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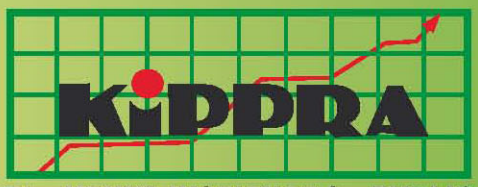

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An Input-Output Table for Kenya and its Application to Development Planning

Bernadette Wanjala

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Kenya Institute for Public Policy Research and Analysis

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Abstract

This study sought to document the methodology that was used to construct the 2009 input-output (I-O) table for Kenya. The study made use of supply and use tables for 2009 that were developed by the Kenya National Bureau of Statistics. The product technology model is adopted to transform the supply and use tables into a symmetric I-O table. The highly disaggregated I-O table has 81 activities and 81 commodities; there was a one-to-one mapping between activities and commodities. Two previous I-O tables (1976 and 2003) and the multiplier analysis methodology were used to analyze structural change and growth options.

A comparison between the I-O tables for 1976, 2003 and 2009 revealed several facts. First, private services (especially transport and communication, and financial services) continued to be major drivers of growth, while agriculture and manufacturing declined and stagnated, respectively. Second, the share of labour in value added continued to decline, which consequently led to a decline in the share of household income in total factor incomes. Third, despite the government's deliberate efforts to promote exports, the ratio of exports to imports declined from 140 per cent in 1976 to only 48 per cent in 2009. Fourth, even though the share of household income in value added declined, the share of household consumption in total demand remained fairly stable. On the contrary, the share of intermediate inputs and investment in total demand increased over time. Fifth, while growth has largely been service driven, the share of labour in value added significantly declined over time.

Results from the multiplier analysis revealed that, in general, most sectors showed increased interdependency in terms of higher backward and forward linkages. Growth simulations showed that a policy combination of agriculture, construction, transport and communication, and financial services resulted in the highest growth potential, while the combination of agriculture and manufacturing resulted in the highest employment creation (largely informal, unskilled and low-paying jobs).

The study concludes that for Kenya to achieve a more inclusive growth process, there is need to: enhance structural transformation (especially in agriculture and manufacturing) through human capital development; create more skilled jobs with higher productivity and remuneration; and promote exports through increased diversification, value addition and removal of supply constraints while encouraging local supply of raw materials.

Abbreviations and Acronyms

BPO	Business Process Outsourcing
CGE	Computable General Equilibrium
GDP	Gross Domestic Product
I-O	Input-Output
ISIC	International Standard Industrial Classification
KNBS	Kenya National Bureau of Statistics
KTMM	KIPPRA Treasury Macroeconomic Model
MPM	Multiplier Product Matrix
SAM	Social Accounting Matrix
SEZs	Special Economic Zones
SUT	Supply and Use Tables

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1. Introduction

Realizing and sustaining high levels of economic growth, generating gainful employment opportunities and reducing poverty have been Kenya's main development goals. The long-term development blueprint, Vision 2030, outlines the country's development agenda and specifically aims at transforming Kenya into "a newly-industrializing, middle-income country providing a high quality of life to all its citizens in a clean and secure environment" (Government of Kenya, 2012). The Vision is anchored on three key pillars: economic, social and political. The economic pillar aims at achieving and sustaining a 10 per cent growth in GDP per annum. To realize this goal, the Vision identified priority sectors that would lead to the 10 per cent growth target, and these include tourism, agriculture, manufacturing, wholesale and retail trade, Business Process Outsourcing (BPO), and financial services. Identification of priority sectors for growth requires an understanding of the production structure of an economy and how the economic structure has evolved over time. It is also important to understand the inter-sectoral linkages across sectors which are important for growth. Input-Output (I-O) frameworks provide an important tool for assessing sectoral contribution to growth, and the potential of sectors in stimulating growth in other sectors.

The I-O framework consists of three types of tables: the supply table, the use table, and symmetric I-O table (European Commission, 2008). Supply and use tables (SUT) provide a detailed snapshot of supply of goods and services by domestic production and imports, and the use of goods and services for intermediate consumption and final use (consumption, gross capital formation, and exports). These tables show the structure of the cost of production and income generated in the production process, the flow of goods and services produced within the national economy, and the flow of goods and services to the rest of the world. The use table also shows how the components of value added (compensation of employees, other net taxes on production, consumption of fixed capital, and net operating surplus) are generated by industries in the domestic economy. Thus, SUT gives detailed information on the production processes, the interdependencies in production, the use of goods and services, and generation of income in production. They assume a simplified economic structure with only three sectors: agriculture, manufacturing and services. The basic structures of simplified supply, use, SUT and symmetric I-O tables (adopted from European Commission, 2008) are shown in Appendix 1 Tables 1-4.

I-O analysis as a theoretical framework and an applied economic tool in a market economy was developed by Wassily Leontief with the construction of the first I-O tables for the United States in 1919 and 1929, published in 1936 (United Nations, 1999). Since then, I-O tables describing the interrelationships among various

producers of an economy have been constructed for many countries worldwide. The integration of an I-O framework into the system of national accounts was developed and published in 1968 by the United Nations as a system of national accounts. The fundamental contribution of I-O in economics is the development of an analytical framework which facilitates economic projections and analyses. The I-O framework assumes that the inputs used in producing a product are related to the industry output by a linear and fixed coefficient production function in the short run.

Previously, I-O analysis was used to analyze structural change for Kenya in early 1990s under the Long Range Planning project (Beaulieu, 1990). Despite I-Os being important tools for both statistical and analytical purposes, Kenya has not been producing the I-O tables on a regular basis. There are only two earlier versions of the I-O tables, produced for 1976 and 2003. Further, given that the application of I-O tables is only relevant in the short to medium term due to changing production structures, development of up-to-date I-O tables for Kenya is necessary. Also, the growing need for sectoral analysis calls for the development of a more up-to-date I-O table.

This paper seeks to:

(i) Document the methodology that was used in developing the I-O table for Kenya for 2009; and

(ii) Use the 2009 I-O and previous ones to carry out structural and growth options analyses for the Kenyan economy.

The rest of the paper is organized as follows. Section two provides a brief background on previous I-O tables for Kenya. Section three reviews the use of I-O tables in development planning. Section four outlines the methodology used in the development of the 2009 I-O table, including multiplier analysis. Section five provides an overview of the 2009 I-O for Kenya while Section six provides a comparative structural analysis using the I-Os of 1976, 2003 and 2009 and an analysis of growth options using the 2009 I-O. Section seven concludes the study.

2. A Review of Previous Input Output Tables for Kenya

In this section, a brief review of two earlier I-O tables for Kenya: a 1976 I-O developed by Vandermoortele (ILO) and a 2003 I-O developed by KIPPRA (Thurlow et al., 2007) is provided. Table 2.1 shows an aggregate version of the 1976 I-O table. The productive sectors are aggregated into four broad categories: agriculture, industry, and private and public services. Value added is disaggregated into labour, operating surplus and depreciation, while final demand categories include: household consumption, government consumption, gross fixed capital formation and exports. Table 2.2 shows the inputs and outputs by product in 1976.

