specific income and expenditure vectors defined in terms of the household income sources and expenditure categories used in the initial CGE model; (ii) integrating and reconciling these vectors with the original SAM through adjustments in one or both, and (iii) introducing all survey households in the initial CGE model" (Cockburn and Decaluwé, 2006, p. 7).

5.3.3. Poverty analysis

The analysis is based on the size distribution of income as specified in the SAM for Kenya from the year 2003. The impact of tourism growth on poverty is accounted for by changes in the Foster-Greer-Thorbecke (FGT) poverty indices (Foster et al., 1984). FGT is a one of the most important poverty measures. It is one which, due to its simplicity, is also widely applied in empirical work. It is based on normalised poverty gaps, i.e. the term in the round brackets in Equation (11). Poverty gaps are then raised to the α power to capture how deep poverty is.
The definition is as follows:

$$P_\alpha(y;z) = \frac{1}{N}\sum_{i=1}^{q}\left(\frac{z-y_i}{z}\right)^{\alpha}, \qquad (11)$$

where y is a vector of household incomes in increasing order, z is the poverty line (in income units), N is the total number of households, q is the number of poor households and α is a parameter.

For $\alpha = 0$, $P_0 = \frac{q}{N}$,

where P_0 is the simple head-count index, as it measures the incidence of poverty as the proportion of total population below the poverty line. In other words, the head-count ratio gives the percentage of population which is not above the poverty line, i.e. the ratio of the number of poor people to the total population.

For $\alpha = 1$, $P_1 = \frac{1}{N}\sum_{i=1}^{q}\left(\frac{z - y_i}{z}\right)$,

where P_1 is the poverty gap index, as it reflects how far the poor are from the poverty line. For any individual, the poverty gap is the distance between the poverty line and his/her income. Aggregating individual poverty gaps for all individuals, gives the aggregate poverty gap.

And for $\alpha = 2$, $P_2 = \frac{1}{N}\sum_{i=1}^{q}\left(\frac{z - y_i}{z}\right)^2$,

where P_2 is the poverty severity index, as it gives an indication of the degree of inequality among the poor. Moreover, poverty severity reveals how difficult it is to climb out. Based upon poverty gap measures, the poverty severity index gives more weight to the extreme poor by squaring the distance to the poverty line. In other words, it measures inequality between sub-populations of the poor.

One convenient feature of the FGT class of poverty measures is their additive decomposability and their ability to calculate the contribution of each population sub-group to national poverty. However, they do not answer the question about what the best value of α is.

The construction of the micro household module relies on datasets from the KIHBS 2005/06. The data used to analyse poverty comes from the Kenya Integrated Household Budget Survey (KIHBS) (2005/06), which is the most recent survey available. Prior to KIHBS, the most recent household survey that collected detailed expenditure data required for poverty measurement was the 1997 Welfare Monitoring Survey (Government of Kenya, 1997). The KIHBS was undertaken to provide indicators and to provide the data needed to measure living standards and poverty in Kenya, with particular emphasis on updating the consumer price index, poverty and inequality, and the System of National Accounts. It also contained data on demographics, housing, education, health, agriculture and livestock, enterprises, expenditure and consumption, among others. The data collection phase was implemented over a period of 12 months, and covered 13,430 households in 1,343 clusters in the 70 districts.

According to the 2005 KIHBS, Kenya has a mean household size of 5.1 persons. The survey also showed that agriculture is a key sector of the country's economy, contributing about 25 per cent of the GDP and providing employment to an estimated 70 per cent of the labour force. It was found that that 68.8 per cent of all households in Kenya are engaged in crop farming activities and that two-thirds of households in Kenya are engaged in wholesale and retail trade sector, while manufacturing is the second most important sector. Almost half of households used own savings, while 15.1 per cent used gifts from friends to start their business. Just over 30 per cent of all households were able to have access to loans.

The household module comprises a representation of the income structure and expenditure behaviour of households. We first reorganised the KIHBS data into household-specific income and expenditure vectors. In order to define the correct proportion of household size, we scaled each set of survey observations up to the population size. We generated percentages of total income or expenditure, household size as well as the percentage of poor in a specific location (rural or urban) by household groups from the KIHBS survey, so as to reconcile the survey and the SAM data.

The data are adjusted for inflation to 2003 using the Kenyan consumer price index from IMF (EconStats, 2013). Through the integration of the 13,430 households in the CGE model, we are able to endogenize the new household income vectors to take account of the accumulation of factor endowments over time. The FGT indices are computed using the simulated income vectors for each year of the simulation. The micro simulation model is computed using DAD software, a tool for income distribution analysis (Duclos et al., 2001).

5.4. Chapter summary

This chapter documented the theoretical structure of the dynamic CGE model developed to study the effects of tourism shocks on Kenya's economy at the national level. The model presented in this research is a multi-sector, sequential dynamic CGE model and the corresponding SAM was developed. The different closures of the model as well as the elasticities/parameters needed for the implementation of the core model were presented. The model is formulated as a system of nonlinear equations solved recursively as a constrained non-linear system with Generalized Algebraic Modelling System (GAMS). GAMS is a language for setting up and solving mathematical programming optimisation models. It is an all in-one package that allows one to specify the structure of the optimisation model and to calculate data that goes into the model.

The model includes a sequential (intra-period) dynamic module, based on adaptive expectations as opposed to forward-looking behaviour where expectations are rational. In order words, the evolution of the economy over time is described by a sequence of single-period static equilibria, connected through capital accumulation and changes in labour supply. In each period the capital stock is updated with a standard capital accumulation equation involving capital depreciation rate and investment by sector. Total labour supply increases at the same rate as exogenous population growth. The model is formulated as a static model that is solved recursively over a 13-period time horizon.

With respect to the net social benefit of tourism growth, that is, poverty and income distribution effects of tourism changes on the Kenyan economy, these effects cannot be satisfactorily captured with CGE models. This chapter showed that the poverty implications of a policy change or demand shock can be captured by linking CGE model to the micro simulation model. This chapter also gave an overview of the 2005/06 Kenya Integrated Household Budget Survey, which contains the data needed to measure living standards and poverty in Kenya. The next chapter deals with the simulation design and its outcomes.

CHAPTER 6. MODEL APPLICATION

6.1. Introduction

This chapter applies the CGE model developed in Chapter 5 to estimate the effect of changes in tourism spending on the economy of Kenya at the national level. Given the data constraints, the analysis focuses on national level projections for the period 2003-2015. In doing so, the chapter adds to the existing literature on tourism in Kenya in many ways. Firstly, it quantifies the impact of tourism growth on Kenya's economy at a highly disaggregated level. Secondly, this chapter investigates the link between tourism growth and poverty reduction, as opposed to previous CGE-studies of tourism expansion, which focused on macro-economic, sectoral and income effects. Thus, the macro-micro linkages are considered. Thirdly, the dynamic effects of tourism growth are analysed, an aspect which has not received adequate attention in previous studies. Fourthly, a systematic sensitivity analysis of the key parameters and elasticities in the database will be carried out.

The rest of the chapter is structured in the following manner. Section 6.2 describes the scenario conducted to capture the effect of tourism. This is followed by the simulation results in Section 6.3. This section presents in detail the macro-economic, sectoral, welfare, distributional and poverty results of the different simulations. Section 6.4 discusses the result of the sensitivity analysis. The chapter concludes with a chapter summary (Section 6.5).

6.2. Simulation design

The research does not make explicit the source of the stimulus to the tourist sector. Tourism boom may occur as the result of policies designed to improve the attractiveness of the country as an international tourist destination. Such policies could be, for example, investing in marketing abroad or improving access to the country for foreign visitors by aggressively pursuing mutually beneficial liberalised air agreements. The increase in tourism may also occur as the result of an exogenous increase in demand. In CGE models, tourism expansion is generally modelled as an increase in total tourism spending or a reduction or elimination of trade restrictions on the tourism industry (e.g. hotel room tax) or related industries (e.g. carbon taxes on transportation services). This requires information on both the economic structure and the size of tourism as well as the likely path for the future growth of the economy and the sectors within it.

The economic structure of Kenya as well as the size of its tourism sector has been analysed in previous sections. Moreover, international tourist arrivals and spending in Kenya grew at an average of 4.6 per cent p.a. between 2003 and 2013, totalling approximately 1.5 million arrivals in 2013 (WTTC, 2013). With respect to future growth, it is forecast that domestic and foreign travel spending will rise by 4.7 per cent on average p.a. from 2013-2023 (WTTC, 2013). In this context, we simulate the effects of a 5 per cent annual growth of tourism spending on the Kenyan economy. Using 2003 as a baseline, this corresponds to a yearly increase in tourism spending of KSh 2,723 million (or 0.2 per cent of GDP). It should be noted that the tourism sector accounted for 4.15 per cent of total GDP in 2003 (KSh 1,311 billion).

6.3. Simulation results

The simulation results are reported in terms of macro-economic and sectoral impacts and in terms of volume, price, income, consumption, welfare and poverty impacts.

6.3.1 Macro-economic results

This section presents the impact of a change in tourism spending at the macro-economic level. The macro-economic effects of the 5 per cent increase in tourism are summarized in Table 34. Compared to the baseline scenario, macro-economic results indicate that the increase in tourism leads to an increase in the demand of non-tradable services.[50] The resulting relative higher prices of non-tradable services

[50]It should be noted that since the production of the majority of tourist goods and services, such as recreation, domestic air transport, restaurant meals etc., never leave the countries, they are considered non-traded according to standard definitions. However, expenditures by foreign tourists on those goods and services represent a trade flow and are therefore treated as exports. This stems from the international mobility of consumers.

(20 per cent from the first (2003) to last (2015) period as compared to 13 per cent for tradable goods) induces an increase in overall prices and changes in the pattern of domestic production, which influences the income and expenditure sides of the economy. The consumer price index increases annually by 0.19 per cent on average, accumulating to an overall percentage change in price index of 1.88 per cent from the first to last period.

Table 34: Macroeconomic effects of simulation

Effects of additional tourism growth (percentage deviations change from CGE-baseline results)				
	Earlier time period (t=1)	Period (t=6)	Last period (t=13)	Total for the whole time period (2003-2015)
Real GDP	0.31	0.28	0.26	3.67
Private consumption	0.12	0.11	0.14	1.40
Rural household	*0.10*	*0.10*	*0.13*	*1.34*
Urban household	*0.13*	*0.12*	*0.15*	*1.46*
Capital stock	0.67	0.63	0.63	8.31
Total investment	0.61	0.58	0.57	7.61
Private investment	*0.72*	*0.72*	*0.74*	*9.47*
Public investment	*0.36*	*0.17*	*0.06*	*2.27*
Government income	0.27	0.27	0.25	3.35
Government transfer	0.27	0.23	0.18	2.92
Household income	0.29	0.25	0.20	3.20
Enterprise income	0.34	0.29	0.27	3.88
Total export	-0.07	-0.00	0.13	2.63
Total import	0.27	0.26	0.26	34.1
Domestic demand	0.33	0.32	0.52	67.69
Labour demand (average all labour types)	0.03	0.02	0.009	9.82
Return to labour	0.29	0.25	0.20	9.64
Return to capital	0.16	0.11	0.05	51.34
Consumer price index	0.20	0.16	0.08	1.88
Savings				
Government	*-0.10*	*-0.93*	*-0.89*	*-12.18*
Households	*0.28*	*0.25*	*0.20*	*63.27*
Enterprise	*0.34*	*0.30*	*0.27*	*3.84*

The 5 per cent increase in tourist spending generates an annual percentage change in GDP of 0.3 per cent on average, aggregating to an overall percentage change in GDP of 3.7 per cent from the first to the last period. Furthermore, the expansion of tourism causes income increases, allowing consumers to enjoy a small increase in private consumption, which increases annually by 0.12 per cent on average, accumulating to 1.4 per cent (on average) for single household groups over the whole time period. Growth in the aggregate volume of private consumption increases by a small percentage due to increases in prices. In the last time period there is a reduction in overall prices (0.08 per cent), resulting in a reduction in GDP (0.26 per cent). The slight decrease in consumer prices stimulates total private consumption, which increases by 0.14 per cent, as well as domestic output, which increases by 0.12 per cent.

On the expenditure side, the tourism expansion stimulates capital formation (8.31 per cent for the whole time period) and generates an increase in the growth rate of aggregate real investments, which grow by 0.61 per cent in the first period, 0.58 and 0.57 per cent in the periods 6 and 13 (2008 and 2013), respectively, resulting in an overall investment growth of 7.6 per cent over the whole time period. Regarding the contribution of each investment aggregate to total investment, results show that private investments make the largest contribution to total investment (9.47 per cent as compared to 2.27 per cent for public investments).

With respect to trade, the simulated percentage changes for traditional exports of agricultural commodities and some manufactured goods are negative. The changes for total export are negative in the first period (-0.07 per cent) and positive in the last period (0.13 per cent). However, despite the negative impact in the first period, the annual increase in tourism by 5 per cent results in an overall increase in exports of 2.63 per cent over the 13 growth period (2003-2013). Moreover, in time period 13 (i.e., allowing for adaptations in the stock of capital) total exports increase moderately.

Total imports, on the other hand, increase by 0.27 per cent in the first period and 0.26 per cent in the last period, leading to a balance of payments deficit. Over the whole period, total imports accumulate up to 34.1 per cent, outweighing the increase in total exports (2.7 per cent). The import content of the induced investment, combined with additional growth in the levels of domestic demand, contributes directly to the deterioration in the trade balance. The resulting appreciation of the real exchange rate (0.34 per cent) generates substitution towards imports. The fall in exports explains why the terms of trade improve and why aggregate exports grow by only a very small percentage. The improvement in the terms of trade and the reduction in the activity levels of land-intensive export industries, namely agriculture, allow an increase in the real wage rate.

On the income side of the economy, average wage rates increase (0.25 per cent on average per annum) more than average returns to capital (0.19 per cent on average per annum). Furthermore, the growth of tourism affects the fiscal position of the government favourably by increasing the government revenue from all taxes by 0.26 per cent in the first period and 0.24 per cent in the last period. Government revenue growth accumulates to 3.35 per cent over the whole time period. The 5 per cent annual increase in tourism spending generates an aggregate annual increase in household income of 0.24 per cent and an annual increase in enterprise income of 0.29 per cent.

There is an increase in savings (savings are assumed to be a fixed share of income) of all household groups in the first period (0.28 per cent on average) with a slight decline in the last period (0.20 per cent). Enterprise savings also increase (0.34 per cent in the first period), while government savings decline by 0.10 per cent in the first period, aggregating to -12.18 per cent over the period 2003-2013. These macro-economic results are in line with previous studies mentioned in Chapter 4.

6.3.2 Sectoral results

This section presents the simulation results at the sectoral level. As with the other tourism-based CGE findings outlined earlier, an increase in tourism demand is associated with the shifting of resources from non-tourism sectors, such as agriculture and manufacturing, towards tourism-related sectors, such as accommodation and entertainment. As regards the three sectors of the economy, while the domestic outputs of the agricultural activities fall slightly by 0.02 per cent, manufacturing increases by 1.67 per cent, the output of the services sectors increases by 12.12 per cent over the whole period (Table 35).