A look at sectoral contributions to output and final demand reveals that agriculture contributed about 26 per cent, 42 per cent and 33 per cent to outputs, value added and exports, respectively, compared to only 5 per cent to imports in 1976 (Tables 2.1 and 2.3). Industry had the highest contribution to outputs and imports estimated at 37 per cent and 83 per cent, respectively, with lower value addition, estimated at 18 per cent. The manufacturing sector was, therefore, highly import dependent in 1976. Private services also contributed significantly to output, value addition and exports accounting for 26 per cent of output, 26 per cent of value addition and 36 per cent of exports.

In 2003, the identity between inputs and outputs also holds. Compared to 1976, the contribution of agriculture to outputs declined from 26 per cent in 1976 to 17 per cent in 2003, while that of value added declined from 42 per cent in 1976 to 26 per cent in 2003 (Tables 2.4 and 2.5). However, the contribution to exports increased from 33 per cent in 1976 to 36 per cent in 2003. For industry, the sector's contribution to output slightly increased from 37 per cent in 1976 to 39 per cent in 2003, while value added increased from 18 per cent in 1976 to 21 per cent in 2003. The sector's contribution to exports increased from 32 per cent in 1976 to 47 per cent in 2003. Growth in 2003 was mainly driven by private services, which accounted for about 37 per cent of value added, compared to 26 per cent in 1976. On the other hand, the contribution of private services to exports declined from 36 per cent in 1976 to 17 per cent in 2003. This scenario is an indication of structural change implying that the economy can achieve sustainable and more inclusive growth that leads to employment creation and poverty reduction. Table 2.6 shows the total I-O by product in 2003.

Table 2.1: An input-output table for Kenya for 1976* (Ksh million)

	Agriculture, Fishing and Forestry	Industry	Private Services	Public Services	Household Consumption	Government Consumption	Investment	Exports	Total Use
Agriculture, fishing and forestry	602	2,258	8	10	5,810	0	798	3,078	12,564
Industry	504	6,702	2,618	1,164	5,712	0	2,970	2,982	22,652
Private services	252	1,696	2,446	370	4,534	0	206	3,350	12,854
Public services	6	8	0	2	2,954	2,400	0	24	5,394
Compensation of employees	7,644	2,570	4,152	3,656					
Operating surplus	2,646	1,402	2,102	0					
Depreciation	552	634	524	38					
Indirect taxes	48	1,834	288	12					
Imports	310	5,548	716	142					
Total supply	12,564	22,652	12,854	5,394					

**This input output table is derived from the Social Accounting Matrix for Kenya for 1976 that was developed by Vandermoortele (ILO); adjusted by Rob Vos and consolidated by J. V. Alarcon.*

Table 2.2: Identities in the 1976 I-O

Ksh Million	**Total Inputs by Product**	**=**	**Total Outputs by Product**
Agriculture	12,564	=	12,564
Industry	22,652	=	22,652
Private services	12,854	=	12,854
Public services	5,394	=	5,394

Table 2.3: Structure of the Kenyan economy using I-O table of 1976 in percentage

	Agriculture	Industry	Private Services	Public Services	Total
Total output	26.2	36.6	26.0	11.2	100.0
Value added	41.8	17.8	26.1	14.3	100.0
Final demand	27.8	33.5	23.2	15.4	100.0
Imports	4.6	82.6	10.7	2.1	100.0
Exports	32.6	31.6	35.5	0.3	100.0

Source: Authors' computation using 1976 I-O

Table 2.4: An Input-Output table for Kenya for 2003* (Ksh million)

	Agriculture, Fishing and Forestry	Industry	Private Services	Public Services	Transaction Costs	Household Consumption	Government Expenditure	Investment	Exports	Total
Agriculture, fishing and forestry	16,444	46,662	1,950	0	0	219,509	6,276	4,133	101,037	396,012
Industry	40,808	316,923	102,551	52,973	0	286,950	4,702	192,537	131,526	1,128,970
Private services	16,532	31,237	211,356	25,182	117,117	312,922	4,263	53	48,824	767,484
Public services	0	192	2,829	2,055		48,634	187,672	0	0	241,381
Transaction costs	22,316	94,801	0	0						
Compensation of employees	112,241	60,840	141,176	118,570						
Operating surplus	125,719	154,457	234,769	34,194						
Land	28,434	0	0	0						
Indirect taxes	5,225	117,592	8,938	0						
Imports	28,293	306,266	63,915	8,407						
Total	396,012	1,128,970	767,484	241,381						

**This I-O table is derived from the 2003 Social Accounting Matrix for Kenya by Thurlow et al. (2007)*

Table 2.5: Structure of the Kenyan economy using I-O table of 2003 in percentage

	Agriculture	Industry	Private Services	Public Services	Total
Total output	17.3	38.7	33.1	11.0	100
Value added	26.4	21.3	37.2	15.1	100
Final demand	21.4	39.7	23.6	15.3	100
Imports	7.0	75.3	15.7	2.1	100
Exports	35.9	46.7	17.4	0.0	100

Source: Author's computation using 2003 I-O

Table 2.6: Identities in the 2003 I-O

Ksh million	Total Inputs by Product	=	Total Outputs by Product
Agriculture	396,012	=	396,012
Industry	1,128,970	=	1,128,970
Private services	933,711	=	933,711
Public services	241,381	=	241,381

3. Use of Input-Output Tables in Development Planning

Input-Output (I-O) models have various uses in development planning. First, they can be used to generate production targets of the various sectors. With projections of final demand, for example an expansion of exports, I-O models can calculate the level of production required from each sector to meet the increase in final demand. Calculation of production targets is important given that it can identify the bottlenecks or excess capacities arising from specific development policies.

Second, I-O models provide a valuable tool for structural analysis. The model enables identification of interdependence among different sectors, where it is possible to trace the extent of dependence of the economy on a certain industry as well as dependence of that industry on other industries through backward and forward linkages. Similarly, the model can also show the weight of the different sectors in the economy, which can be derived by looking at the percentage of the industry's output that arises from domestic production and also the percentage of the inputs to the industry that are derived from domestic production. Industries with higher import dependence will have lower percentages.

Beaulieu (1990) used I-O analysis to examine sectoral interdependence and the changing structure of production for Kenya between 1967 and 1986. Sectoral interdependence was viewed as the extent to which sectors purchase inputs and sell outputs to all sectors in the economy. An increase in sectoral interdependence over time is an indication of structural change. The period between 1967 and 1986 was characterized by: an increased effective protection of the manufacturing sector, which was matched with an increasing share of manufacturing in total GDP; substitution of domestic products for some imported goods including inputs; and an increased interdependence among sectors. The analysis showed that, overall, both backward and forward linkages increased between 1967 and 1986. The coefficient of variation, which shows how integrated a sector is with other sectors, largely declined between 1967 and 1986 for all sectors, except manufacturing and financial services. The decline in the coefficient of variation was an indication that sectors were not only demanding for more intermediate goods from other sectors, but also sourcing from more sectors.

Manufacturing and finance were found to rely on fewer sectors for sourcing their intermediates. Agriculture had lower linkages and also relied on fewer sectors for inputs, implying the sector was not fully participating in the modernization of the economy as envisaged. In terms of sources of growth, the study revealed that the importance of export demand declined between 1967 and 1986. This was mainly attributed to changes in manufactured exports and the tariff structure, which sought to protect the manufacturing sector, rendering it uncompetitive. High and

non-uniform tariff structures encouraged domestic manufacture of intermediate inputs at higher costs compared to world prices. The high cost of intermediate inputs eroded the competitiveness of Kenyan exports in the world market.

Another example of empirical application of I-O models for analysis of structural change is Guo and Planting (2000) who analyzed structural change in the US using I-O models from 1972 to 1996, focusing on inter-industry linkages and the effect of international trade on those linkages. They showed that the relative impact of manufacturing on the economy had declined, which was mainly attributed to increased import penetration. They used graphical presentation of inter-industry relationships through the "Multiplier Product Matrix" (MPM)[1] and its associated "economic landscape" to provide a visual picture of the US economic structure for selected years and how it had changed over time. To evaluate the effects of trade on inter-industry linkages, separate MPMs were created to show linkages for only domestic production with those between the US economy and the rest of the world, and the influence of trade on the structure of the US economy being derived as a residual. Reis and Rua (2006) also follow a similar approach to assess sectoral interdependence and trade e□ects for individual sectors as well as for the economy of Portugal. They found that services had lower backward linkages and lower levels of leakages mainly because of lower external dependence. Manufacturing sector, on the other hand, had higher backward linkages and higher leakages.

Third, I-O tables provide a tool for sectoral analysis. The level of disaggregation depends on the objective of developing the I-O table. For instance, we can have agriculture as a single sector or disaggregate it into various sub-sectors depending on the desired goal. There are several studies in literature that have used I-O models to estimate the impact of specific sectors. For instance, Surugiu (2009) used an I-O model to measure the impact of tourism (proxied by hotels and restaurants) on the Romanian economy. They showed that in 2005 an increase of 1 RON in the demand for hotels and restaurants resulted in a change in the economy's total output of 1.736 RON, and an increase of earnings in the economy by 0.269 RON. Also, the increase of one thousand units of final demand for hotels and restaurants products means 0.023 increase in the demand for employees. Another study by Valle and Yobesia (2009) used a social accounting matrix (SAM), which is an extension of an I-O model to estimate the economic contribution of tourism in Kenya. This study showed that tourism has the potential to contribute to growth and employment creation. Given that tourism was not captured as a distinct sector in the SAM, the authors largely analyzed the effect of private services on

[1] MPM provides a measure of the impacts of an industry on other industries that can be compared with those of other industries or with itself at different points in time. These linkages represent the interactions by an industry with other industries both as a producer of outputs (forward linkages) and a consumer of inputs (backward linkages).

the economy. Other studies that have used I-O models to estimate the impact of tourism on the economy include: Mazumder, Ahmed and Al-Amin (2009) study on Malaysia, and Kweka, Morrisey and Blake (2003) study on Tanzania.

Fourth, I-O models can be used to evaluate different investments and their effect on overall growth of the economy, income generation, employment creation and import requirements. This is particularly important for Kenya which hopes to achieve higher and sustainable growth levels, coupled with employment creation. I-O models are designed to trace the impact of changes in final demand such as consumer expenditures, investment and government spending on the structure of outputs, and employment by industry or sector (Grady and Muller, 1988). For instance, an input-output model can be used to estimate the impact of government expenditures on particular programmes or projects on outputs, and employment by industry. For example, the impact of a construction project (such as building a road) on the economy could be estimated by translating the direct impact of initial spending on the project into spending on intermediate material inputs such as concrete, steel rods, gravel, and fuel, and into spending on the primary inputs of labour, capital, and indirect taxes. Spending on inputs would in turn be transformed into industry outputs, producing estimates of the indirect impact of the initial increase in spending. Employment/output coefficients are used to transform industry output impacts into employment impacts. The end result would be an estimate of the total (direct plus indirect) impact of the initial increase in spending on outputs and employment by industry.

A similar approach was used by Wanjala and Were (2009) who used SAM multipliers[2] to analyze the gendered employment outcomes of various investment options under Vision 2030 in Kenya. They showed that investing in Kenya's agriculture resulted in the highest increases in compensation of employees, which benefited rural households more than urban ones. On the other hand, the manufacturing sector was found to account for the largest share of job creation, even though most of the jobs were in the informal sector. In addition, unskilled labour accounted for the highest proportion of the increase in employment creation, yet it was less than 30 per cent of the increase in compensation of employees. A gender analysis of increases in compensation of employees also showed that the proportion of women was higher in the informal sector than the formal sector. Also, women benefited relatively more from employment creation in the manufacturing sector even though their jobs were largely precarious, informal, or casual with lower wages. In general, such results from I-O/SAM analysis can be useful in guiding the formulation of policies for a more inclusive growth process, given it provides

[2] The only difference between SAM and I-O multipliers is that while I-O models only endogenize production activities (including value added), SAM multipliers endogenize production activities and private institutions (mostly households and enterprises).

an insight into the distribution of gains from employment creation, consequently poverty reduction.

I-Os can also be used to evaluate the effect of various policies on the economy, such as the effect of taxes. For instance, Zaman, Surugiu and Surugiu (2010) used an I-O model to provide a justification for the need for optimal taxation in Romania by estimating the effects of taxation on the economy. They estimated tax multipliers for both backward and forward linkages. Tax backward linkage coefficients were used to quantify the relationship between the tax coefficient and the change by one value-unit of the final demand. The tax multipliers show how many times state tax revenues change in the case of one value-unit change of final demand within the respective branches. They argued that there are sectors that have a less direct contribution to tax revenues, but generate (as a result of various links between sectors) higher taxation revenue depending on the size of tax generated in other economic sectors. From the analysis, they showed that sectors that serve others (e.g. electricity, gas, water, education, public administration) were characterized by a strong tax propagation effect. Thus, policy makers could argue for a change in taxation in these sectors provided they quantify the (indirect) propagated effects of taxation both in terms of impact on final demand and living standards, and the need for promoting and stimulating certain sectors or economic activities.

Lastly, I-O tables are an important dataset in the construction of SAM and Computable General Equilibrium (CGE) models, which are useful in economy wide evaluation of policies. The Kenya National Bureau of Statistics (KNBS) extended the 2009 I-O to a SAM in 2015.

Ongoing applications of the Kenyan I-O model include: estimation of the contribution of Meetings, Incentives, Conferences and Events (MICE) on the Kenyan economy; assessing green jobs in Kenya; and using I-O coefficients for sectoral forecasting and macroeconomic modeling under the KIPPRA Treasury Macroeconomic Model (KTMM) sectors model.

Even though I-Os are important tools for statistical and analytical purposes, they should be applied with caution given that the model makes several assumptions, key among them: estimation of only short term changes, exogenous final demand, constant prices, the absence of supply constraints, and lack of budget constraints (Coughlin and Thomas, 1991; Grady and Muller, 1988; Mills, 1993; and Bess and Ambargis, 2011).