Table 35: Results from an annual 5 per cent increase in tourism spending

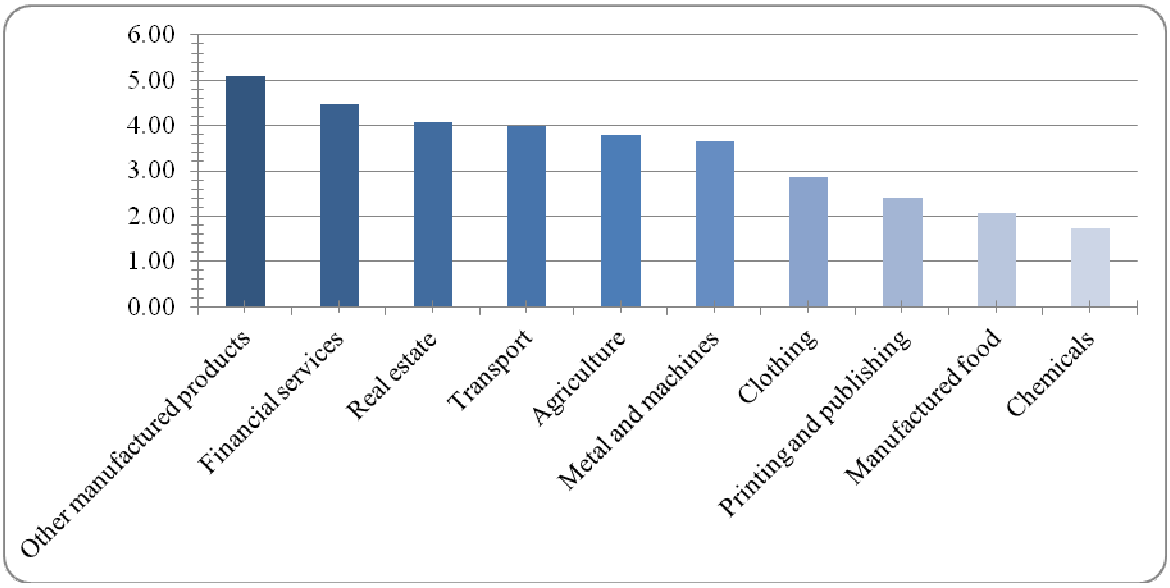
*Initial shares and ratios

	Sectoral shares* (in per cent)		Ratios* (in per cent)		Per cent age change in variables from benchmark across time (total over the whole period)			
	Import	Export	Import/ Consumption	Export/ Output	Import	Domestic supplies	Export	Quantity demanded
Agriculture	4.82	39.18	6.1	33.49	3.8	-0.02	-2.8	0.4
Manufacturing	78.58	45.58	35.35	13.77	17.8	2.04	-6.7	11.69
Services	16.42	15.31	5.7	3.64	12.6	12.1	12.12	12.84

In the cases of agriculture, the fall in domestic sales results in an increased demand for imported commodities (3.8 per cent). Furthermore, the quantity demanded of imported manufacturing increases by 17.8 per cent, while that of services increases by 12.6 per cent for the whole time period. The increased demand for imported manufacturing and imported services may be attributed to the increased activities in the manufacturing and service sectors. In addition, the volume of exports of agricultural and manufactured commodities declines by 2.8 and 6.7 per cent, respectively. In terms of annual percentage change in quantity demanded, the largest positive impact is in the service sector (12.84 per cent over the whole time period).

Output by sector – Figure 32 illustrates the magnitude of tourism shock on imports for 10 sectors aggregated from the 50 industries distinguished in the 2003 SAM. In response to tourism growth, all imports increase by 0.26 per cent on average. Moreover, the real outputs of manufactured products and financial services are among the most positively affected, with increases in imports of 5 per cent and 4.7 per cent for the whole time period, respectively. Moderate growth prospects are projected for manufactured food and chemicals (2.0 per cent and 1.8 per cent, respectively).

Figure 32: Percentage changes in the volume of imports by sector over the whole time period

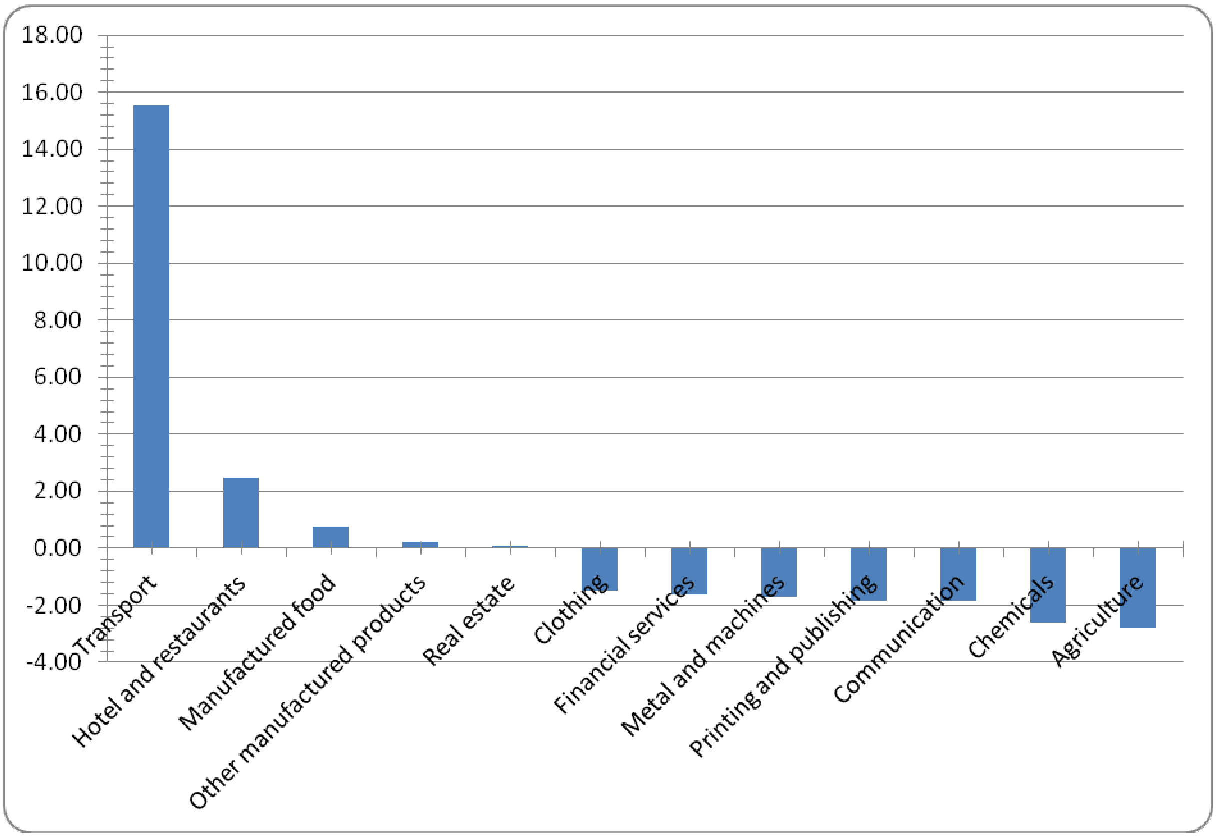


As mentioned earlier, an appreciation of the exchange rate, in parallel with increasing domestic prices (0.16 per cent on average per annum), rental returns (0.20 per cent on average) and wage rates (0.25 per cent on average), has the result that traditional export sectors experience a decrease in their export competitiveness.

Figure 33 shows that tourism expansion leads to the contraction of the traditional exports of agricultural commodities (-2.78 per cent over the entire period) and of import-competing industries[51] (-4.88 per cent). The sectors that are the most positively affected are "transport" and "hotel and restaurants" (15.7 per cent and 2.3 per cent, respectively). Transport in the model includes all transport modes, namely, air, maritime, rail and road.

[51] These are transport equipment, chemicals, textiles, clothing, footwear and other manufactures.

Figure 33: Percentage of world demand for exports by sector over the whole time period



All in all, the results indicate that at the sectoral level there will be losers and gainers from the expansion of tourism. Moreover, service industries catering directly to tourists (sectors whose products or services are consumed by tourists, for example restaurants and hotels, transport services, entertainment and tour operators) as well as industries indirectly supplying tourism-related activities (for example, construction, aircraft maintenance, manufactured food, trade, communication and financial services) are stimulated by the additional expansion of tourism, whereas non-tourism exporters experience weak to negative growth.

6.3.3 Impact on prices

The previous section reported the impact in terms of volumes. This section examines the impact of tourism growth on prices, namely the rental price of capital, land and wages as well as their effect on commodity prices. Following the 5 per cent boom in tourism spending, the relative returns to factors increase. In terms of factor prices, returns to semi-skilled (4.1 per cent) and skilled (3.6 per cent) experience the strongest increase, whereas returns to unskilled labour (2.0 per cent) registers low increases. As illustrated in Table 36, returns to capital increase strongly in indirect tourism sectors such as construction (6.0 per cent) and transport (6.26 per cent) and weakly in sectors that experience a decline of their output, such as agriculture (2.01 per cent) and real estate (2.02 per cent). Returns on labour, on the other hand, increase by 3.2 per cent on average in all sectors, with agriculture recording the strongest growth (3.94 per cent). Returns to land increase by 2.14 per cent. The increase in wage rates causes an increase in the marginal cost of the domestic activities and thus an increase in its average output price relative to the price of the group of the imported activities. This has caused substitution away from the domestic activities and toward the imported activities.

Table 36: Percentage changes in the production factors

	Industry shares in factor employment*			Change (over the whole time period) in price of:		
	Land*	Labour*	Capital*	Land	Labour	Capital
Agriculture	100	28.3	11.6	2.14	3.94	2.01
Construction	0	8.42	2.28	0	3.75	6.0
Trade	0	9.02	4.32	0	3.22	3.28
Hotels and restaurants	0	0.84	1.29	0	3.6	3.27
Transport	0	6.70	7.77	0	3.75	6.26
Communication	0	3.85	2.64	0	3.2	2.23
Finance	0	9.89	4.03	0	2.5	2.26
Real estate	0	6.42	5.62	0	3.42	2.02
Other services	0	11.04	9.15	0	3.0	2.83
Health	0	0.14	4.77	0	2.1	2.1

*initial share

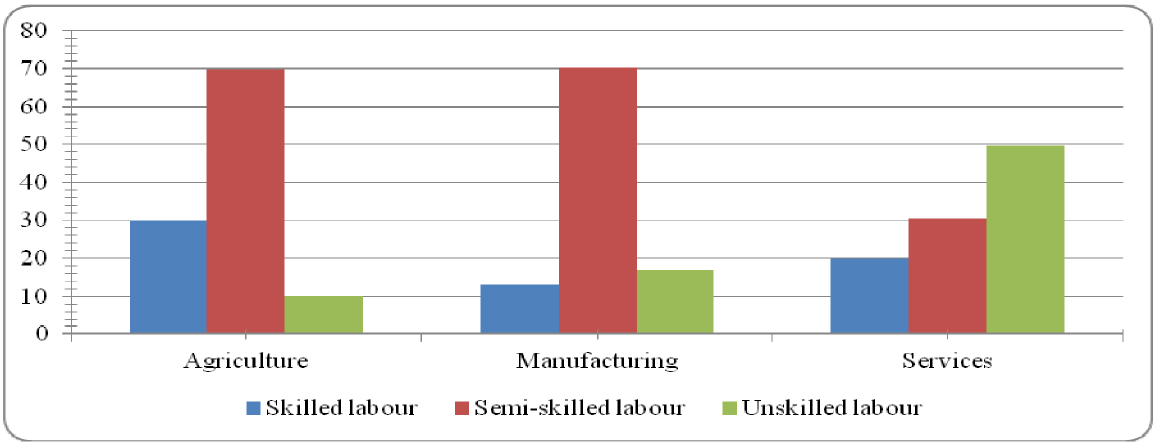
The increase in tourism spending leads to an increase in commodity prices, which increase annually by 0.13 per cent and accumulate to 33.9 per cent over the whole time period. The price of value-added increases by 0.13 per cent on average per annum and that of local products sold on the domestic market by 0.16 per cent, aggregating to 41 per cent. These changes in prices then influence tourism consumption, thereby resulting in a reduction in the growth in tourism consumption to around 0.8 per cent.

Low import prices (0.01 per cent on average, max 1.8 per cent) and high prices of local commodities explain the decline in the domestic demand for locally produced goods and the increase in imports of agricultural and manufacturing goods. The price received for exported commodities (excluding export taxes) increases on average by 0.14 per cent on average, aggregating to 20.98 per cent.

6.3.4 Impact on labour and capital

This section presents the effects of tourism expansion on factor demand. In order to understand the results this section shows in Figure 34 the initial shares of labour by skill type in agriculture, manufacture and services. Taking services as an example, the majority of workers in the services sector are unskilled workers (50 per cent), followed by semi-skilled workers (30 per cent and skilled workers (20 per cent). It is surprising that semi-skilled labour is found in almost equal proportion in agriculture and manufacturing.

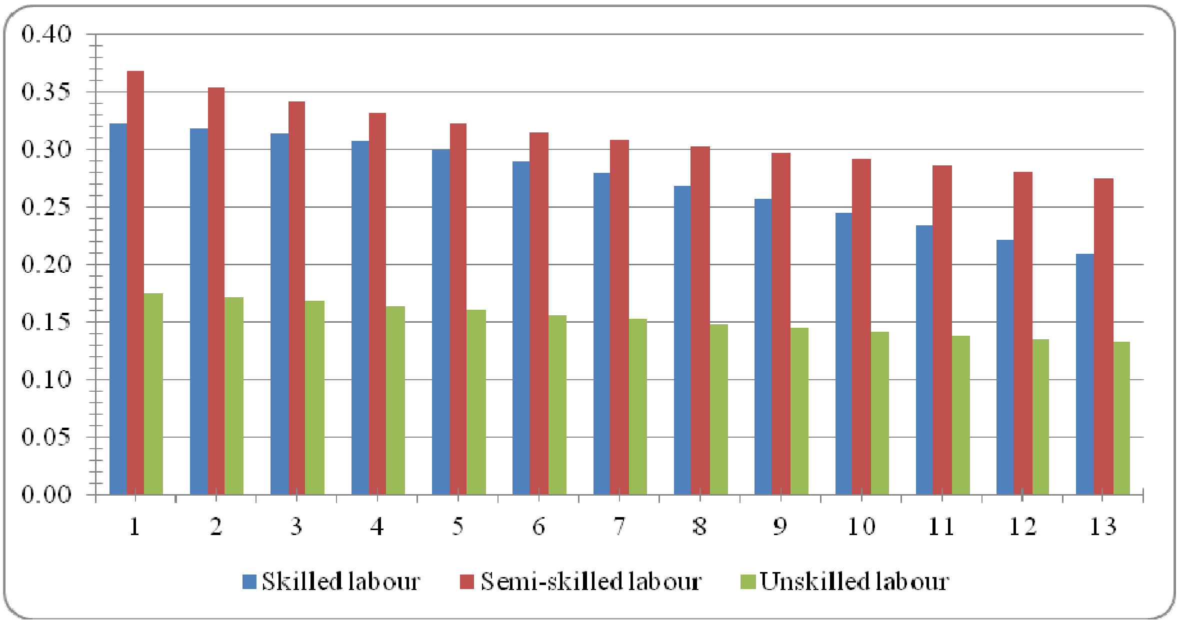
Figure 34: Initial shares of labour by skill type relative to total labour employed in each sector



Source: Kenya SAM 2003

Figure 35 shows the changes in wage rate by type of labour. Results show that return to semi-skilled labour increase strongly (0.31 per cent annually on average) as compared to skilled and unskilled labour, which increase annually by 0.27 per cent and 0.15 per cent (on average), respectively.

Figure 35: Percentage changes in wage rate by type of labour

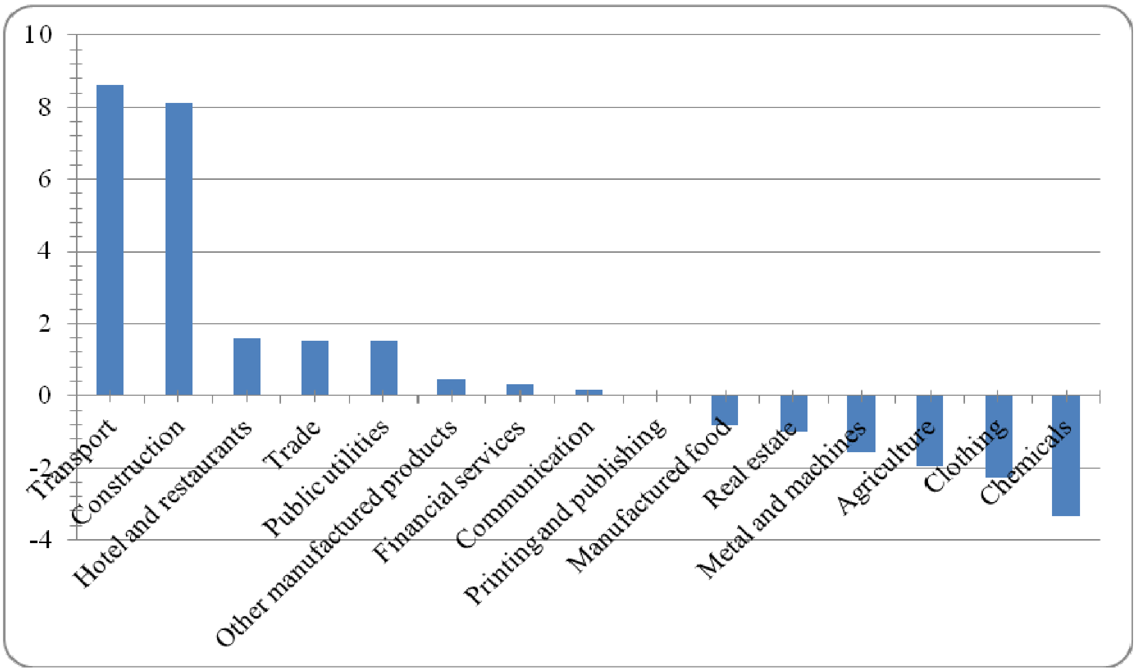


Simulation results indicate that industries closely related to the tourism industry as well as industries indirectly supplying tourism-related activities are among the most positively affected. Non-tourism exporters as well as agriculture experience a decline in factor earnings. It is interesting to see that patterns of demand for the different types of labour (Figures 36, 37 and 38) are identical to patterns of output growth.