4. Methodology

4.1 Constructing the Input-Output Table

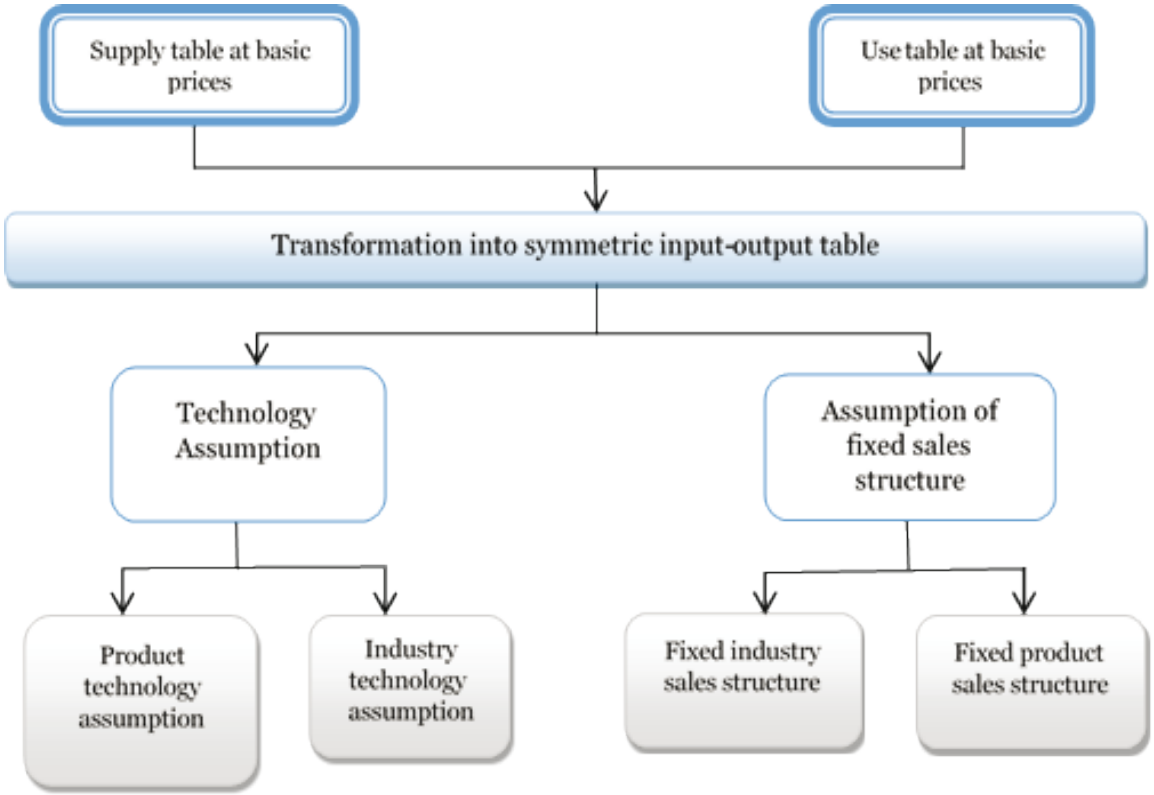
The development of the I-O table for 2009 was based on supply and use tables developed by the Kenya National Bureau of Statistics (KNBS) in 2013. The task, therefore, was to transform the supply and use tables into symmetric I-O tables. Following from European Commission (2008), there are four models that can be adopted for the transformation of supply and use tables into symmetric I-O tables (Figure 4.1). The models are based on the following assumptions:

1. Product technology model assumes that each product is produced in its own specific way, irrespective of the industry of production;
2. Industry technology model assumes that each industry has its own specific way of production, irrespective of its product mix;
3. Fixed industry sales model assumes that each industry has its own specific sales structure, irrespective of its product mix; and
4. Fixed product sales structure model assumes that each product has its own specific sales structure, irrespective of the industry of production.

Application of the technology assumption (both product and industry technology) yields product-by-product I-O tables, while use of the fixed sales structure assumption yields industry-by-industry I-O tables. Product-by-product I-O tables describe technological relations between products and homogenous units of production, while industry-by-industry tables describe inter-industry relations. Given the condition of homogeneity in the production process, it is assumed that secondary production is not existent. In practice, the product-by-product tables are preferred and best suited for economic analysis compared to industry-by-industry tables because they describe technological relations that are important for I-O analysis (European Commission, 2008). Thus, this study adopted the technology assumption in developing the 2009 I-O table for Kenya, without explicit differentiation between industries and products. The distinction between industries and products is not important, given there is very limited reporting of secondary products (by- and joint products) in supply and use tables.

The products in the supply and use tables were classified according to the International Standard Industrial Classification (ISIC), Revision 4. The first step was to aggregate the products according to their broad classification of industry, from about 150 products to 81 industrial classifications as shown in Appendix 2. After mapping the products into the respective industries, the supply and use tables were aggregated according to the 81 industries into symmetric tables. The

Figure 4.1: Transformation of supply and use tables into symmetric I-O tables



Source: European Commission (2008)

tables were then transformed into an I-O table using the technology assumption as shown in Table 4.1.

Table 4.1: Structure of 2009 Input-Output table for Kenya

	Industries	Final Uses				Total
		Household consumption	Government consumption	Gross Fixed Capital Formation	Exports	
Products	Intermediate consumption by product and by industry (81 by 81 matrix)	Final household consumption (81 by 1 matrix)	Final government expenditure (81 by 1 matrix)	Investment (81 by 1 matrix)	Exports (81 by 1 matrix)	Total use by product @ purchasers prices (81 by 1 matrix)
Value added	Compensation of employees (1 by 81 matrix)					
	Operating surplus (1 by 81 matrix)					
	Taxes and subsidies (1 by 81 matrix)					
Domestic supply	Domestic supply by product @ basic prices (1 by 81 matrix)					
Imports	Imported goods by product (1 by 81 matrix)					
Indirect taxes	Indirect taxes on goods and services by product (1 by 81 matrix)					
Total Supply	Total supply by product @ purchases prices (1 by 81 matrix)					

Source: Author's compilation

Two key identities hold for I-O tables, which also provide the consistency checks. They include the following:

Total supply by product/industry = Total use by product/industry

Total input by product/industry = Total output by product/industry

In addition, the Keynesian macroeconomic identity also holds:

Gross domestic output (Y) + imports (M) = final household consumption (C) + government expenditure (G) + gross fixed capital formation (I) + Exports (X).

$$=> Y + M = C + G + I + X$$

The resulting I-O table was balanced manually through a step by step examination of the discrepancies by industry. Given that the accounting framework in an I-O table is through double counting (i.e. an input in one sector must be an output in another sector), the net discrepancy was zero. Thus, positive discrepancies were matched with corresponding negative discrepancies, even though not all of them were one-on-one. For instance, one positive discrepancy in one industry could correspond to a summation of several negative discrepancies in several industries. The resulting I-O table was a balanced one with 81 industries as shown in Table 4.2.

4.2 Analysis of Structural Change and Sources of Growth using the I-O Framework

Major shifts within the economy can be assessed through a comparative static examination of the key parameters within an I-O framework (Zakariah and Ahmad, 1999). This method provides a framework for examining structural change by assessing the links that transmit changes among industries through technological changes (Forssell, 1988 as quoted by Zakariah and Ahmad, 1999). This study takes into consideration various aspects of structural change as highlighted by Monga (2012), which include:

1. Sectoral shifting, especially away from traditional agriculture and other low-productivity primary activities towards more modern sectors (including non-traditional agriculture) characterized by higher levels of productivity and more diversified and sophisticated products.
2. Changing production structure with a shift of resources (capital and labour) to industries with high value added per worker. These industries largely have high capital to labour ratios. This shift is not very appealing to poor countries and, therefore, should not be pursued quickly given the need for more pro-poor and inclusive growth.

3. Changing composition of exports which are an important engine of growth for most African countries.
4. Economic diversification, which includes the distribution of output, value added and employment across industries. More diversified economies tend to have higher levels of per capita income.

In addition to the comparative static analysis of key parameters over time, multiplier analysis was used to assess inter-sectoral dependencies and identify potential sources of growth and employment creation. Multiplier analysis was used to estimate the level of backward and forward linkages of sectors over time, using the I-Os of 1976, 2003 and 2009. To maximize the growth potential, priority sectors should have the highest linkages. The analytical framework for I-O analysis is described as follows:

If the amount of sector *i*'s output required for the production of sector j's output X^{ij} is assumed to be proportional to sector *j*'s output X_j, then the I-O coefficients can be given as $a_{ij} => X_{ij} = a_{ij} X_j$. Thus, the domestic I-O technology can be expressed as $i^d = (i\text{-}m_i) = AX$, while the value added generation relation is y = BX .

The direct backward linkage of sector *j* is measured by the amount that sector *j*'s output uses as inputs from other sectors. Thus, the direct backward linkage of sector *j* is the sum of the elements of the *jth* column of the direct-input coefficients.

$$BL_j = \sum a_{ij} \text{ where } a_{ij} = X_{ij}/X_j$$

A comprehensive measure of backward linkages includes both direct and indirect effects. The total backward linkage of sector *j* is measured by the sum of the *jth* column of the Leontief input-inverse matrix – $(I\text{-}A)^{-1} = M_a$.

Thus, total backward linkages are given as:

$$BLT_j = \sum z_{ij} \text{ where } z_{ij} \text{ is the i, jth element of } M_a.$$

Forward linkages for sector *i* are the share of its output used by other sectors weighted by each sector's share in final demand. The direct forward linkage of each sector *i* is the sum of the elements of the *ith* row of the direct output coefficient matrix.

$$FL_i = \sum a^*_{ij} \text{ where } a^*_{ij} = X_{ij}/X_i$$

Total forward linkages for sector *i* is the row sum of the *ith* row of Leontief output-inverse matrix Ma.

$$FLT_i = \sum z^*_{ij} \text{ where } Z_{ij} \text{ is the i,jth element of } M_a.$$

The impact on exogenous accounts and employment is given by $L(I-A)^{-1}X$ and $E(I-A)^{-1}X$, where L and E are shares of exogenous accounts and employment categories in total outputs, respectively.

4.3 Growth Simulations

Another important aspect would be to assess whether Kenya's current sectoral priorities would lead to both growth and employment creation, and also whether a service-led growth is good for Kenya given its level of development. According to the MTP II (2013-2017)[3], the economy was expected to grow by 6.1 per cent in 2013, and eventually by 10.1 percent in 2017. Which sectors can best deliver this growth target? To assess the sectoral growth potential, we make two assumptions: the prices are fixed[3], and the sectoral shares in total outputs are maintained.

We assessed economic growth between 2009 and 2013 using the 2009 I-O. In nominal terms, achieving a 6.1 per cent growth in real GDP implies that GDP should have increased on average by Ksh 499 billion annually. Further, to assess employment effects, an employment satellite account was created for both formal and informal sector employment for 2009, which was sub-divided into private and public employment and according to skill levels.[4] Using this annual growth as the target, we carry out three different simulations[5] to assess the implications of different growth policy options which include:

1. Agriculture, manufacturing, services (specifically transport and communication, and financial services) and construction;
2. Agriculture and manufacturing; and
3. Agriculture, services (specifically transport and communication, and financial services) and construction.

[3] MTP II (2013-2017) also makes this assumption to make GDP projections.

[4] Skill levels were derived from household survey data (KIBHS 2005). We, therefore, made an assumption that there were no significant changes in the distribution of employees by skill level between 2005 and 2009 in Kenya.

[5] The choice of simulations is guided by: (i) the debate on whether Kenya's growth path of moving from agriculture to services instead of following the traditional path of agriculture, industry and then services; and (ii) a deliberate choice of sectors with highest linkages, implying higher growth prospects.

5. Overview of Input Output Table for Kenya for 2009

The highly disaggregated I-O table for Kenya has 81 sectors (Appendix 1). A highly aggregated I-O table is shown in Table 5.1. From Table 5.2, agriculture accounted for 17 per cent of total outputs (at market prices), while industry and private services accounted for 39 per cent and 34 per cent, respectively. Private services continued to be the major drivers of growth by accounting for 42 per cent of value added, which was mainly driven by growth in transport and communication, and financial services. The contribution of industry to value added remained constant at 21 per cent in both 2003 and 2009. The contribution of agriculture to value added declined from 26 per cent in 2003 to 24 per cent in 2009. In terms of final demand, the contribution by industry increased from 40 per cent in 2003 to 44 per cent in 2009, which was mainly driven by an increase in household consumption, government expenditure and exports. The share of private services in final demand, on the other hand, declined from 24 per cent in 2003 to 22 per cent in 2009, which was mainly due to slower growth in household consumption compared to final demand by industry.

Industry accounted for 84 per cent of intermediate imports in 2009, which was an increase from 75 per cent in 2003. Majority of imports into industry were for manufacturing, which accounted for 75 per cent of the imports into industry. The high dependence of industry on imported intermediate inputs has implications on the degree of the sector's interdependence on other domestic production sectors, which is important for its ability to stimulate growth in other sectors of the economy.

The contribution of industry to exports also increased from 47 per cent in 2003 to 60 per cent in 2009, of which manufacturing accounted for 75 per cent of total exports by industry. The main exports from manufacturing include: processed tea and coffee, tobacco products, textiles and clothing, petroleum products, chemicals, metallic products and non-metallic mineral products.

Table 5.1: 2009 Input Output Table for Kenya

	Agriculture, fishing and forestry	Industry	Private services	Public services	Household consumption	Government	GFCF	Change in inventories	Exports	Total use
Agriculture, fishing and forestry	55,857	242,868	8,322	3,419	608,234	19,731	10,191	1,248	83,542	1,033,410
Industry	88,974	701,818	336,450	130,814	851,220	33,259	492,154	22,451	280,122	2,937,264
Private services	142,328	470,568	411,764	107,612	703,580	5,729	29,819	0	101,304	1,972,705
Public services	164	1,084	6,099	3,678	195,844	376,973	0	0	0	583,843
Imports	74,437	727,364	62,097	0						
Compensation of employees	68,650	149,081	356,170	320,755						
Subsidies on production	0	0	-800	-13, 851						
Operating surplus	578,062	406,992	750,133	31,112						
Indirect taxes	24,939	237,489	42,469	304						
Total supply	1,033,410	2,937,264	1,972,705	583,844						

Table 5.2: Structure of the economy using the 2009 I-O table in percentage

	Agriculture	Industry	Private Services	Public Services	Total
Total output	16.9	39.0	33.7	10.3	100.0
Value added	24.3	20.9	41.6	13.2	100.0
Final demand	18.9	44.0	22.0	15.0	100.0
Imports	8.6	84.2	7.2	0.0	100.0
Exports	18.0	60.0	22.0	0.0	100.0