Figure 36 through Figure 38 presents the changes in the demand for skilled, semi-skilled and unskilled labour in 15 sectors. Results indicate that industries closely related to the tourism industry as well as industries indirectly supplying tourism activities are among the most positively affected. Demand for skilled and unskilled labour increases strongly in all or almost all sectors as compared to demand for semi-skilled labour. Aggregate demand for skilled, semi-skilled and unskilled labour over the whole time period increases by 11.36 per cent, 0.51 per cent and 16.03 per cent, respectively. Demand for unskilled labour increases by 26.77 per cent in tourism-related and indirect tourism sectors over the whole time period.

On the other hand, demand for all type of labour in non-tourism exporting and import-competing sectors declines. However, skilled and unskilled labour in those sectors fall by smaller percentages as compared to semi-skilled labour.

Figure 36: Percentage changes in the demand for skilled labour over the whole time period



From Figure 36 through Figure 38 it is clear that the industries which draw agricultural workers away from land are the transport and construction industries, which far surpassed the others (3.8 per cent over the whole time period against 2 to 3 per cent on average in other industries).

Figure 37: Percentage changes in the demand for semi-skilled labour over the whole time period

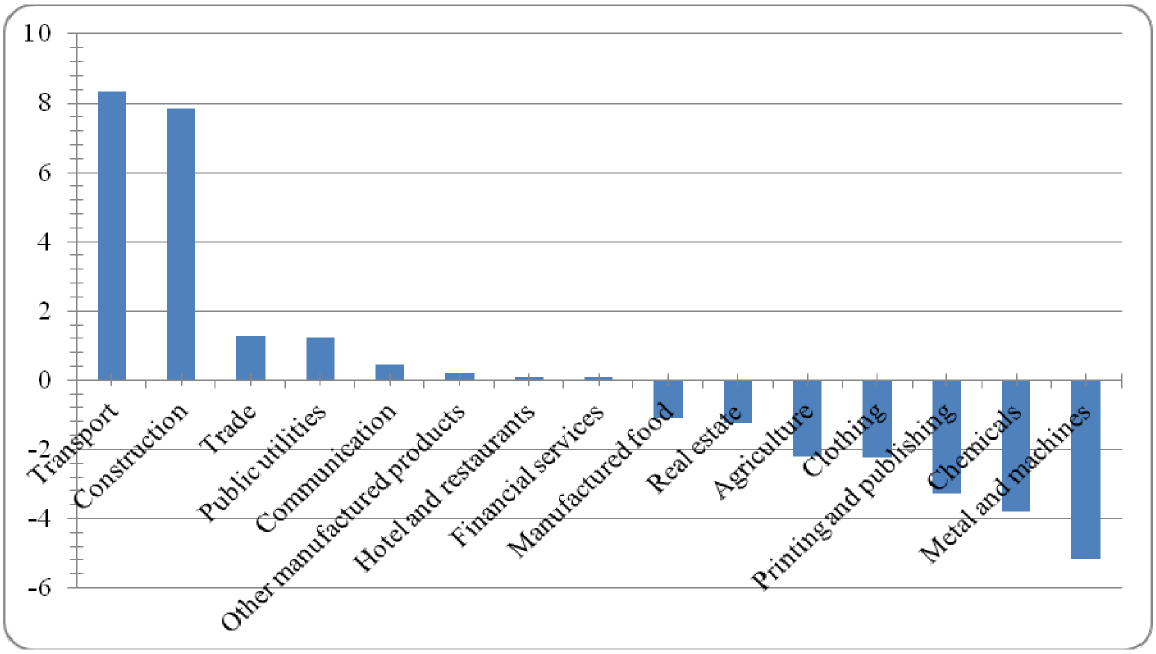
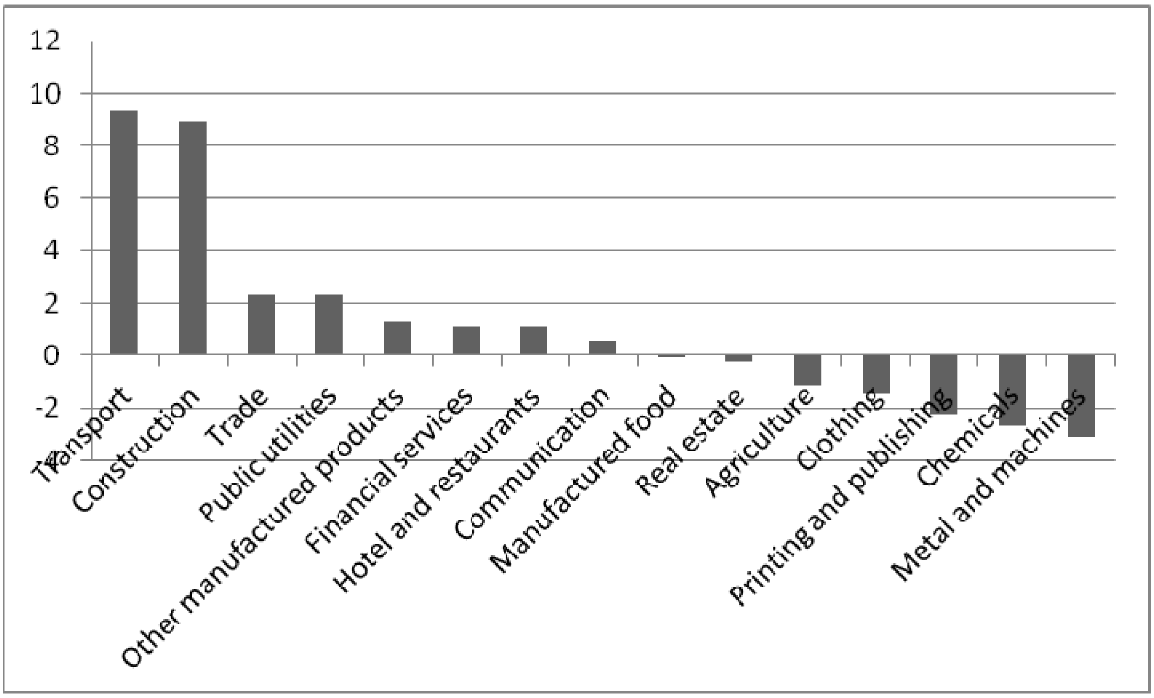


Figure 38: Percentage changes in the demand for unskilled labour over the whole time period



The results are consistent with other studies which have investigated the relationship between tourism and agriculture in developing economies (for example, Bowen et al. 1991; Sahli & Nowak, 2007). In a theoretical work, Sahli & Nowak (2007) argue that in developing economies, whose tourism sector is relatively more labour intensive than the agricultural sector, the net benefit from inbound tourism growth on national welfare will be positive. Moreover, in this case, any inbound tourism growth will lead to the following results:

- an increase in the residents' standard of living (or increase in income);
- a rise in the wage rate and;
- an expansion of tourism output at the expense of agricultural output.

They further argue that the expansion of tourism leads to increases in the relative price of tourism goods and services, resulting in two mechanisms: the first is a price effect and the second a quantity effect.

The rise in the price of tourism goods and services stimulates the tourism production to the detriment of the output of the agricultural sector. The quantity effect, on the other hand, is a result of labour migratory flows. According to the Rybczynski theorem, the arrival of additional workers in a rural area, following the migration flows, brings about an expansion of the more labour-intensive sector, in this case tourism, and a decline of the more land-intensive sector, here agriculture (Sahli & Nowak, 2007).

Tourism's detrimental effects on agriculture result from competition for limited factors of production, namely land, labour and other natural resources. Results indicate that there is a significant pull of labour from agriculture to the indirect sector (construction, transport, mechanical repair work, boats, crafts, entertainment and shopping). Samy (1973) found that of 466 employees of a hotel in a rural part of Fiji, 23 per cent had previously been farmers.

Clearly tourism, especially rural tourism, affects agriculture in many ways. Both industries compete for resources, including land, labour and capital. For instance, the designation of parks reduces the economic opportunity of the farmers. Fishermen have to compete with tourism for shore space. Bowen et al. (1991) argue that linkages can benefit both industries. They found that while traditional agriculture appears to have declined in areas where tourism has developed, production of alternative crops and product in general has increased. Thus, tourism can stimulate the development of new agriculture-based services, such as tours of agricultural production and processing facilities, and guest accommodation on farms.

6.3.5 Impact on income

This section presents the effect of a permanent 5 per cent increase in tourism on income. In order to understand the results, the section begins with the presentation in Table 37 of initial distribution of household income in Kenya by sources. According to 2003 SAM, rural households received 48.06 per cent of their income from wage sources, 20.33 per cent from capital income and 31.63 from land, remittances and other government transfers. The corresponding figures for urban households are 41.63, 36.47 and 21.9, respectively. An increase in wage income is likely to benefit rural households at the bottom expenditure decile more than their urban counterparts. In fact, rural lower income households receive 40.17 per cent of their income from wages, whereas wage income accounts for only 29.15 per cent of the total income of urban lower income households. Similarly, an increase in capital income is likely to benefit the urban household groups (36.47 per cent source of income against 20.33 per cent for rural households) more than the rural household groups.

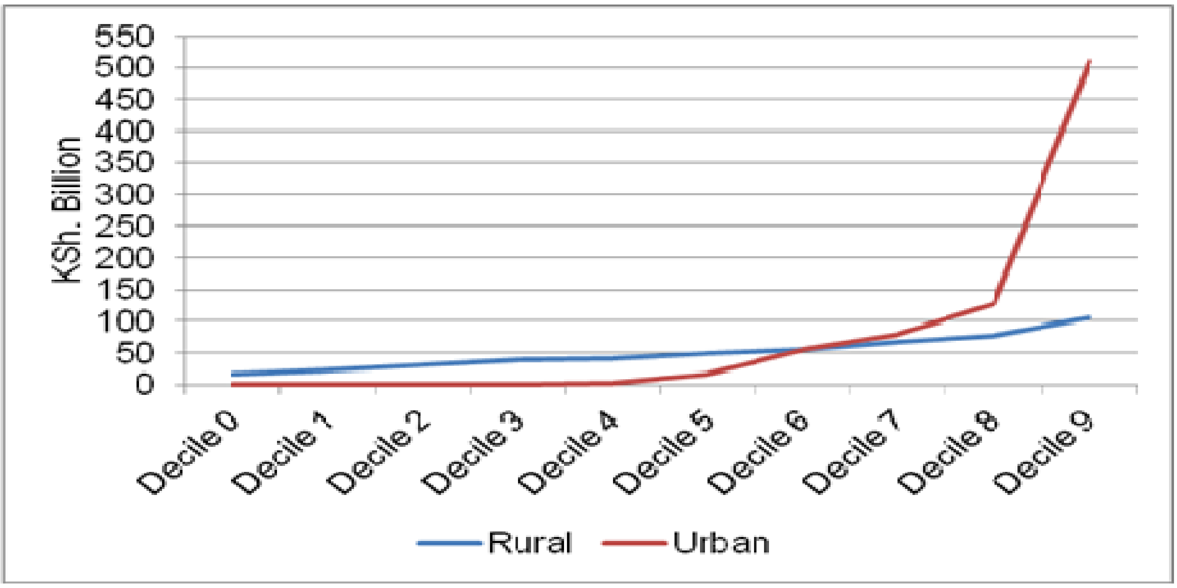
Table 37: Income sources of household groups

	Income share (per cent)		
Labour and capital income of type h households	Wages	Capital	Other income (i.e. land, remittances and transfers)
Average all households	100	100	100
Rural households	48.06	20.33	31.63
Urban households	41.63	36.47	21.9
Rural lower income households	40.17	12.06	47.77
Rural upper income households	54.01	26.79	19.2
Urban lower income households	29.15	44.57	26.28
Urban upper income households	41.80	41.50	16.7

Source: Kenyan SAM, 2003

Figure 39 shows the incomes of both rural and urban households by deciles. Except for the richest deciles (deciles 7, 8 and 9), which holds the most incomes, the total income of rural households is much higher for all deciles. A comparison within regions shows that income disparity is more pronounced in urban areas relative to rural areas. Moreover, as can be seen from Figure 39, the total income for rural households has a gradual slope, implying less income inequality as compared to the urban slope which bends at decile 8 and increases rapidly.

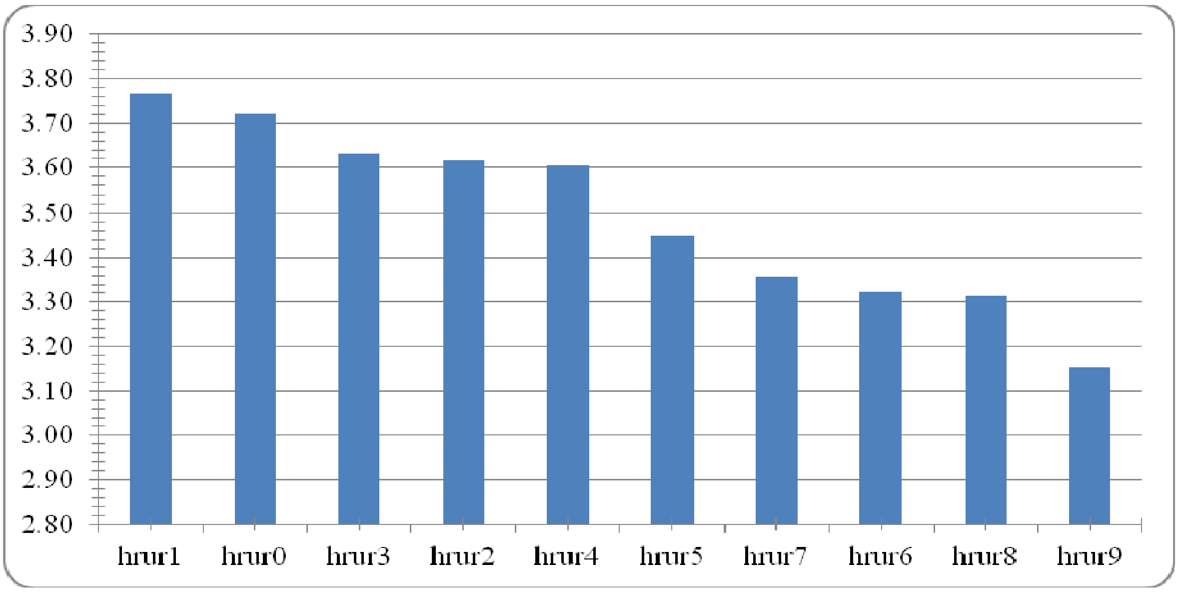
Figure 39: Incomes distribution rural and urban households



Source: 2003 Kenya SAM

The changes in labour and capital income of all households are presented in Figures 40, 41, 42 and 43. As a result of the rise in labour and capital factor returns, income from both wages and capital returns witness an increase from the base values. Urban lower and rural income households at the lowest decile register the largest increase in wage income. With respect to capital, the largest income accrues to urban and rural upper income households.

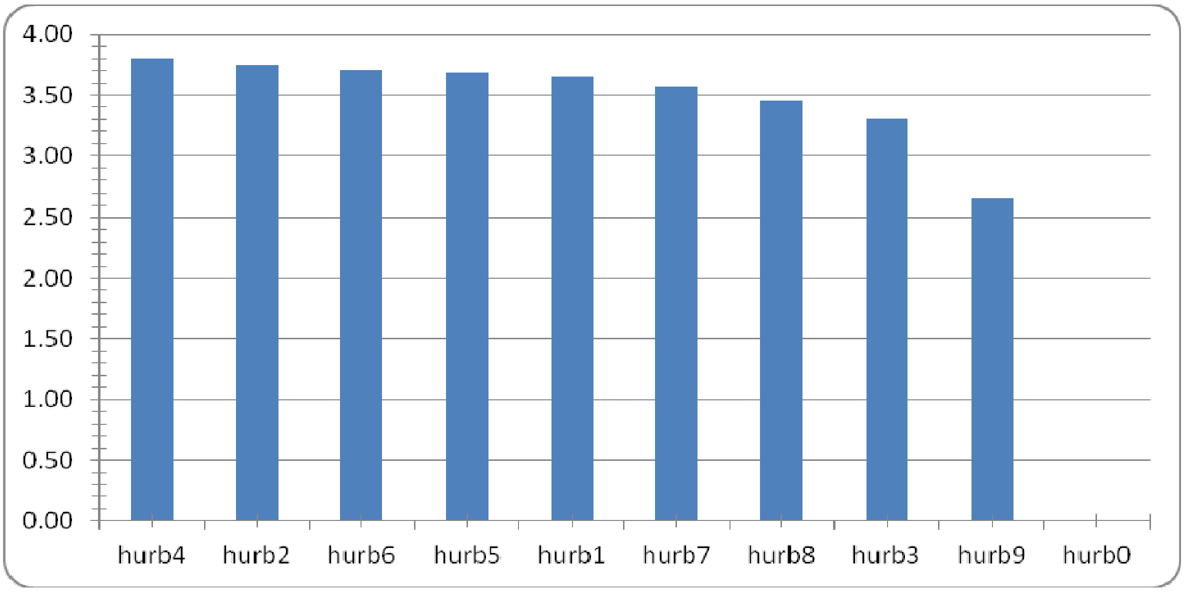
Figure 40: Percentage changes in labour income of rural households



HRUR0 = poorest rural household; HRUR9 = richest rural household

As illustrated in Figures 40 and 41, the labour income of rural households increases to a greater extent strongly (3.5 per cent on average) than the labour income of urban households (3.2 per cent on average). Most importantly, as shown in Figure 39, the labour income of the rural poor (deciles 0, 1, 2 and 3) grows at higher percentages, as compared to the labour income of households at the upper deciles (deciles 8 and 9). With the exception of the household at the upper decile (HURB9), labour income growth is relatively evenly distributed across urban household groups.