Source: Author's computation using 2009 I-O

6. Structural Change and Sources of Growth for Kenya: An Input-Output Analysis

6.1 Indicators of Structural Change

Factors of production: There are three factors of production; capital, land and labour, which constitute value added. The theory of comparative advantage stipulates that a country should derive comparative advantage from the more abundant factor of production, which is labour for Kenya. Labour share in value added declined from 69.5 per cent in 1976 to 42.8 per cent in 2003, and eventually to 27.7 per cent in 2009, reflecting a shift to more capital intensive production over time (Table 6.1). The decline in the labour share is expected to translate to a reduction in household share in factor incomes. Earlier analysis using SAM revealed that the decline in the labour share between 1976 and 2003 translated to a decline in household share in factor incomes from 69 per cent in 1976 to 46 per cent in 2003 (Wanjala and Kiringai, 2007). Preliminary analysis using the 2009 SAM shows that the household share in total income declined further to 36 per cent in 2009. The declining share of household income in total value added has implications on the ability of the country to pursue pro-poor and more inclusive economic growth, and development.

The key question is whether Kenya can achieve the desired goals of growth and employment creation given the current growth path. The question on drivers of growth can be answered by looking at sectoral linkages, which are discussed in Section seven of this study. However, the question on whether we can have pro-poor growth depends on pro-poor growth process and inclusiveness. Given that Kenya is a labour-abundant country, achieving pro-poor growth implies generating jobs for the masses. Given that the Kenyan economy has become less labour intensive over time, the country is using more capital than labour to produce outputs. The structure of production does not use the most abundant factor of production, which is labour and therefore does not exploit the country's comparative advantage. This implies that owners of capital are likely to benefit more from growth compared to labour owners who are the majority. Having pro-poor growth that is more inclusive would require a structural shift towards more labour intensive production technologies so that factor incomes are distributed across the majority.

Table 6.1: Indicators of Structural Change in Percentage

	1976	2003	2009
Labour share in value added	69.5	42.8	27.7
Export share in gross output	20.2	14.0	8.2
Import share in gross supply	12.6	16.8	15.3
Ratio of exports to imports	140.0	69.0	53.8
Share of household consumption in total demand	35.6	35.9	36.1
Share of investment demand in total demand	7.4	8.1	9.0
Share of intermediate inputs in total demand	34.9	35.9	42.0

Source: Author's computation using 1976, 2003 and 2009 I-Os

Openness: The Kenyan economy has become more open over time, following a period of liberalization reforms. However, statistics show that the country's trade balance has worsened. The ratio of exports to imports was very high in 1976, estimated at 140.0 per cent. This implies that the country was exporting almost one and half times the value of its imports. This ratio declined to 53.8 per cent in 2009, implying that the country is exporting only about a half of the value of its imports. Over time, the ratio of exports in gross output has declined from 20 per cent in 1976 to 14.0 per cent in 2003 and 8.2 per cent in 2009. On the contrary, imports have grown from a share of 12.6 per cent of gross supply in 1976 to 16.8 per cent in 2003, and declined to 15.3 per cent in 2009.

For Kenya to pursue a development strategy that is predicated on export led growth, there is need to reverse these trends by promoting exports. A glimpse at Kenya's trade policy indicates that at independence, the country inherited a trade regime that was aimed at import substitution. However, two key shocks (oil crisis led to a balance of payments crisis, and the coffee export boom which had temporary effects on the terms of trade) necessitated a shift towards a more liberal trade regime. There were efforts to reduce import restrictions through a reduction in quotas and tariffs, and loosening of foreign exchange restrictions. Promotion of exports was mainly through: (i) Manufacturing Under Bond which was initiated in 1988; (ii) Export Processing Zones which were introduced in 1990; (iii) Export Promotion Programmes Office initiated in 1993; and (iv) Special Economic Zones (SEZs) under Vision 2030. The continued poor performance of exports, despite the export promotion efforts, has been attributed to the economies over-reliance on traditional exports, unfavourable world market conditions (especially prices), and the supply constraints that have limited the ability to take advantage of opportunities of international production sharing in foreign markets (Ng and Yeats, 2005; Were *et al*., 2002; Gertz, undated).

Composition of demand: The share of household consumption in total demand has remained fairly stable over time accounting for about 35.6 per cent of total

demand. The share of investment in demand increased from 7.4 per cent in 1976 to 8.1 per cent in 2003, and to 9.0 per cent in 2009. Intermediate inputs have increased over time but, as already observed, the import intensity in production has also increased. The combination of a larger share of intermediate demand and increasing import intensity weakens inter-sectoral linkages in the economy, which are crucial for growth. There is need to boost household consumption and exports.

Sectoral composition of value added: Despite focusing on agriculture and manufacturing as engines of growth, a look at the contribution to value added reveals that the share of agriculture has declined over time, while that of manufacturing has remained stable. Growth between 2003 and 2009 was mainly driven by growth in two key service sectors – transport and communication and finance, real estate and business services (Table 6.2). The question is whether Kenya is ready for a service led growth given its level of development.

From theory, it is argued that countries develop by first moving from an agrarian economy to a commercial stage, then industrial stage and, finally, the knowledge-based stage (Sachs, 2004). Most African economies are at the pre-commercial stage, beyond which they move to the industrial stage, from primary commodity production and small urban sector to industrial production of goods. While

Table 6.2: Sectoral sources of growth and labour share in value added

	Contribution to Value Added in %			**Labour Share in Value Added in %**		
	1976	2003	2009	1976	2003	2009
Agriculture, fishing and forestry	43.0	24.0	24.3	74.3	47.2	10.6
Mining and quarrying	0.0	0.0	0.6	73.1	43.9	31.5
Manufacturing	12.0	13.0	13.9	57.2	28.1	23.1
Electricity and water	1.0	3.0	2.4	43.8	25.0	26.1
Construction	3.0	5.0	4.1	97.3	29.2	39.3
Trade, hotels & restaurants	11.0	14.0	9.6	75.6	39.1	45.7
Transport & communication	5.0	10.0	13.1	82.2	38.5	27.2
Finance, real estate & business services	8.0	7.0	16.1	35.9	37.4	22.3
Other services	2.0	7.0	2.8	89.6	33.6	65.8
Public administration	7.0	5.0	5.2	100.0	61.0	71.2
Education	7.0	8.0	5.8	100.0	96.1	91.8
Health and social work	1.0	3.0	2.2	100.0	56.0	91.8

Source: Author's computation using 1976, 2003 and 2009 I-Os

Kenya can still be considered predominantly agrarian; the country's vision has always been to become an industrial nation. The manufacturing sector has, over time, been seen as a key stimulant of growth mainly as a supplier of essential inputs to other sectors, and the industrial sector itself, and as a user of outputs from other sectors.

A look at Kenya's sectoral priorities reveals that agriculture and manufacturing have been seen as twin engines of economic growth over the past four decades. After decades of trying to industrialize, the manufacturing sector still remains uncompetitive, and its value added has remained constant as the service sector value added has continued to increase. The performance of agriculture sector has also worsened. Whether the service sectors can deliver on the twin promises of higher economic growth and employment creation depends on the structure of their production.