Figure 41: Percentage change in labour income of urban households

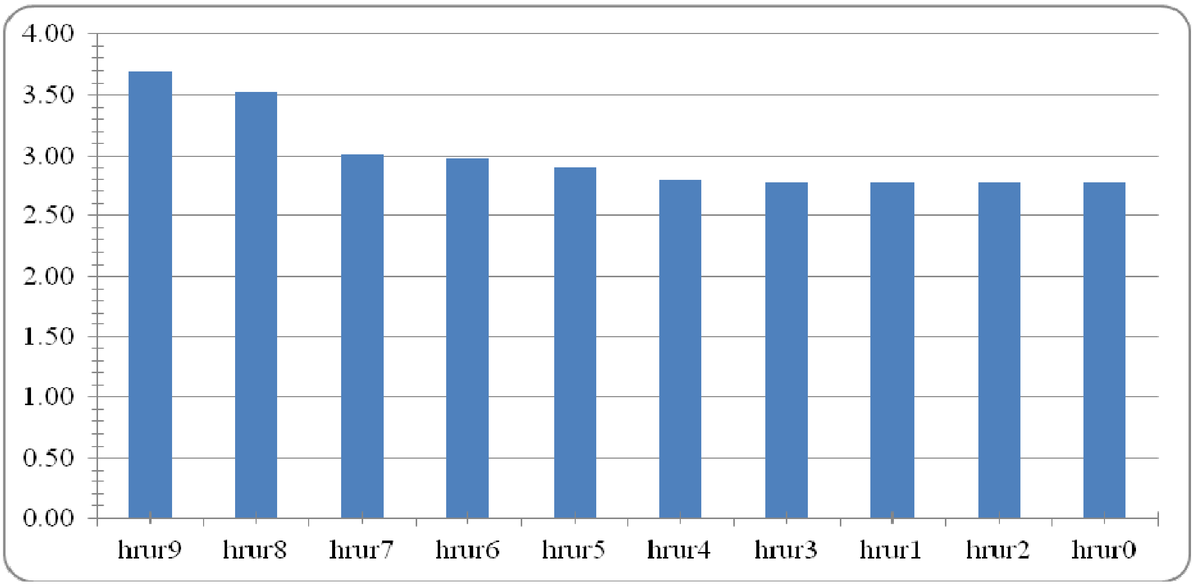


HURB0 = poorest urban household; HURB9 = richest urban household

As mentioned earlier, few urban households fall into the bottom end of the national income distribution. This explains why the value of changes in labour and capital income of the household group at the bottom decile (HURB0) is zero.

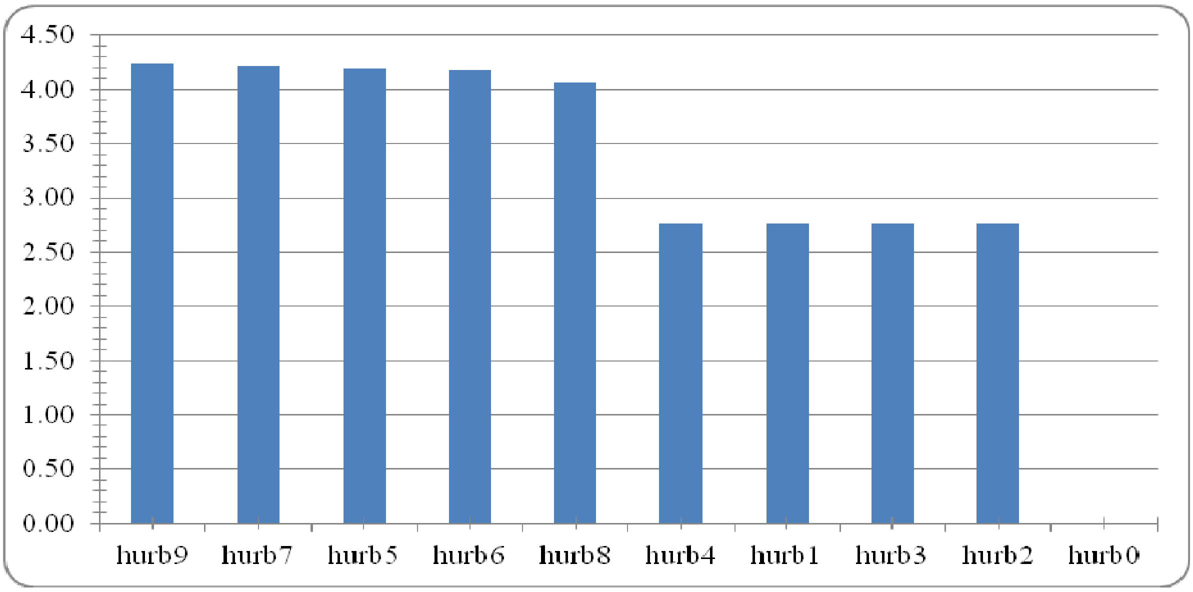
As shown in Figures 41 and 43, the capital income of urban households (4.18 per cent on average) grows strongly as compared to that of their rural counterpart (3.31 per cent on average). A comparison within each subgroup show in both rural and urban households, groups at the upper decile experience a stronger growth of income from capital as compared to household groups at the bottom decile. However, the gap is much more significant within the urban subgroup than within the rural subgroup.

Figure 42: Change in capital income of rural households



HRUR0 = poorest rural household; HRUR9 = richest rural household

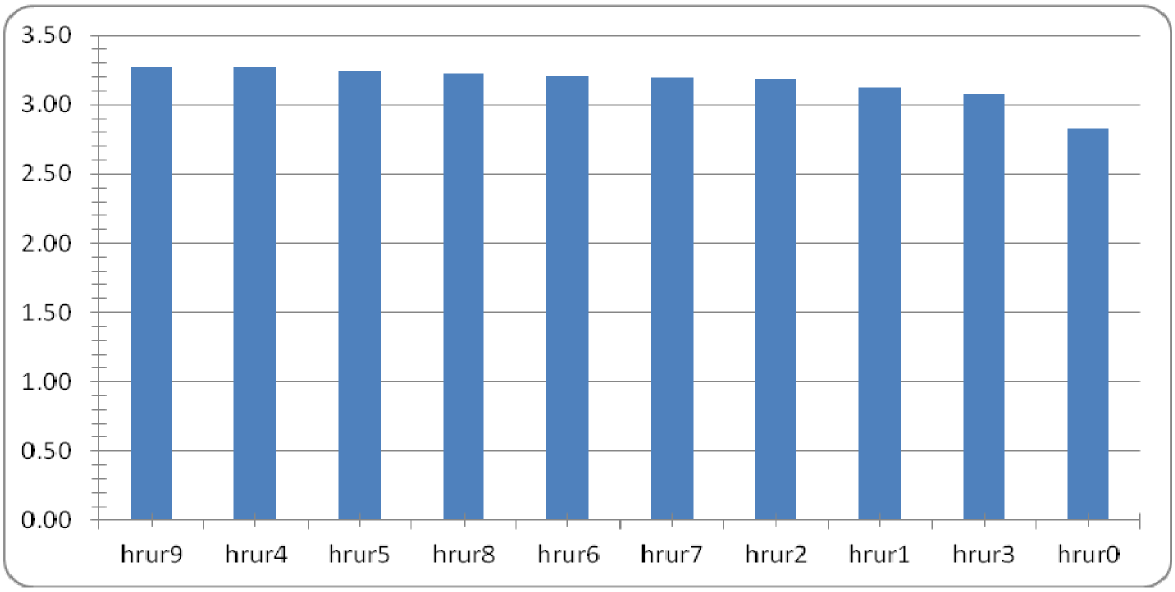
Figure 43: Change in capital income of urban households



HURB0 = poorest urban household; HURB9 = richest urban household

Figures 44 and 45 present the simulation results with respect to nominal income of rural and urban households, respectively. Results indicate that, on average, nominal income increases at similar percentages for both rural and urban households (3 per cent over the whole time period). However, growth appears to be more evenly distributed in rural areas as compared to urban areas. Since the direct tax rates remain the same, aggregate real disposable income (total income less income taxes less transfer) increases in roughly the same proportion as total income.

Figure 44: Percentage changes in nominal income of rural households over the whole time period



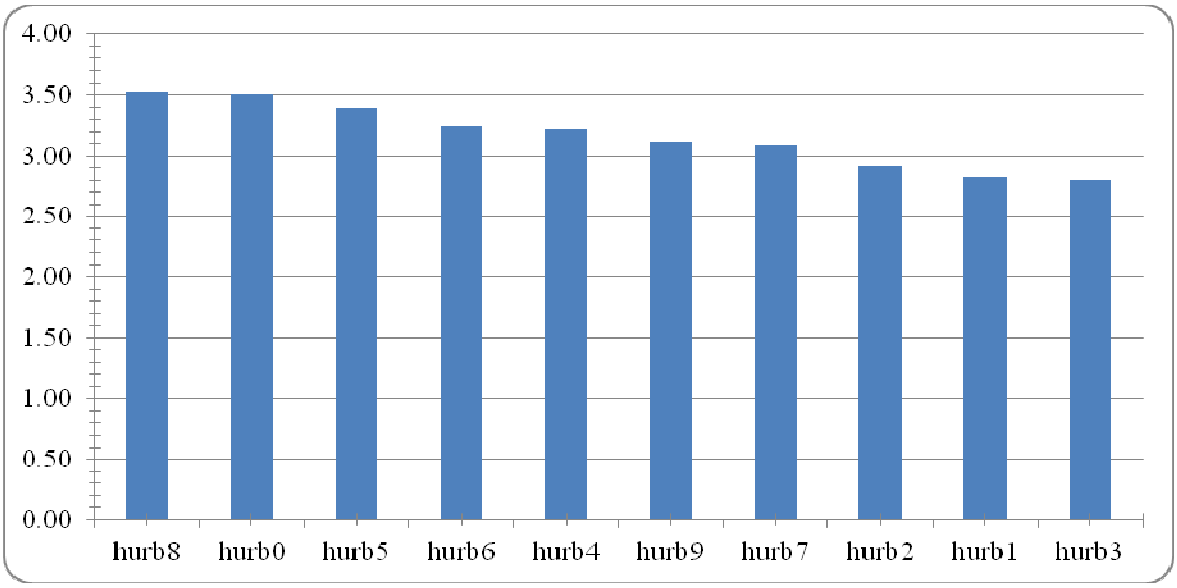
HRUR0 = poorest rural household; HRUR9 = richest rural household

Within the rural area (Figure 44), with the exception of the poorest household group (HRUR0) which records the lowest growth (2.8 per cent), all 9 remaining household group experience more than a 3 per cent increase in their income over the whole time period. In the urban area (Figure 45), middle and upper income households as well as households at the lowest decile (HRUR0) are those that gain the most.

It should be noted that some low income household groups participate in the tourism sector as entrepreneurs in the informal sector[52] such as handicraft producers, vendors and traditional jewellery makers. It is believed that tourism expansion provides more job opportunities for these groups (Mitchell & Ashley, 2010). The urban bottom group (HUB0) can be considered to be engaged in small businesses in informal sectors. Given that the contributions of capital and labour incomes of this group are insignificant, the growth in their income (3.5 per cent over the whole time period) might be explained by their participation in tourism as entrepreneurs.

[52] The informal sector includes subsistence agriculture, self-employed and unpaid workers.

Figure 45: Percentage change in nominal income of urban households over the whole time period



HURB0 = poorest urban household; HURB9 = richest urban household

Comparing households by deciles and by region, the poor households in urban areas seem to be more favoured than poor households in rural areas. Thus, low-income agricultural households experience the least changes, while low-income non-agricultural households (i.e. those which derive their income from services industries) and high-income households gain the most.

This might be explained by the fact that agricultural exports provide substantially higher returns to poor rural households than direct and indirect tourism activities (hotels and restaurants and transport). The urban poor, on the other hand, are less involved in both direct tourism activities and agricultural exports, but more in indirect tourism activities (transport and construction). These results are in line with the results by Kweka (2004), Wattanakuljarus and Coxhead (2008) and Blake et al. (2008). Wattanakuljarus and Coxhead (2008) argue that tourism expansion in Thailand benefits all four household classes in the model, the biggest gains accrue to high-income and non-agricultural households in every scenario. Kweka (2004) found that, unless governments invest in improving the infrastructure, tourism expansion will benefit urban areas and hence the urban poor, more than their rural counterparts. Blake et al. also show that, in general, tourism expansion benefits all household groups, but the poorest household group gains less than the other household groups.

6.3.6 Impact on consumption

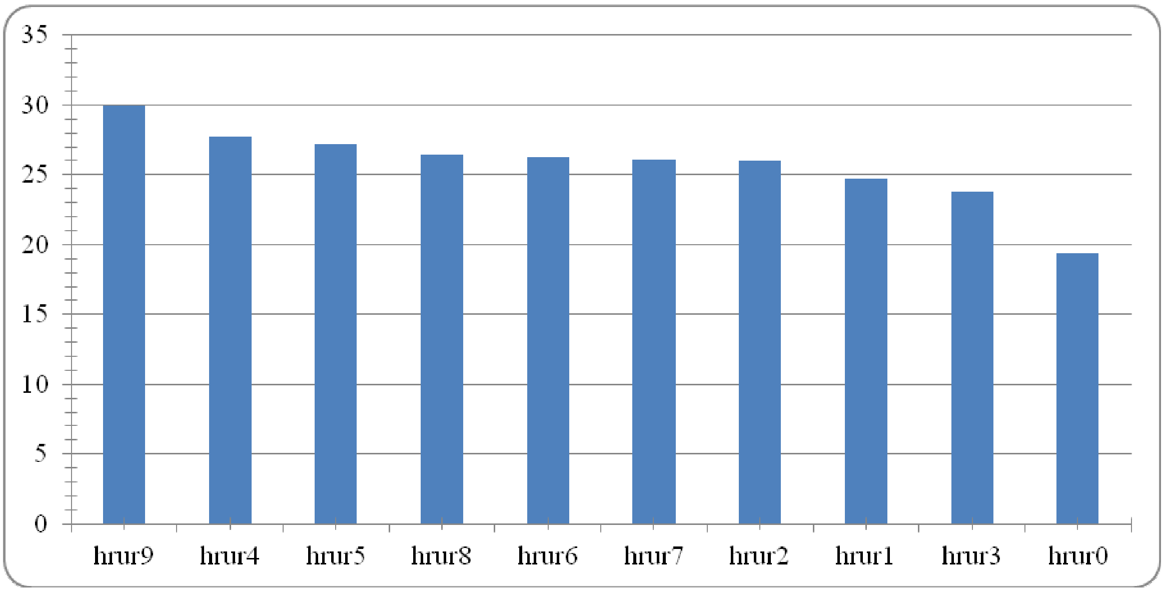
According to Kenya SAM 2003, consumption of agricultural commodities accounted for over 33 per cent of the consumption of rural households. The corresponding share is significantly lower (7.85 per cent) in the consumption of urban households. Data further show that all household groups spend more than 30 per cent of their disposable income on services and manufacturing goods. The results of the post-simulation changes in consumption are presented in Figures 45 and 46.

Rural household consumption increases by 26 per cent on average over the whole period, whereas urban household consumption grows on average by 28 per cent from the first to the last period. The lowest increase is registered in the agricultural sector, with consumption increasing by 0.8 per cent on average for all household groups, aggregating to 16 per cent over the whole time period. Results indicate that rural households register slightly higher expenditures on agriculture (0.9 per cent) as compared to urban households (0.7 per cent).

Expenditures on manufactured goods increase significantly for all household groups due to the induced growth in import expenditures. The highest increase is recorded in the service sector (17 per cent on average), followed by manufacturing (13 per cent on average).

Figure 46 shows that a 5 per cent increase in tourism spending raises the consumption of all household categories in rural areas, with the richest household group experiencing the highest growth in consumption (30 per cent over the whole period) and the poorest group the lowest growth (19 per cent). This is consistent with increases in nominal income discussed in the previous section.

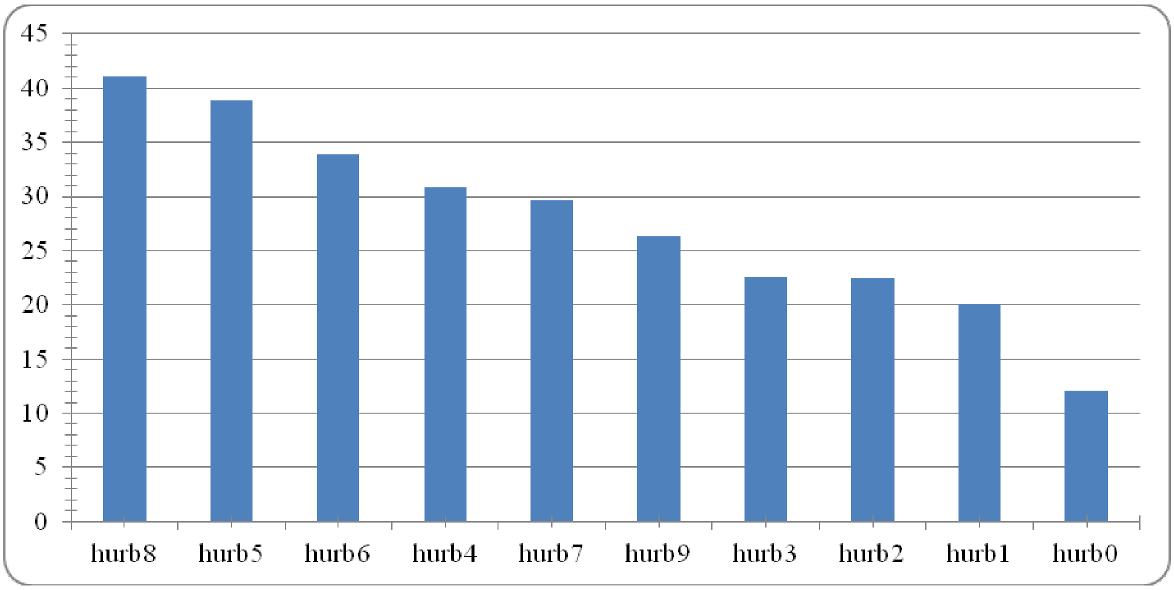
Figure 46: Percentage change in consumption of rural households over the whole time period



HRUR0 = poorest rural household; HRUR9 = richest rural household

Figure 47 indicates that, similar to rural households, consumption growth of urban households at the middle and upper decile increases more strongly than those at the lower decile. Comsumption growth is more equally distributed within the rural area as compared to urban areas, which also reflects the distribution of income discussed previously. However, the distribution gap across the regions in terms of growth is less pronunced as compared to distribution within a region.

Figure 47: Percentage change in consumption of urban households over the whole time period



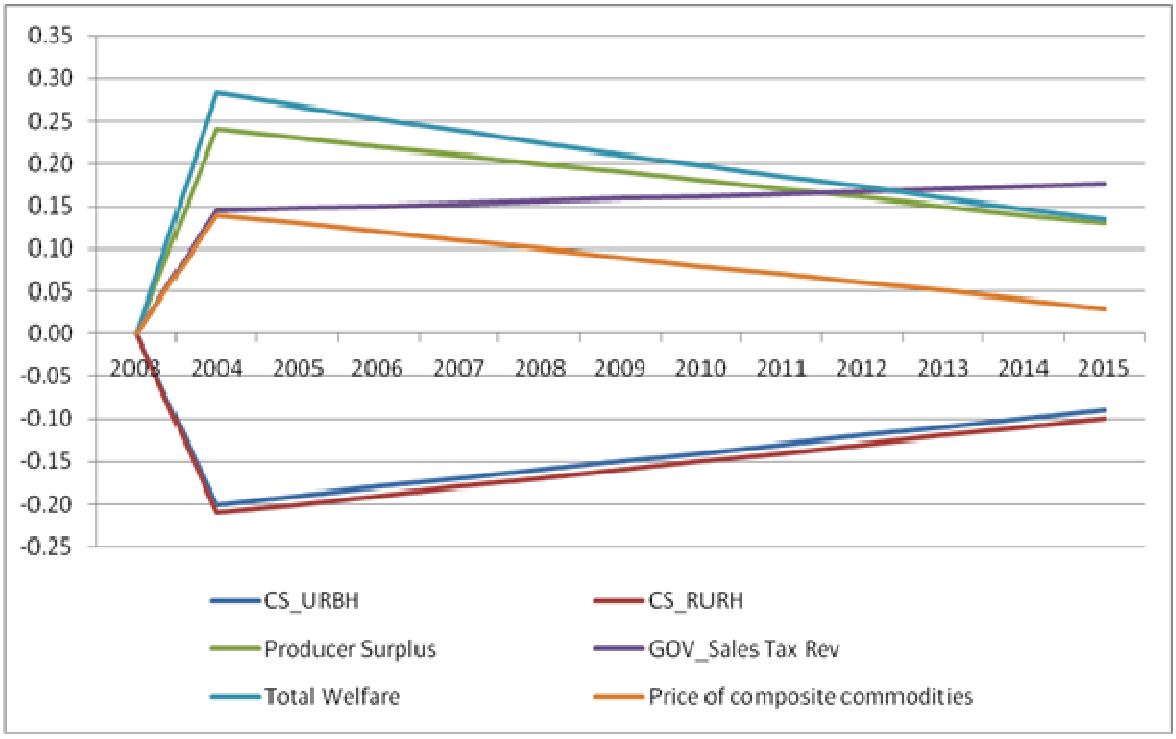
HURB0 = poorest urban household; HURB9 = richest urban household

6.3.7 Impact on Welfare

As mentioned earlier, the welfare effects on households, as depend on. The results of the impact on welfare are presented in Figure 48.

Results indicate that the impact of changes in tourism spending on welfare differs between rural and urban households (Figure 48).The welfare impact in terms of consumer surplus is likely to be higher if the commodity constitutes a greater proportion of the household consumption expenditure. The price of commodities increases leading to an increase in producer surplus, tax revenues and total welfare and a decrease in consumer surplus. Tourism consumption usually leads to increased output, prices and wages in the industries that sell products directly to tourists. Results show that the surplus of rural households falls faster than that of urban households.

Figure 48: Percentage change in total welfare over the whole time period (2003 = 0.00 per cent)



CS_URBH = consumer surplus urban household; CS_RURH = consumer surplus rural household; GOV_Sales Tax Rev = Government sales tax revenue

This is surprising, the higher the share of tourism-related goods and services in total consumption, the higher the welfare impact via the price channel. While is expected that urban households would consume more tourism-related goods and services, such as hotel and restaurants, the database (2003 Kenyan SAM) shows that the rural households consume more of those commodities than their urban counterparts. This can be attributed to challenges of construction and aggregation of SAM accounts, where in certain cases peri-urban households are classified as rural households.

The simulation further shows that a 5 per cent increase in tourism spending would have a positive total welfare impact. Welfare grows more strongly in the first period than in the last period. Prices and consumer price indices (CPI) grow at a higher rate in the first periods than in the last periods. The increase in prices induces an increase in supply, investments, employment and an increase in tax revenues. The increase in prices negatively affects consumer surplus. In the final periods prices and CPI decrease, leading to a decrease in supply and investment.

This finding is consistent with researches by Blake (2009). Blake (2009) points out that, in general, welfare decreases in the long term. The author claims that tourism demand shocks rely on increases in prices to provide welfare benefits, meaning that the more an economy can adjust to the shock, the lower will be the price effect and the lower will be the welfare benefit. The results of our simulation also indicate that prices (rental rate of capital, commodities) decrease (from period 10 to period 13) and that the overall welfare benefits are lower.

6.3.8 Domestic versus foreign tourism

The previous results show the post-simulation results of a cumulated increase in domestic and foreign tourism by 5 per cent. In order to isolate the effects of different types of tourism, this section compares the results of a permanent 5 per cent increase in domestic tourism, while assuming that foreign tourism remains unchanged and vice versa.

The Kenyan domestic tourism market has significant growth potential. According to WTTC (2013) domestic tourism spending is expected to grow by 3.4 per cent in 2013 to KSh148.6bn, and rise by 4.7 per cent pa to KSh234.2bn in 2023. It can act as a buffer against unpredictable fluctuations in foreign tourism demand and earnings. Table 38 compares selected macroeconomic and sectoral results of domestic tourism with those of foreign tourism. Domestic tourism spending are expenditures on products that domestic residents consume if they take a trip (accommodation, passenger transport, tour agency and operation services, recreational services, and souvenir goods). Domestic tourism consumption is mainly concentrated upon the wealthiest sections of society.

Table 38: Selected macro-economic and sectoral effects of a 5 per cent increase in both domestic and foreign tourism spending

	Domestic tourism (all time period)	Foreign tourism (all time period)
Total aggregate output	0.17	0.15
GDP at purchasers' prices from the perspective of final demand	0.16	0.14
Export	0.05	0.02
Import	0.10	0.19
Household income (average all households)	0.11	0.13
Labour income (average all households)	0.13	0.19
Agricultural output	-0.02	-0.06
Industrial output	-0.05	-0.05
Services output	0.15	0.21

The macro-economic effects of a 5 per cent increase in domestic tourism spending are found to lead to an increase in GDP by 0.16 per cent, whereas total aggregate output is projected to increase by 0.17 per cent. The corresponding figures are 0.15 and 0.14 per cent, respectively, for the foreign tourism spending. Results indicate that imports will grow faster under the growth of foreign tourism (0.19 per cent) than under the growth of domestic tourism (0.10 per cent).

Table 38 indicates that the increase in domestic tourism will do less harm to the agricultural sector as compared to foreign tourism (-0.02 per cent versus -0.06 per cent, respectively). On the other hand, the sector that benefits most from the growth of foreign tourism is the service sector (0.21 per cent).

In summary, both domestic and foreign tourism have a positive impact on the Kenyan economy, and there seem to be no marked differences between domestic and foreign tourism with respect to the overall economic impact. This might be explained by a combination of factors, such as the volume of expenditures, the nature of demand and preferences. Based on statistics by WTTC (2012) and World Bank (2010), foreign and expenditures in the model account respectively for 56 and 44 per cent. Thus, in absolute terms, foreign spending is highest in Kenya, but its contribution to GDP is relatively lower than that of domestic spending. This might be explained by the nature of demand. The preferences and nature of demand of domestic tourists are not necessary the same as those of foreign tourists. The countribution may also vary by sector. For example, in terms of directly attracting foreign exchange, domestic tourism makes little contribution to local economy.

6.3.9 Impact on poverty

The poverty effects are assessed against the base year 2005/06, using the national poverty line of KSh 1,562 per month per person for rural and KSh 2,913 per month for urban areas (in adult equivalent terms, which at that time was approximately US$0.75 and US$1.40 a day per person) and includes minimum provisions for both food and non-food expenditures (GOK, 2007). Table 39 presents a summary of the poverty incidence using the standard Foster–Greer–Thorbecke FGT poverty indicators, i.e., headcount (P0), income gap (P1) and severity (P2). The headcount ratio gives the percentage of population which is not above the poverty line, i.e. the ratio of the number of poor people to total population. For any individual, the poverty gap is the distance between the poverty line and his/her income. Aggregating individual poverty gaps for all individuals gives the aggregate poverty gap. Poverty severity indicates how difficult it is to escape poverty. On the basis of poverty gap measures, the poverty severity index gives more weight to the extreme poor by squaring the distance to the poverty line. In other words, it measures inequality between sub-populations of the poor. The numbers in brackets represent the initial level of poverty. While 45.0 per cent of the rural population lives below the national rural poverty line, the corresponding figure is much lower for urban population, with 34.5 per cent of urban and 69.9 per cent of rural population living below the national poverty line (KNBS, 2007). The initial poverty gap index for all households is 15.2 per cent and the poverty severity index is 7.7 per cent.

Table 39: Poverty results, percentage change from the base scenario (simulation results)

	First Period			Last Period		
	P_0	P_1	P_2	P_0	P_1	P_2
All households	-0.08 (45.0)	-0.17 (15.2)	-0.15 (7.7)	-0.06	-0.26	-0.21
Rural	-0.04 (69.9)	-0.61 (17.6)	-1.25 (8.9)	-0.09	-0.53	-1.20
Urban	-0.13 (34.5)	-0.42 (11.6)	-0.75 (5.4)	-0.11	-0.25	-0.22

Poverty headcount (P_0) is found to fall at the national level (-0.08 per cent). However, while headcount ratio decreases by 0.13 per cent for urban households in time period 1, it decreases by only 0.04 percentage points from the base results for rural households in the same period. Similar trends are observed for poverty gap (P_1) and poverty severity (P_2), implying an improvement in income distribution. In the last period, the headcount ratio deceases by 0.11 per cent for urban households and by 0.06 per cent for rural households. The poverty gap falls by 0.26 per cent, while poverty severity falls by -0.21 per cent at the national level. The corresponding figures are -0.25 per cent and -0.22 per cent, respectively, in urban areas and -0.53 per cent and -1.2 per cent in rural areas.

Generally, the effects are stronger in the first period (-0.08 per cent at the national level) than in the last period (-0.06 per cent). Overall changes in headcount ratio accumulate to -0.79 per cent from the first (2003) to the last (2013) period for Kenya's population as a whole, whereas aggregate changes in poverty gap and poverty severity are -2.16 per cent and -1.99 per cent , respectively.

In sum, the poverty impact is positive but marginal meaning that means that the changes were not sufficient enough to substantially reduce poverty.

6.4. Sensitivity Analysis on Key Model Parameters

The elasticities and other parameters for this research have been obtained from existing studies on Kenya, values assumed in CGE models for other African countries. Given that the elasticities used in this CGE model were not estimated econometrically for the time period studied, a sensitivity analysis is used to demonstrate the robustness of simulation results by varying parameters that may significantly affect the results. By increasing or decreasing the values of key parameters in the model, we examine the stability of equilibrium values of variables such as GDP, demand for labour and welfare.

In the Kenyan model, these elasticities are employed in four ways, for four categories of use (production, household consumption and demand tourism and investment goods). Specifically, the parameters and elasticities in the model include the following:

- Elasticity of substitution between labour and capital
- Elasticity of substitution between different types of labour
- Price elasticity of import (CES) and export (CET)
- Price elasticity of world demand of exported commodity
- Income elasticity
- Frisch parameter
- Price elasticity of demand for tourism
- Price elasticity of supply
- Price elasticity of demand.