A glimpse at the labour share in value added shows that the service sectors are highly capital intensive, with labour only accounting for 27.2 per cent and 22.3 per cent of value added in transport and communication and finance, and real estate and business services respectively, in 2009. Comparatively, labour share in value added was 82.2 per cent and 35.9 per cent in transport and communication and finance, real estate and business services, respectively, in 1976. Given the low and declining labour shares, it is unlikely that adequate jobs will be created following growth in these sectors. Thus, unless deliberate attempts are made to ensure structural transformation[6], achievement of a more inclusive and pro-poor growth will continue being elusive for Kenya.

How does the Kenyan experience compare with other African countries? As discussed by Carmignani and Mandeville (2010), Africa is a case of structural change without industrialization and diversification. Most African countries have experienced a declining share of agriculture in total GDP, a stagnant manufacturing sector and an increasing share of services in GDP. Employment creation and structural economic transformation are among the major challenges facing African growth and development strategies (Kingombe and te Velde, 2013). High and sustained growth rates combined with socio-economic development in low income countries can only be achieved with productivity changes that are based on widespread economic diversification and structural transformation. Kingomb and te Velde (2013) provide an example of SEZs that can be used to foster economic growth with employment creation and also promote structural transformation. They reveal that some countries such as Singapore and Malaysia

[6] Structural transformation is defined as the reallocation of economic activity across broad sectors that accompany the process of modern economic growth (Herrendorf, Rogerson and Valentinyi, 2013). It entails the reallocation of economic activity away from the least productive sectors of the economy to more productive ones, thus raising overall productivity (Africa Development Bank, 2013).

have successfully used SEZs to create employment and foster structural change, while Kenya's SEZs[7] created employment opportunities but did not promote structural transformation. The role of SEZs in employment creation and structural transformation can be enhanced through: (i) Responding to global developments such as building on comparative advantage and linking them to trade preferences. SEZs should also be based on clustering rather than single factory schemes; (ii) Incorporating SEZs in growth strategies with emphasis on inter-sectoral linkages and building of local supply capabilities. This would also require human resource and infrastructure development; and (iii) Locating SEZs near the markets or ports with an adequate public/private mix in implementation of the zones.

Africa's experience is in contrast with the experience of many other developing countries. The experience of China resembles the traditional patterns of reallocation from agriculture to manufacturing. However, in the knowledge-based era, some countries such as India bypassed manufacturing and moved from agriculture to services. Indonesia, on the other hand, simultaneously moved from agriculture to manufacturing and services. Thus, Africa's weak growth dynamics cannot be explained by this pattern of structural change. The concern is whether the growth patterns can lead to socio-economic development.

6.2 Inter-sectoral Linkages

A review of inter-sectoral linkages over time also provides an insight into whether structural change has occurred. Table 6.3 summarizes backward and forward linkages. The manufacturing sector has above average backward linkages but the highest forward linkages. The lower backward linkages are largely explained by the higher import dependence by the sector. A comparison of the linkages shows that, on average, backward linkages for manufacturing slightly increased between 2003 and 2009, even though there was a decline between 1976 and 2003.

Forward linkages also declined between 1976 and 2009, from 4.84 in 1976 to 4.45 in 2009. Construction, and transport and communication also had higher backward linkages which increased from 2.11 in 1976 to 2.15 in 2009. Transport and communication, and financial services also had higher forward linkages, which increased between 1976 and 2009. In general, most sectors recorded increased linkages between 1976 and 2009. Earlier findings by Beaulieu (1990) revealed that there were increased sectoral interdependencies between 1967 and 1986, which was mainly attributed to the import substitution policy which encouraged use of domestically-sourced inputs.

[7] As indicated in the MTP II (2013-2017), SEZs are at the core of the employment strategies within the medium term.

Table 6.3: Summary of backward and forward linkages

	Backward Linkages			Forward Linkages		
	1976	2003	2009	1976	2003	2009
Agriculture, fishing and forestry	1.16	1.27	1.48	1.68	1.29	1.58
Mining and quarrying	2.13	1.55	1.35	1.18	1.01	1.20
Manufacturing	1.68	1.41	1.80	4.84	4.49	4.45
Electricity and water	1.70	1.35	1.71	1.36	1.19	1.30
Construction	2.11	1.98	2.15	1.46	1.06	1.18
Trade, hotels and restaurants	1.64	1.68	1.79	1.68	1.63	1.94
Transport and communication	2.01	1.73	1.82	1.97	1.75	2.15
Finance, real estate and business services	1.26	1.47	1.33	1.51	1.57	2.08
Other services	1.56	1.47	1.46	1.04	1.31	1.16
Public administration	1.70	1.66	1.71	1.00	1.07	1.04
Education	1.27	1.38	1.72	1.00	1.00	1.00
Health and social work	1.50	1.43	1.74	1.00	1.00	1.00

Source: Author's computation using 1976, 2003 and 2009 I-Os

6.3 Sectoral Sources of Growth Simulations

The results of the growth simulations are shown in Table 6.4. The results indicate that focusing on agriculture, construction and private services yields the highest growth potential compared to focusing on agriculture, manufacturing, construction & services; or agriculture & manufacturing. From a target of Ksh 499 billion, focusing on agriculture, manufacturing, construction and private services yields additional growth of about Ksh 56.6 billion over and above the targeted growth level.

Focusing on agriculture and manufacturing yields additional growth of about Ksh 127.6 billion while agriculture, construction and private services yields Ksh 147.1 billion over and above the targeted growth level. The additional growth is as a result of inter-sectoral backward and forward linkages. For instance, higher growth synergies are reported in trade, hotels and restaurants as a result of targeting agriculture and manufacturing compared to agriculture, construction and private services. This is because agriculture and manufacturing are expected to have higher forward linkages with trade, hotels and restaurants, mainly through supply of outputs which are then sold or consumed within the hotels and restaurants. Also, this is important within sector effects; for instance, targeting agriculture, construction and private services yields the highest additional growth in all targeted sectors.

Table 6.4: Effect on economic growth (Ksh million)

	Agriculture, Manufacturing, Construction & Services	Agriculture and Manufacturing	Agriculture, Construction and Services
Agriculture, fishing and forestry	92,368.9	139,620.6	176,406.8
Mining and quarrying	8,006.5	10,775.3	4,678.5
Manufacturing	237,620.3	359,176.2	98,481.4
Electricity and water	5,285.5	5,767.7	6,407.5
Construction	28,014.1	1,470.1	53,501.5
Trade, hotels and restaurants	38,878.4	55,214.7	33,189.6
Transport and communication	74,841.7	33,731.5	142,933.2
Finance, real estate and business services	65,951.9	15,893.9	125,955.4
Other services	3,732.9	4,194.1	3,515.0
Public administration	649.9	608.0	849.1
Education	0.0	0.0	0.0
Health and social work	0.0	0.0	0.0
Total growth	555,350.1	626,452.1	645,917.8

Source: Author's computation using 2009 I-O

Analysis of the effect on employment shows that targeting agriculture and manufacturing leads to the highest annual job creation, estimated at 993,829 jobs (Table 6.5). The job creation is largely in the informal sector, accounting for about 84 per cent of the job creation, 93 per cent of which are unskilled jobs. The proportion of private sector employment is 11 per cent for agriculture and manufacturing; 11 per cent for agriculture, construction and private services; and 14 per cent for agriculture, manufacturing, construction and private services. For Kenya to achieve more inclusive growth and reduce poverty, there is need to create more jobs for skilled labour, which attract higher levels of remuneration. These results compare favourably with job creation statistics as highlighted in the 2015 Economic Survey which showed that total employment creation in 2009 was about 620,000, of which 92 per cent were informal sector jobs. This study provides more insights by providing a breakdown of the jobs into formal public, formal private and informal sectors, and according to skill level.