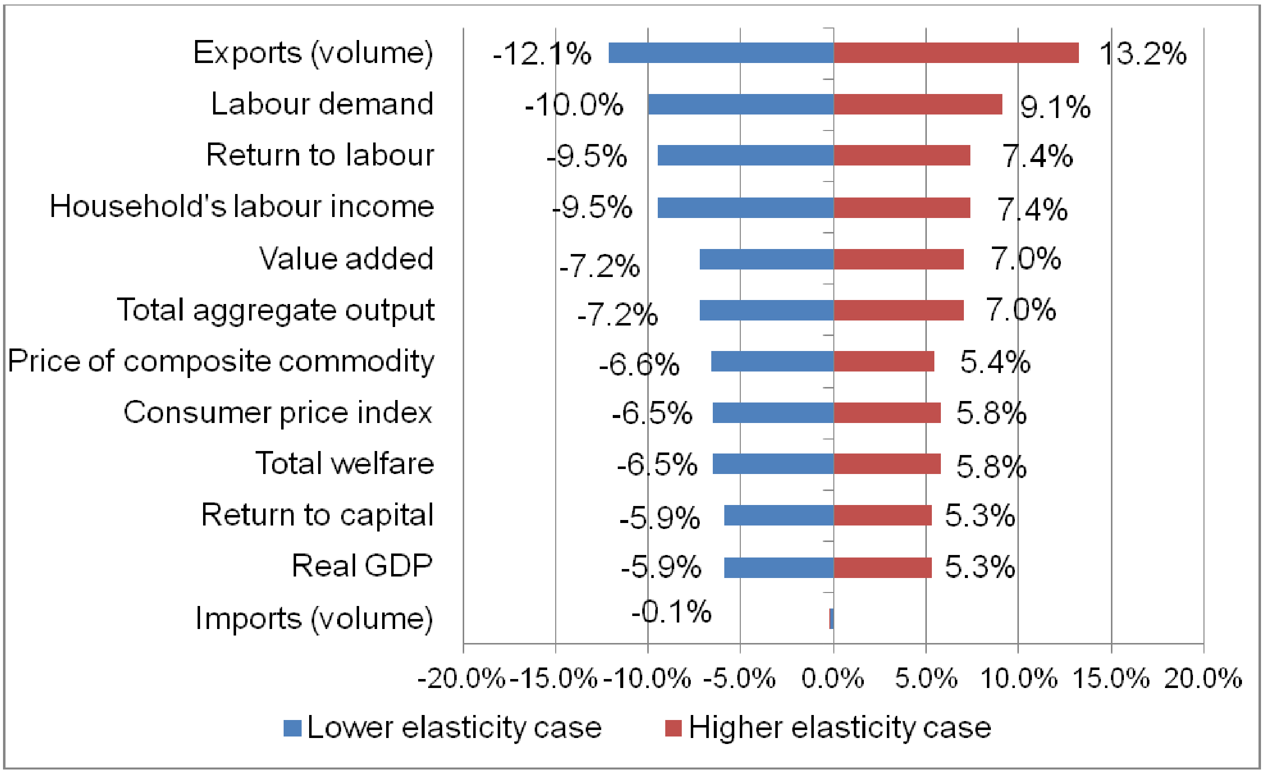
To assess the sensitivity of his findings, Blake (2000) carries out a limited sensitivity anaylis where, for the six elasticities in the model, the values are doubled. In order to determine the sensitivity of the Kenyan tourism-focused model, we define a higher-elasticity case with 20 per cent higher values and a lower-elasticity case with 20 per cent lower value for the elasticities in the model. To evaluate the robustness of the simulation results, we set the following two criteria: (a) whether the signs of the changes in quantity variables remain unchanged in all cases and (b) whether the ordering of the changes in output among sectors is maintained in all cases.

For selected macro-economic variables, the results of the sensitivity analysis shown in Figure 49 indicate that the simulation results satisfy criteria (a) and (b). For example, a 20 percent decrease in the price elasticity of exports and imports results in a decrease in the impacts of tourism as compared to the baseline results. The volume of exports decreases by 12 percent, followed by the demand for labour (10 percent) and returns to labour (9 percent). The impact on imports is very small (-0.1

percent). A 20 percent increase in the price elasticity of exports and imports results in an increase in the impacts of tourism as compared to the baseline results (Figure 49). The results are reasonably insensitive to changes in other elasticities.

More precisely, all quantity variables will always be affected in the same direction in the different assumed elasticity values. The results further that the volume of exports are smaller when goods have only relatively poor substitutes and larger when the goods are assumed to be readily substitutable. In general, the sensitivity analysis shows the robustness of the results, which are consistent with theoretical predictions; that is, higher export demand elasticities will produce larger impacts on the quantity variables, for any given policy changes.

Figure 49: Selected macro-economic effects of changes in the price elasticity of exports and imports



6.5. Chapter summary

This chapter simulated the possible impact of changes in tourism spending on Kenya's economy at the national level – with particular focus on welfare and poverty effects, measured by the equivalent variation and the Foster-Greer-Thorbecke poverty indices.

It was found that a 5 per cent increase in tourism expenditure is projected to result in:

- an increase in GDP;
- a small increase in the general level of prices;
- output increases in the industries which serve tourist needs, and in manufacturing, construction and services;
- an appreciation of the real exchange rate;
- output reductions in traditional exports of agriculture;
- an increase in imports, particularly those associated with tourist related industries;
- an increase in labour demand in the construction and transportation, hotel and restaurants industry, and trade; and
- a narrowing of the rural-urban income gap;
- an improvement in welfare and a marginal reduction in poverty.

Moreover, the macro-economic results show that the expansion of tourism will have an overall positive effect on the Kenyan economy, with a modest increase in GDP. At the sectoral level, results indicate that the real output of Kenya traditional export sectors of agriculture is projected to decline, whereas industries closely related to the tourism industry as well as industries indirectly supplying tourism-related activities will expand.

In terms of welfare impact, results indicate that the welfare impact of changes in tourism spending differs between rural and urban households. The 5 per cent increase in tourism spending has a positive impact on the welfare of all household groups. Everywhere middle and upper income households, both rural and urban, record the highest increase in welfare over the whole time period. Most importantly, tourism growth leads to a slight redistribution of income between rural and urban region. Moreover, whereas 2003 Kenya SAM reports a wider gap in average income between urban and rural households (1.4 per cent)[53], post-simulation results show fewer tangible gaps (1.07 per cent) in income growth between rural and urban households. This implies that tourism expansion is likely to contribute to the reduction of income disparities across the regions.

Results further show that tourism expansion increases welfare and reduces poverty marginally. Foster-Greer-Thorbecke poverty indices decline in the wake of the positive effects of tourism spending, suggesting that tourism has the potential to reduce poverty. The sensitivity analysis shows that the results are reasonably insensitive to changes in these elasticity values.

A simulation of air transport policy and infrastructure using the CGE model could not be undertaken because of a lack of detailed data on air transport in Kenya. In order to model the impact of air transport, further information about the contribution of the air transport subsector to GDP as well as the linkages between the subsector and other sectors and institutions such as households types, government, investors and rest of the world was required. This information is not available. While is estimated that the air transport subsector account for 25 per cent of the total transport sector expenditures, no further information concerning the intersectoral and inter-institutional transactions between the subsector and the rest of the economy could be found. In the presence of data, the impact of air transport liberalisation can be modelled in two different ways. The first approach consists of applying trade theory, or economics of restrictions on international trade, to air transport liberalisation and simulate the impact on the economy of gradual elimination of regulated tariffs, subsidies, aviation related export/import quota (i.e. single versus multiple designation, capacity restrictions, restrictive BASAs versus open skies, etc.), import/export taxes (on aircraft spare parts, for example). The second involves the simulation of the impact on the economy of a change in airline productivity stemming

[53] According to Kenya SAM 2003, although urban households make up 20 per cent of the total household population they earned 59.75 per cent of the country’s income.

from air transport liberalisation, assuming that liberalisation improves airline productivity resulting in a decrease in prices.

CHAPTER 7. CONCLUSIONS

7.1. Introduction

The aims of dissertation were twofold. First, it set out to examine the link between the air transport sector and tourism with a specific focus on Kenya. Second it sought to examine the impact of additional tourism on economic growth and poverty reduction in Kenya using a CGE model. This chapter reviews the extent to which the research objectives have been achieved and provides answers to the research questions from the findings. In addition, it provides recommendations to policymakers, highlights important limitations of the dissertation and suggests directions and areas for future research. The chapter ends with some concluding remarks.

7.2. Summary of the main findings

The main findings of the interrelation between aviation and tourism were summarized in Chapter 3.

a. Affordable and regular access by air transport is crucial to the successful development of domestic and international tourism. The dissertation has reviewed the literature on the role of air transport in the development of tourism and compiled current market trends of the Kenyan commercial aviation and tourism industry. A broad literature review has established a positive relationship between air transport liberalisation and incoming tourism to a country. The literature has revealed that remoteness and difficulty of access clearly constrain the development of tourism.

b. The research has shown that while air connectivity has improved in Kenya some barriers remain. Kenya engaged in the liberalisation of the air transport sub-sector in the 1990s. The country has liberalised its domestic air service and has demonstrated greater flexibility in the granting of 3rd and 4th freedom traffic rights and relaxation of 5th freedom traffic and has established an autonomous civil aviation authority. The gradual abolition of restrictions on access has also led to the development of privately owned and low cost airlines. The current good performance of the Kenyan tourism industry reflects, to some extent, its strong aviation industry. In fact, tourism development and air transport in Kenya is broadly linked with the matter of harmonisation of air transport and tourism development policies.

Further expansion of air transport is likely to boost the development of Kenya through the development and promotion of international tourism as well as the export of fresh produce, such as vegetables, fruits and cut flowers. Aviation regimes are likely to play an important role in the expansion of air transport.

c. The current relatively good performance of the Kenyan tourism industry reflects, to some extent, its strong aviation industry. The dissertation has compared the performance of the aviation and tourism industries in Kenya with those of other East African countries, showing that, compared with their East African counterparts, Kenya performs well in terms of tourist arrivals, but poorly in terms of tourism competitiveness.

d. With respect to aviation development in Kenya, competition laws, dispute resolution mechanisms and restrictions in airline cooperation and ownership have been recognized as the major challenges that need to be addressed**.** While the domestic and international markets have been liberalised, a framework of ensuring fair competition between airlines is lacking.

e. Tourism development stemming from an efficient transport network would, given the relatively strong backward linkage of some tourism-related sectors with the local economy, not only create direct benefits for tourism-related businesses, such as hotels, visitor attractions and restaurants, but also indirect benefits in other sectors such as construction and manufacturing and therefore contribute to poverty reduction.

As set out in Chapter 1, the second aim of the dissertation was to quantify the impact of additional tourism on other businesses, households, government, GDP and total welfare.

The main findings of the second aim of the dissertation are as follows:

f. As with any other economic activity, the contribution of tourism to development and poverty reduction critically depends on the nature and interactions of tourism-related activities, with both suppliers and customers in the provision of services and commodities that tourists consume. Consequently, strong backward and forward linkages are often highlighted as having the potential to enhance the local benefits of tourism. The dissertation estimated the effects of tourist expenditure on the local economy using an economic model that identifies and quantifies the linkages between the different sectors of the local economy. Kenyan tourism-related sectors have weak forward linkages and medium-level backward linkages. These findings suggest that unless backward linkages between tourism and the local economy are strengthened, the benefits of tourism will either not flow to locals or the share flowing to locals will be marginal.

g. At the macro-economic level, tourism growth induces modest increases in real GDP and in capital formation. The increase in capital formation generates an increase in real investment. Tourism expansion is also projected to increase savings of households and enterprise as well as government revenues.

h. Tourism growth reduces the output of non-tourism and export-oriented sectors. The output of non-tradable services increases relative to tradable commodities as a result of tourism expansion. In other words, there is a shift of resources from non-tourism sectors such as agriculture and manufacturing towards tourism-related sectors.

i. Additional tourism leads to an appreciation of the real exchange rate, which leads to an increase in imports and the contraction of the traditional exports of agricultural commodities. More specifically, tourism growth induces a fall in outputs and domestic sales of agricultural commodities while stimulating the demand for its imports. Medium-level backward linkages mean that most of the tourism commodities and services are imported. In fact, all sectors show an increase in demand, the imports of manufacturing and service sectors rising faster than that of agriculture.

j. Returns to capital and wages as well as the consumer price index increase. With respect to wages, returns to semi-skilled and skilled labour increased faster as compared to returns to unskilled labour in all time periods. While returns to capital also experienced a high growth rate, returns to land registered the lowest growth. The latter is primarily due to the fact that agricultural output decreases as tourism expands. The increase in wage rates induces an increase in the marginal cost of the domestic activities and thus an increase in its average output price relative to the relative price of the group of the imported activities. This causes a substitution away from the domestic activities toward the imported activities.

k. Additional tourism has a substantial positive impact on the Kenyan economy. Tourism growth and the resulting slight economic growth principally trickle down to the poor, through increases in income and in labour demand. Increased incomes allow consumers to enjoy a high level of aggregate real consumption. However, tourism growth provides higher returns to poor urban households as compared to their rural counterparts. The relatively low level of returns accruing to poor rural households reflects the fact that these groups are more involved in agriculture and less in tourism activities.

l. Demand for skilled and unskilled labour increases strongly in almost all sectors as compared to demand for semi-unskilled labour. Results show that tourism-related industries, namely transport and construction industries draw agricultural workers away from the land.

m. Overall income distribution across regions (i.e. rural and urban areas) improves modestly. Income from both wages and capital returns witness an increase stemming from the rise in labour and capital factor returns. The poor households in urban areas are more favoured than poor households in rural areas. Moreover, low-income agricultural households experience the least changes, while low-income non-agricultural households and high-income households gain the most.

n. Tourism expansion improves total welfare and reduces poverty marginally. The results of the simulation are positive, owing to the medium-level backward linkages of the tourism sector. However, the welfare effects as measured by equivalent variation differ between rural and urban households. The distribution of welfare changes reflects the changes in income and expenditures both within and across regions. The welfare changes are relatively equally distributed within the rural area as compared to the urban area. In the urban area, the poorest household group records a strong increase in welfare. Welfare grows stronger in the first period than in the last period owing to the strong increase in the general level of prices in the first period as compared to the last period.

o. Although there are some slight differences with regard to macro-economic and sectoral effects, the overall economic impact of foreign tourism is not significantly different from that of domestic tourism.

7.3. Policy implications

The research findings have policy implications for policy-makers and businesses. The results presented earlier in this chapter showed that working together will benefit the aviation and tourism sectors. Growth in tourism demand largely depends on reliable and affordable air transport services, whereas an efficient air transport network evolves more around tourism centres. However, air transport and tourism are often seen as competitors, and tourism benefits are not often taken into account when negotiating air services agreements. Air services providers need to work collaboratively with tourism development agencies to further improve access and attract greater tourist arrivals. There is a need to jointly promote air transport services in general and tourism in particular through pooled resources. Governments and policy-makers can assist in providing an encouraging environment which enables firms in both industries to achieve faster growth, as well as in providing incentives that bring operators together to cooperate.

The interdependence of the two industries largely hinges on the conditions inherent in the aviation industry that are likely to benefit the tourism industry. Open skies policies are important in this respect insofar as they contribute to enhancing competition and innovation. The implementation of the Yamoussoukro Decision represents an important step to develop air transport and by extension tourism in

Africa in general, and in Kenya in particular. The implementation of the YD is likely to ease access to African markets by African airlines, thereby considerably unleashing the growth of airlines. The success of Kenya Airways can be largely attributed to privatisation and its experience with regard to strategic alliances. Opening up air routes to competition is likely to increase partnership between African carriers through, for example, franchise agreements, codeshares or strategic agreements.

It has been argued that sustainably developed and managed tourism can be an effective tool to the achievement of the first millennium development goal of eradicating extreme poverty. This research shows that tourism has the capacity to create opportunities for the poor through additional demand for unskilled labour, resulting in increased incomes. Taxes on tourism activities can be used for poverty reduction purposes. However, the findings show that the impact of tourism expansion on poverty reduction is marginal, implying that unless the links between tourism and local sectors of the Kenyan economy are further enhanced, tourism expansion tourism will not make an important contribution to poverty reduction. The current structure of the tourism industry has only a small-scale impact on rural households. 49 per cent of rural households, which constitute 77.8 per cent of the total Kenyan population (2010),[54] are considered poor. Agriculture is a major sector from which rural households derive a substantial fraction of their income (36 per cent).

The above findings indicate a relatively weak linkage between the agricultural sector and the tourism industry, meaning that tourism in Kenya is not inclusive enough. Agriculture remains the largest sector in Kenya in terms of employment and export. With almost three quarters of the population living in rural area and depending on agriculture for livelihood, there is no doubt for the importance of tourism and agricultural linkages for sustainable development and poverty reduction. As seen in Chapter 5, tourism-related sectors have weak forward and only medium-level backward linkages with the local economy. Therefore policies aiming at attracting more tourists or boosting the discretionary spending of tourists alone will not work for the poor. It has been found that tourism draws agricultural workers from the land,

[54] http://www.ruralpovertyportal.org/

leading to a reduction of the output of traditional agriculture. One of the main issues that emerges from these findings is that when deciding on a tourism development strategy, policy-makers should give due consideration to the linkages that benefit both the tourism and the agricultural sector. Tourism expansion creates production linkages, which include both backwards and forwards linkages, and consumption linkages. Consumption linkages include spending by consumers on locally produced goods and services.

Moreover, policy-makers should pay attention to leakages arising from overall tourism. It is essential to ensure that access to public utilities for tourism purposes does not jeopardise access by the poor, either by restricting the volume of supply or by increasing prices. Differential pricing or subsidies, for instance, can be applied to favour farmers over hotel establishments. With respect to the question regarding whether additional tourism growth will advance or retard the broader development goal of poverty alleviation, it can be concluded that complementary strategies aiming at minimizing leakages (mainly via imports), and maximizing linkages are likely to help attain economic development and poverty reduction objectives. Such measures may include the development of agritourism, such as farm-based accommodation, agricultural festivals, attractions and farm-tours; and the implementation of policies, such as physical planning, protection of agriculture and fishing areas to integrate agriculture. Further measures include the strengthening of the link between rural and urban areas through efficient transport. This is particularly important as it has been shown that tourism has the potential to narrow the income disparity between rural and urban areas. Exploiting the linkages between tourism and the local economy towards poverty reduction require a diversified growth strategy that expands tourism while at the same time improving the competitiveness of other sectors and ensuring a better distribution of income. The government should also strengthen the forwards and backwards links between the tourism sector and the manufacturing sector given that the manufacturing and services sectors have shown strong links with urban poor households and ensure that investment injections in any of the sectors result in positive spill over effects that spur growth and development.

7.4. Some limitations and suggestions for future research

This research also has several limitations. The primary limitation of this dissertation was data availability. The model developed was based on four sets of data: (1) SAM reflecting the wider economic structure and economic interactions between sectors and institutions of the economy; (2) Data reflecting the spending patterns of tourists in Kenya were gathered from different sources including the World Bank and the Kenyan National Bureau of Statistic and were incorporated and reconciled with the SAM; (3) KIHBS data providing information on household income and expenditure patterns; and (4) sets of values for various elasticities obtained from existing studies on Kenya. The development of these tourism data was subject to various limitations. Given the fact that the tourist expenditure categories were quite aggregated and did not compare exactly with the SAM, some sets of data had to be based on particular assumptions. The database of the model can be improved by connecting SAM with a Tourism Satellite Account, an internationally recognized and standardized method of assessing the scale and impact of tourism spending and its links across different sectors. However, Kenya has not constructed a TSA yet.

Another source of weakness in this research, which could have affected the results, is the specification of several dynamic parameters. Moreover, the model developed is based on the assumption of rational economic agents, as well as the assumption of perfect competition with constant returns to scale technology. In reality, however, despite the existence of many small firms, we usually face a situation in which much tourism supply is dominated by a few large firms (for example airlines, cruise ships, theme parks, etc.). Therefore, future research might incorporate imperfect competition in sectors in which a few firms dominate the market to reflect such a situation.

Another possible improvement to the research could have been to incorporate air transport policy into the CGE model to capture the key features of the air transport sector. However, this could not be done due to the lack of data. Furthermore, future research should decompose poverty in order to examine the contribution of each household group to overall poverty. Moreover, additional research is required for a better understanding of how tourism policies can be combined with other macro-economic, sectoral or complementary policies that ensure that tourism results in poverty reduction. The current model does not include rural-urban migration of workers. This would increase considerably the complexity of the model and its numerical solution, and hence has been left for future research. There is therefore also need to undertake a detailed examination of the impacts of rural-urban migration on the magnitude of the effects of tourism expansion.

The welfare impact of tourism expansion was evaluated at market prices, assuming that markets are competitive and there are no distortions. In reality, markets in most developing countries are subject to various distortions, such as quantity controls, monopoly, tariffs, subsidies and price controls. Such factor price distortions usually result from some form of government action such as (i) artificially high minimum wages, (ii) government support to trade union demands, or (iii) high wages designed to encourage worker efficiency. Moreover, in economies in which resources are not fully employed, the allocation of factors on the basis of market prices is imperfect because of the existence of fundamental disequilibria in the economy. In situations where the above distortions exist, market prices are different from opportunity costs. There is need to evaluate the welfare impact of shocks and policies at shadow prices. This is an important area of focus for further research since the knowledge of shadow prices is essential to guiding the direction of policy changes.

7.5. Concluding remarks

Tourism is a growing sector in Kenya and is considered to be a strategic sector towards achievement of the country's development programme covering the period 2008 to 2030. This dissertation has established, through theoretical and empirical literature reviews, the interdependent relationship between air transport and tourism, on the one hand, and the macro-micro linkage between tourism expansion and poverty reduction in Kenya on the other. Efficient aviation infrastructure and open skies polices would significantly contribute to further development of tourism in Kenya. The Kenyan tourism-based CGE model underlies inter-temporal (between periods) optimisation rather than forward-looking expectations, which could be regarded as well suited for a developing economy.

Tourism expansion has been found to increase prices and wages in tourism-related commodities and to affect household welfare through direct, indirect and dynamic impact. It was found that tourism-related sectors respond to price rises by increasing the production of those commodities. Results further show that output in non-tourism sectors contract in order to release resources that go into tourism-related sectors. It was also found that tourism expansion in Kenya would lead to an increase in household income, which in turn would result in a rise in household consumption and welfare as well as a decline in the incidence of poverty at the household level.

Although the effects on all income groups are positive, the rural households benefit less than urban income groups in the first time period (in years 1 to 6). However, the lowest income groups in the rural areas are the main beneficiaries in the last time period (from year 10 onwards). This is due to the fact that the lowest income groups rely heavily on earnings from commodity export sectors (such as coffee and tea), which are adversely affected by tourism expansion in the earlier period and less in the last time period. Due to its consumption patterns, the economic impact generated by domestic tourism appears to be slightly greater than international tourism. However, the size and the strength of linkages rather than the type of tourism are of critical importance in the development of tourism. Furthermore, in order to sustain the development of tourism and to boost its contribution to economic growth and income distribution in Kenya, the need for complementary measures which involve efficient transport infrastructure is crucial.

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APPENDIX A: A simple CGE model

1. Introduction

For illustrative purposes, we have developed a simple CGE model to help understand the working of CGE models. CGE models are based upon general equilibrium theory. This theory combines assumptions regarding the optimising behaviour of economic agents with the analysis of equilibrium conditions to address both economy-wide efficiency as well as the distributional impact of policy interventions. Efficiency of resource allocation is at the heart of economics as long as economics exists. Resource allocation can be viewed as a trade-off issue. For example, goods can either be exported or set aside for domestic supply. Income can be allocated between consumption and savings. Suppliers decide on the shares of exports and domestic supplies on the basis of the relative prices received in the foreign and domestic markets. Thus, the price mechanism is a powerful device capable of solving the trade-off problems stated above. The market price of a good is determined by the relationship between the quantity of goods supplied by producers and the amount demanded for it from those willing and able to pay for it.

Economic agents, such as households and firms, make their decisions about economic activities using price information prevailing in the markets. If at any given time the market price of the good rises above or below the "natural price[55]" then agents will respond. If for example the price goes below the "natural price", those who produce that commodity will be motivated by self-interest to produce some other commodities where they can make a larger profit. That would lead to a decrease in supply of the original commodity and then the market price would rise again. If the market price of the commodity went above the natural price, those people with capital and labour would move their resources into producing that commodity in order to make higher profit or wage. If the market is structured to operate along the line of this model, the market will tend to provide more and more goods at the cheapest price at

[55] The natural price is, according to Adam Smith (1776, Vol. 1, pp. 66-67), the price that is sufficient to pay the rent of the land, the wages of the labour, and the profits of the stock employed in the production and commercialisation of a commodity, provided there is perfect competition.

which they can be produced. Self-interest will be channelled into socially beneficial effects. Smith (1779) reminds us that the competitive market is the most efficient institutional mechanism by which to channel self-interest into the wealth of the nation. CGE models can depict such market economies in a quantitative manner.

Moreover, CGE modelling is an attempt to use general equilibrium theory as a tool in empirically oriented analyses of resource allocation and income distribution issues in market economies. The model brings solutions for the prices at which quantity supplied equals quantity demanded across all markets. The general equilibrium theory of the competitive market economy was originated by Walras (1874). His theory was further extended to proofs of existence and stability of the equilibrium by Debreu (1959). These studies are of a general, abstract and rigorous nature and do not include numerical analysis. In contrast, CGE models are designed to establish a numerical framework for empirical analysis and evaluation of the economic policies. This is why they are called Computable General Equilibrium models.

Furthermore, a CGE model combines economic data and a system of equations in order to capture the interactions of the institutions in an economy, namely households, businesses and the government. Institutions are interlinked through labour market or capital market flows, household consumption, intermediate product demand, government transfers or taxes.

CGE models are also able to handle the macro-economic impact such as GDP and unemployment[56] as well as backward and forward impact on other sectors from "shocks". They can be used to measure the gain to the economy in welfare terms from a policy as well as to trace distributional impacts of a policy on:

- Factor (labour, land, capital) and commodity markets
- Household types
- Regions

[56] It is important to note that the introduction of involuntary unemployment may be very difficult to handle within a standard CGE framework (Boeters and Savard, 2011).

Following this introduction, Section 2 describes the structure of the economy under study. This is followed by an explanation of the modelling process in Section 3 and a conclusion in Section 4.

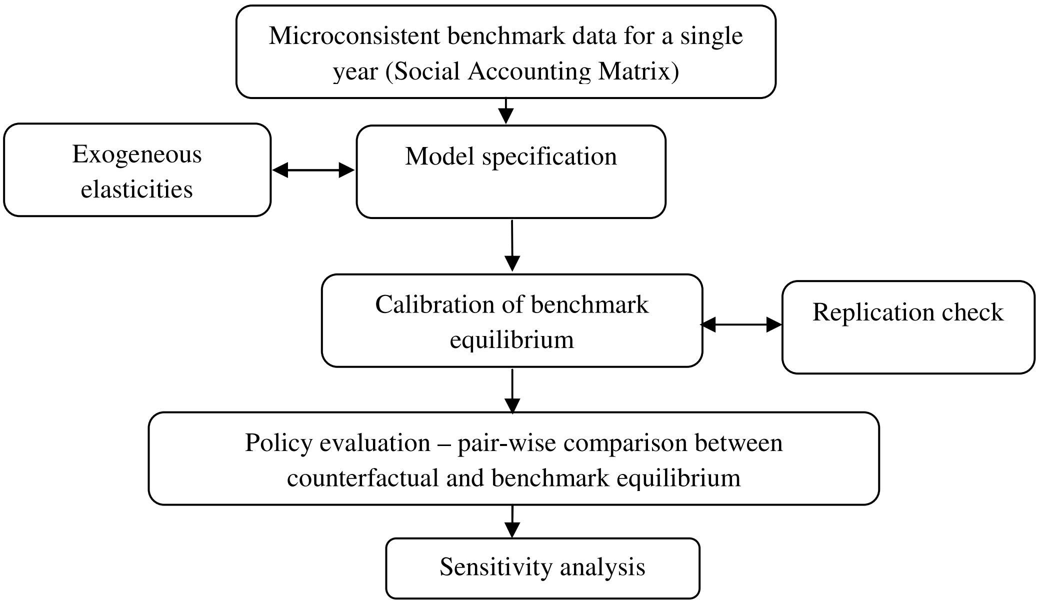
2. Two-activities, two-commodities and two-households CGE model

It is assumed that two goods are produced, and that two factors exist, capital and labour, in this economy. Two households exist and consume two kinds of goods to maximize their utility. There are two production activities, each of which produces one commodity. There is a government, which collects taxes and provides public goods. There are two types of tax, namely income and sales taxes. Sales taxes are paid on commodities. It is assumed that there are intermediate inputs, meaning that gross output is equal to the sum of combination of value-added and intermediate inputs. Labour is employed with a fixed wage and mobile among sectors, while capital is fully employed and activity-specific. Capital and labour endowments are exogenously fixed. The households, endowed with two factors, provide them to the firms in return for income payments. The firms employ these factors in their production. The demand and supply of these goods and factors by households and firms are equilibrated in the markets with flexible price adjustments. It is further assumed that the markets are perfectly competitive.

3. The modelling process

As shown at the top of Figure 1, development of a typical CGE model begins with specification of micro-consistent data that represent the economy in a single year. Once the underlying dataset has been constructed, functional forms are chosen that describe substitution possibilities available to households and producers (model specification). Given that the calibration process only involves a single year's data, it is necessary to specify exogenous elasticity values which control the ease of substitutions in the functional forms. When this process is complete and a replication check is undertaken to ensure that the model is fully specified and is initially in equilibrium, it is ready to be used for policy analyses. Considering the uncertainties associated with the elasticity parameters obtained from secondary sources, sensitivity analysis is used to demonstrate the robustness of simulation results by varying parameters that may significantly affect the results. The different steps are described in turn.

Figure 1: Steps in CGE modelling (own illustration)



3.1. Micro consistent benchmark data for a single year

To develop a CGE model, various coefficients and exogenous variables[57] of the model based on real data must be estimated. The estimation process consists of two steps. First, we collect data of the base year and construct a comprehensive and consistent macro-economic database, called a Social Accounting Matrix (SAM). Second, by using the SAM, we estimate the coefficients and exogenous variables of the model.

SAM is represented in the form of a square matrix with rows and columns, which brings income and expenditure, respectively, of each of the agents of the economy. It is a matrix representation of the circular flow of income. Each row and column is called an "account". As the simple model consists of two households, two activities with two commodities, two factors and a government, its SAM has only twelve accounts (see Table A1).

[57] Parameters (or coefficients) are fixed values that describe the relationship between variables. They are assumed to be fixed over time. Exogenous variables are those assumed constant in the model, but vary in real life. While parameters are estimated econometrically, exogenous variables are typically measured directly. Endogenous variables are those determined within the model.

It is assumed that there are two production activities available in the economy system, namely a tourism activity denoted (TOU-A) and a non-tourism activity (NON TOU-A). The two production activities produce two commodities, namely TOU-C and NON TOU-C. The rows for TOU-C {66,44,55,77,11,27} and NON TOU-C {44,66,110,55,47,61} record payments made at market prices, which include activities (TOU-A and NON TOU-A), end consumption by rural and urban households (RUR-H and URB-H), the government (GOV) and investment (S-I), represented by changes in stock, and gross fixed capital formation. The total value of production activity for the hypothetical economy[58] are 255 for TOU-A and 350 for NON TOU-A. The receipts in factor of production accounts {LAB: 72,105} and {CAP: 73,135} are made up of payments from production activities which employ factors of production. They make up the total value added. The institution accounts consist of households, capital account (S-I) and government (GOV). Investment in our closed economy can be financed either with savings from the households, the government or the investor. In this model it is assumed that only the investor carries out investment.

Households receive payments from factor accounts for provision of labour and capital services and transfers from the government (rows 7 and 8). The government receives sales taxes on products (row 9). The capital account records receipts due to changes in stock over the period being analysed.

[58] It should be noted that although the values in the table are hypothetical, they mimic the structure of a typical African economy.

Table A1: SAM for the simple CGE model

	Activities		Commodities		Factors		Households				Taxes		
	TOU-A	NON TOU-A	TOU-C	NON TOU-C	LAB	CAP	RUR-H	URB-H	GOV	S-I	YTAX	STAX	TOTAL
TOU-A			255										255
NON TOU-A				350									350
TOU-C	66	44					55	77	11	27			280
NON TOU-C	44	66					110	55	47	61			383
LAB	72	105											177
CAP	73	135											208
RUR-H					95	125			5				225
URB-H					82	83			25				190
GOV											25	58	83
S-I							40	53	-5				88
YTAX							20	5					25
STAX			25	33									58
TOTAL	255	350	280	383	177	208	225	190	83	88	25	58	

Source: adapted from Lofgren et al. (2002)

Since, for each agent, expenditure is balanced with income, the column and row sums are the same. It is usually convenient to assume that prices and wages in the base SAM are equal to one. This is by no means realistic, but the normalisation of prices and wages does allow changes from the base to be measured. With all prices equal to one, quantities in Table 1 can be interpreted as in either physical or value terms.

3.2. Model specification

Model specification consists of the following elements:

a) Dimensions of the model – examples of model dimensions include:
   - Number and type of sectors and institutions;
   - Whether the analysis is static or dynamic;
   - Whether model is closed or open economy.

b) Types of functional forms to describe the behaviour of economic agents– examples include:

- Constant elasticity of substitution (CES) function:
- Linear Expenditure System (LES);
- Leontief function.
- Usually Cobb-Douglas (CD); for this simple CGE model we chose a CD[59] functional form to describe the behaviour of agents. For the tourism-based Kenyan CGE a combination of LES, CES, CD and Leontief was used. The choice was driven by the characteristics of the sectors and institutions of the Kenyan economy. More flexible functional forms such as the translog function could be used, but they present a number of analytical difficulties.

a) Exogenous elasticities or parameters
    - For a CD function, a single price and quantity observation is sufficient to determine the parameters of the function.
    - But, for more general CES and LES functions, extra values of substitution elasticity parameters are required to compute the curvature of indifference curves and isoquants. These are considered as exogenous inputs to the model.

The model equation follows closely that in Lofgren et al. (2002). As mentioned above, the households aim to sell all their endowed factors to the firms to earn income. They are further assumed to choose the consumption of goods that maximize their utility. The government is supposed to purchase goods and services and to collect taxes which are used to make transfer payments to households. The production activities produce two commodities.

[59] The choice of functional forms in CGE models is guided by many factors. The behavioural functions should be continuous and homogeneous of degree zero and result in a system of demand in conformity with the Walras Law (Shoven and Whalley, 1984). They also depend on the charateristics of the economy under study, the various sectors and on the values of the related elasticities.

Table 2A summarises the notation principles.

Table A2: Notational principles

Items	Notation
Endogenous variables	Upper-case Latin letters without a bar
Exogenous variables	Upper-case Latin letters with a bar
Parameters	Lower-case Latin letters or lower-case Greek letters
Set indices	Lower-case Latin letters as subscripts to variables and parameters

Source: adapted from Lofgren et al. (2002)

Indices

$a \in A$ activities
{TOU-A tourism activity
NONTOU-A non-tourism activity}

$c \in C$ commodities
{TOU-A tourism commodity
NONTOU-A non-tourism commodity}

$f \in F$ factors
{LAB labour
CAP capital}

$i \in I$ institutions
{URB-H urban household
RUR-H rural household
S-I capital account
GOV government}

$h \in H(\subset I)$ households
{URB-H urban household
RUR-H rural household}

3.2.1. Specification of model equations

3.2.1.1. Production, price and commodity demand

Production, price and commodity equations

Cobb-Douglas production function for activity a

$$QA_a = \varphi_a * \prod_{f \in F} QF_{f,a}^{\delta_{f,a}} \qquad a \in A \qquad (1)$$

Demand for factor f from activity a

$$WF_f * WFDIST_{f,a} * QF_{f,a} = \delta_{f,a} * PVA_a * QA_a \qquad f \in F, a \in A \qquad (2)$$

Intermediate demand for commodity c from activity a

$$QINT_{c,a} = ica_{c,a} * QA_a \qquad c \in C, a \in A \qquad (3)$$

Output of commodity c

$$Q_c = \sum_{a \in A} \theta_{a,c} * QA_a \qquad c \in C \qquad (4)$$

Demand price for commodity c

$$P_c = (1 + tc_c) * PX_c \qquad c \in C \qquad (5)$$

Price for activity a

$$P_a = \sum_{c \in C} \theta_{a,c} * P_c \qquad a \in A \qquad (6)$$

Value-added price for activity a

$$PVA_a = PA_a - \sum_{c \in C} P_c * ica_{c,a} \qquad a \in A \qquad (7)$$

where

$\delta_{f,a}$	share of value-added to factor *f* in activity *a*
$ica_{c,a}$	quantity of commodity *c* as intermediate input per unit of activity *a*
φ_a	scale parameter in CD production function
tc_c	tax rate on commodity *C*
$\theta_{a,c}$	yield of output *c* per unit of activity *a*
P_c	price of commodity *c*
PA_a	price of activity *a*
PVA_a	value-added (or net) price for activity *a*
PX_c	producer price for commodity *c*
QA_a	level of activity *a*
$QF_{f,a}$	quantity demanded of factor f from activity *a*
QFS_f	supply of factor *f*
$QINT_{c,a}$	quantity of commodity *c* as intermediate input to activity a
WF_f	price of factor *f*

Equation (1) defines the production function for activity as a Cobb-Douglas (CD) aggregate of primary factors, namely capital and labour. The demand equations for the producers for capital and labour are captured by a CD function as shown in Equation (2). The intermediate input demand function is a fixed coefficient of activity output (Equation 3). In Equation (4), the activity level determines the quantity of commodity outputs produced by each activity. Equations (5), (6), (7) specify the prices for commodity, activity and value-added, respectively.

3.2.1.2. Income and expenditure of households and government

Income and expenditure equations

Transfer of income from factor f to household h

$$YF_{h,f} = shry_{h,f} * \sum_{a \in A} WF_f * QF_{f,a} \qquad h \in H, f \in F \qquad (8)$$

Income of household h

$$YH_h = \sum_{f \in F} YF_{h,f} + tr_{h,gov} \qquad h \in H \qquad (9)$$

Consumption demand for household h & commodity c

$$QH_{c,h} * P_c = \beta_{c,h} * (1 - mps_h) * (1 - ty_h) * YH_h \qquad c \in C, h \in H \qquad (10)$$

Investment demand for commodity c

$$QINV_c = \overline{qinv_c} * IADJ \qquad c \in C \qquad (11)$$

Government revenue

$$YG = \sum_{h \in H} ty_h * YH_h + \sum_{c \in C} tc_c * PX_c * Q_c \qquad (12)$$

Government expenditures

$$EG = \sum_{c \in C} P_c * qg_c + \sum_{h \in H} tr_{h,gov} \qquad (13)$$

where

$\beta_{c,h}$	share of household *h* consumption spending on commodity *c*
mps_h	marginal (and average) propensity to save for household *h*
$shry_{f,h}$	share in the income of factor *f* for household *h*
qg_c	government demand for commodity *c*
$qinvbar_c$	base-year quantity of investment demand for commodity *c*
$tr_{ii'}$	transfer from institution i' to institution *i*
ty_h	rate of income tax for household *h*
EG	government expenditures
$IADJ$	investment adjustment factor
Q_c	output level for commodity *c*
$QH_{c,h}$	quantity consumed of commodity *c* by household *h*
$QINV_c$	quantity of investment demand for commodity *c*
$YF_{h,f}$	income of household h from factor *f*
YH_h	income of household *h*
YG	government revenue

Equation (8) defines the share of factor incomes accruing to households. Household income is the sum of the income from factor plus transfer from the government (Equation 9). It is assumed that the utility function is of a Cobb-Douglas type. The consumption of different commodities is a function of income, marginal propensity to save and transfer (Equation 10). The volumes of commodities purchased for investment are determined by the volume in the base period and can be varied using an adjuster (Equation 11). Government revenue is defined as the sum of income tax and sales tax (Equation 12). The value of government expenditure is therefore equal to the sum of government demand for commodities plus its transfer payment to households (Equation 13).

3.2.1.3. System constraints (equilibrium conditions)

System constraint equations

Market equilibrium condition for factor f

$$\sum_{a \in A} QF_{f,a} = QFS_f \qquad f \in F \qquad (14)$$

Market equilibrium condition for commodity c

$$Q_c = \sum_{h \in H} QH_{c,h} + \sum_{a \in A} QINT_{c,a} + QINV_c + qg_c \qquad c \in C \qquad (15)$$

Savings-investment balance

$$\sum_{c \in C} P_c * QINV_c + WALRAS = \sum_{h \in H} mps_h * (1 - ty_h) * YH_h + (YG - EG) \qquad (16)$$

Price normalisation

$$\sum_{c \in C} cwts_c * P_c = cpi \qquad (17)$$

where

cpi consumer price index

$cwts_c$ weight of commodity *c* in the CPI

$WALRAS$ dummy variable (zero at equilibrium)

Equations 14 to 16 define the market-clearing equilibrium conditions. We introduce one index, namely the consumer price index that can be used for price normalisation. The consumer price index is defined as a weighted sum of composite commodity prices in the current period, where the weights are the share of each commodity in total demand (Equation 17).

3.2.2. Market-clearing conditions

The optimisation problems are not dependent on the decisions of other agents, but only on the given good and factor prices. The optimisation problems of the different agents have so far been analysed separately. Therefore, there is no guarantee that the prices assumed by the household are the same as those assumed by the producers. Furthermore, even if those prices are identical, supply is not necessarily equal to demand for each good and for each factor. In addition, the total demand for each factor does not necessarily match its endowments.

With respect to the savings–investment account, equilibrium is achieved through adjustment in real investment. We determine the value of savings (that is a fixed proportion of disposable household income expressed through the marginal propensity to save, *mps*) and let the balance identity determine the value of total investment. In other words, real investment adjusts to changes in savings. This is called a savings-driven closure[60]. For the factor markets, we assume full employment and mobility of labour, with real wages as the market-clearing variable for the unified capital market.

3.2.3. Closure of the model and the numéraire

This model contains 17 block equations (38 single equations), 19 block variables (44 single variables), and therefore cannot be solved. We need to make six variables exogenous. Mathematically it is arbitrary which ones we choose, but there are economic reasons for selecting some rather than others. Given the assumption that the factor supply is fixed while labour is fully employed and capital is activity-specific, the following variables are fixed at base values: $PA_a, PX_c, IADJ$, and WF_{cap} = 2+2+1+1 = 6.

We now have 38 equations and 38 variables. However, Walras' Law shows that these are not independent equations. If we have *n* markets and excess demands in *n-1* are zero (i.e. in equilibrium), then the last market must also balance. In other words, equilibrium in the last market follows from the supply-demand balance in all

[60] Alternatively, we could determine the value of total investment within the model and let the balance identity determine savings. This is called 'Johansen' or investment-driven closure.

other markets. Thus, we only really have 37 independent equations, as one equation is redundant and has to be dropped. Therefore, we have to fix one more variable to get to 37 variables. Instead of dropping one variable, we could add one dummy variable (Burfisher, 2011). We do not drop one equation, but rather we add an additional equation called "Walras". If all markets in the model are in equilibrium, then the Walras value will equal zero. It should be noted that we cannot solve absolute prices but only relative prices, as in other general equilibrium models with zero homogeneity in prices.

3.2.4. Calibration of benchmark equilibrium

Calibration involves solving unknown parameters in the model system. Let us call the equilibrium depicted in the SAM the initial equilibrium, as opposed to the base year run equilibrium. A CGE model is a system of simultaneous equations (expresses in vector form):

CGE (**X, Y, A**) = 0,

where **X** denote the endogenous variable vector, **Y** the exogenous variable vector and **A** the coefficient vector. A common practice is to solve the model system CGE (.) for the (unknown) endogenous variable vector **X**, given **Y** and **A**. In calibration, given the exogenous variable vector **Y** and the model system (.), we solve for the coefficient vector **A** instead of **X**. We denote the initial equilibrium value of **X** as **X0**. The following equation holds: CGE(**X0**, **Y**, **A**) = **0** (cf. Hosoe et al., 2010).

Calibration of the Cobb-Douglas consumption and production equations involves determining and evaluating the two share parameters ($\alpha_{c,h}$ and $\beta_{c,h}$), where all prices are normalized to one. Moreover, CGE models rely greatly on coefficients and exogenous variables, calibrated on the basis of the SAM. Once we confirm the reproduction of the SAM data by calibration, we can begin the simulations, where counterfactual values are assumed for some of the constants in the model to examine the impact of exogenous or policy shocks on the economy (cf. Hosoe et al., 2010). The model is solved in GAMS.[61]

[61] Generalized Algebraic Modelling System (GAMS) is a language of setting up and solving mathematical programming optimisation models. It is an all-in-one package that allows one to specify the structure of the optimisation model and calculate data that goes into the model.

Model base solutions

Parameter beta (share of household consumption spending on commodity c)

	URB-H	RUR-H
TOU-C	0.583	0.333
NONTOU-C	0.417	0.667

Parameter theta (yield of output c per unit of activity a)

	TOU-C	NonTOU-C
TOU-A	0.911	
NONTOU-A		0.914

Parameter tr (transfer from institution ip to institution i)

	GOV
URB-H	25.000
RUR-H	5.000

Parameter ty (rate of income tax for household h)
URB-H 0.026, RUR-H 0.089

Parameter cpi = 1.096 consumer price index

Parameter cwts (weight of commodity c in the CPI)
TOU-C 0.444, NONTOU-C 0.556

Parameter ica (quantity of c as intermediate input per unit of activity a)

	TOU-A	NONTOU-A
TOU-C	0.236	0.114
NONTOU-C	0.158	0.172

Parameter shry (share for household h in the income of factor f)

	Lab	Cap
URB-H	0.399	0.463
RUR-H	0.601	0.537

Parameter qg (government demand for commodity c)
TOU-C 10.018, NONTOU-C 42.950

Parameter qinvbar (base-year qnty of investment demand for commodity c)
TOU-C 24.589, NONTOU-C 55.744

Variable EG.L = 88.000 government expenditures
Variable IADJ.L = 1.000 investment adjustment factor

Variable MPS.L {marginal (and average) propensity to save for household h}
URB-H 0.286, RUR-H 0.195

Variable PA.L (price of activity a)
TOU-A 1.000, NONTOU-A 1.000

Variable PVA.L {value-added (or net) price for activity a}
TOU-A 0.569, NONTOU-A 0.686

Variable PX.L (producer price for commodity c)
TOU-C 1.000, NONTOU-C 1.000

Variable P.L (price of commodity c)
TOU-C 1.098, NONTOU-C 1.094

Variable Q.L (output level for commodity c)
TOU-C 255.000, NONTOU-C 350.000

Variable QA.L (level of activity a)
TOU-A 255.000, NONTOU-A 350.000

Variable QF.L (quantity demanded of factor f from activity a)

	TOU-A	NONTOU-A
Lab	52.644	97.356
Cap	72.000	105.000

Variable QH.L (quantity consumed of commodity c by household h)

	URB-H	RUR-H
TOU-C	70.125	50.089
NonTOU-C	50.261	100.522

Variable WF.L (price of factor f)
Lab 1.387, Cap 1.000

Variable QFS.L (supply of factor f)
Lab 150.000, Cap 177.000

Variable YF.L (income of household h from factor f)

	Lab	Cap
URB-H	83.000	82.000
RUR-H	125.000	95.000

Variable YH.L (income of household h)
URB-H 190.000, RUR-H 225.000

Variable QINT.L (quantity of commodity c as intermediate input to activity a)

	TOU-A	NONTOU-A
TOU-C	60.107	40.071
NONTOU-C	40.209	60.313

Variable QINV.L (quantity of investment demand for commodity c)
TOU-C 24.589, NONTOU-C 55.744

Variable YG.L = 83.000 government revenue

3.2.5. Policy evaluation

Within the policy simulations, single parameters or exogenous variables are changed and a new (counterfactual) equilibrium is computed. We simulate an increase in the parameter “sales tax” by 20 per cent. Comparison of the counterfactual and the benchmark equilibrium then provides information on the policy-induced changes of economic variables such as employment, production, consumption and relative prices. Finally, the model results must be interpreted based on sound economic theory.

Table 3: Effects of a 20 per cent increase in sales tax

	Base year value	**Simulation value**	**Per cent age change**
Government expenditures	88.000	88.004	0.004
Government revenue	81.083	81.101	0.022
Disposable income of households ***URB-H*** ***RUR-H***	*188.279* *221.511*	*188.237* *221.117*	*-0.022* *-0.177*
Consumption of TOU-C by ***URB-H*** ***RUR-H***	*70.125* *50.089*	*69.051* *48.923*	*-1.531* *-2.327*
Consumption of NONTOU-C by *URB-H* ***RUR-H***	*50.261* *100.522*	*48.366* *94.241*	*-3.770* *-6.248*

A 20 per cent increase in sales tax is shown to increase government revenue and expenditure by 0.022 per cent and 0.004 per cent, respectively. The simulated shock results in a 2.327 per cent decrease in rural household consumption of tourism product, a 6.248 per cent decline in the consumption of non-tourism product and in a 0.177 per cent decrease in its income (see Table 3). Urban household’s consumption of tourism product (non-tourism product) declines by 1.531 per cent (3.770 per cent) and its income drops by 0.022 per cent.

3.2.6. Sensitivity analysis

Due to the reliance on exogenous elasticity values and a single base-year observation, comprehensive sensitivity analysis on key elasticities (and possibly alternative assumptions on economic incentives) should be performed before concrete policy recommendations are derived. All parameters used in this simple model such as the share of value-added of each factor in production activities, the budgetary share of the consumption of each commodity, the scale parameter in CD production function and the share in the factor income for each household are derived directly from the Social Accounting Matrix. Therefore, there is no need to undertake a sensitivity analysis.

4. Conclusions

The essence of CGE models is the combination of the general equilibrium theory with a consistent data set in order to derive policy insights. This chapter has shown how to specify, solve and draw policy lessons from a small, static, multi-sector and multi-household CGE model. The different closures of the model as well as the parameters needed for the implementation of the model have been presented. The model has been implemented using GAMS software. Although very simple and reduced, the model, built and implemented, captures features and characteristics of the Kenyan CGE model presented in Chapter 5.

APPENDIX B: Model options

The tourism-focused CGE model presented above can be used to evaluate rich array of issues at a much disaggregated level. The model captures the essential mechanisms by which external shocks and economic policies ripple through the economy. It includes a number of features designed to reflect the structure of the characteristics of sub-Saharan African economies. It can easily be altered to reflect the economic structure of a particular country or to suit the purpose of a particular policy or project.

It can enable us to look at the impact of tourism infrastructure investments, tourism subsidies, tourism taxation as well as the impact of economic crisis and special events. The current version of the model does not include the aviation-tourism interactions; however, the model can easily be extended to capture those links. Such a model can be used for a number of other investigatory questions. For example, the tourism and welfare impact of aviation policies, such airline subsidies, airport investments, changes in air passenger duty or the economic impacts of removing restrictions.