Table 6.5: Effect on employment (number of jobs)

	Agriculture, Manufacturing, Construction and Services	Agriculture and Manufacturing	Agriculture, Construction and Services
Public unskilled	7,185	7,908	12,262
Public skilled	4,859	3,897	7,873
Private unskilled	66,347	79,740	91,184
Private skilled	29,911	28,297	38,373
Informal unskilled	621,969	806,511	742,973
Informal skilled	55,989	67,476	56,676
Total	**786,261**	**993,829**	**949,341**

Source: Author's computation using 2009 I-O

**Unskilled refers to those with no education, primary and secondary education. Skilled are those with technical and university education.*

A look at the effect on other macroeconomic variables reveals that targeting agriculture, construction and private services results in the highest increase in value added (Table 6.6). Compensation of employees increases by Ksh 71,462 million while operating surplus increases by Ksh 241,999 million. However, compensation of employees accounts for 30 per cent of additional value added, compared to a proportion of 35 per cent in the baseline. This implies that increased growth in these sectors benefits owners of labour less than owners of capital. The same applies to the other two simulations where the share of compensation of employees is 23 per cent for agriculture and manufacturing, and 25 per cent for agriculture, manufacturing, construction and private services. While the combination of agriculture and manufacturing results in the highest number of jobs created, they result in the lowest compensation of employees. This implies that most of the jobs created in this sector are low-paying. Thus, with the reducing share of compensation of employees in value added and also the creation of jobs that are largely informal and low-paying, there is need for structural transformation if the economy is to achieve an inclusive and pro-poor growth.

Targeting the different policy options also yields different impacts on imports and indirect taxes. Agriculture and manufacturing have the highest impact on imports, in addition to yielding the highest growth potential and employment creation (Table 6.6). These two sectors also require the highest subsidies. The effect on imports is expected given that manufacturing sector has high import dependence.

Table 6.6: Effect on other macroeconomic variables (Ksh million)

	Agriculture, Manufacturing and Services	**Agriculture and Manufacturing**	**Agriculture and Services**
Compensation of employees	50,465.8	45,145.4	71,461.7
Other taxes on production	0.8	0.8	1.1
Other subsidies on production	(29.0)	(32.6)	(27.3)
Consumption of fixed capital	8,216.9	8,270.3	11,881.3
Operating surplus, net	154,392.3	152,231.8	241,998.9
Imports	83,754.0	118,677.4	54,772.5
Taxes less subsidies on products	29,181.8	40,182.2	21,060.2

Source: Author's computation using 2009 I-O

Generally, choosing between these combinations largely depends on the country's overriding objectives. For a country such as Kenya that is keen on promoting economic growth and creating employment opportunities, then the current growth path that is service driven is still desirable even though, as stated earlier, structural transformation is required to achieve a more pro-poor and inclusive growth. A look at the African experience in general reveals that it has experienced very little structural transformation, even though it is rare for a country to evolve from lower income to higher income status without sustained structural transformation (Monga, 2012). For Kenya, agriculture still accounts for a large proportion of GDP while the manufacturing sector has stagnated. There has also been minimal changes with regard to the distribution of employment (with most jobs being informal) and the level of economic diversification (especially in production and export basket). The question therefore is how the country can ignite structural transformation. This requires efforts to raise agricultural productivity and enhance economic diversification (International Monetary Fund-IMF, 2014; AfDB *et al.*, 2013), which can be achieved through: investment in physical and human capital, infrastructure improvement, promotion of value addition in agriculture, provision of incentives and sector-specific policies that are aimed at promoting inter-sectoral linkages, and improvement of the business climate to enhance private sector participation.

7. Conclusion

This study sought to document the methodology that was used in developing the 2009 I-O for Kenya, and use the I-O to analyze structural change and growth options for Kenya. The study has demonstrated that I-O models are useful instruments in development planning, especially through the analysis of structural change and choice of sectoral priorities for growth. I-Os provide important insights on the choice of priority sectors by quantifying the level of backward and forward linkages. Further, an I-O can give insights on whether economic growth is inclusive and pro-poor. While I-Os are important tools for guiding development planning, Kenya has not been developing these tools on a regular basis. Given that the I-O is a medium-term tool, there is need for regular up-to-date development of the tool, preferably within a three to five years' time period.

The following is a summary of the the analyses and the policy recommendations.

1. The policy strategies pursued by the government have placed great emphasis on agriculture and industry as the key sectors that would lead to the growth and development of the economy. However, these sectors have not significantly contributed to growth over time, given their low shares in value added. These sectors are important engines of structural transformation, which is needed to ensure a more inclusive growth process. While the traditional development path dictates that a country first reduces the agricultural share in output, industrializes, and then becomes service driven, Kenya's growth over the past decade has largely been service driven. This experience is not unique, as some countries such as India have followed a similar path. The performance of manufacturing sector has been poor, with almost constant shares in value added over time. The question is whether Kenya is ready for a service-led growth at its current level of development. The results and also literature support that a service-led growth is viable for development and employment creation in Kenya. However, structural transformation (through increased investment in human capital and infrastructure, diversification and value addition) is required to ensure a more inclusive growth process. There is also need for increased backward and forward inter-sectoral linkages (especially for the sectors that are driving the economy) through stimulation of demand for local raw materials.

2. The economy has become more capital intensive as shown by the increasing share of capital in value added. The labour share in value added has declined over time, which has led to declining shares of household income in total income. Further, job creation has largely been in the informal sector with lower wages. For an economy such as Kenya that is labour abundant, having a more

capital intensive production process limits the chances of growth benefiting the poor who are largely owners of labour. Achieving a more inclusive growth process would entail creation of more skilled jobs with higher productivity and remuneration.

3. Although, the economy has become more open, exports share in gross output has been declining while the share of imports has increased. Exports were one and half times the level of imports in 1976, a situation which has been reversed, with imports being twice the amount of exports in 2009. The increased import dependency (which mainly constitutes intermediate inputs into manufacturing) undermines the effectiveness of inter-sectoral linkages in generating additional growth. For the economy to pursue an export-led growth as envisaged by the Kenyan government, there is need to increase the export share by encouraging export orientation, diversification of the export portfolio, removal of export supply constraints and promotion of value addition. There is also need to develop the capacity of local industries to supply raw materials, which would increase inter-sectoral dependencies that are important for growth. The proposed SEZs can be useful in promoting exports and employment creation, though they need to be diversified and innovative to foster structural transformation.

References

African Development Bank-AfDB, Organization for Economic Cooperation and Development-OECD, United Nations Development Programme-UNDP, Economic Commission for Africa-ECA (2013), *African Economic Outlook 2013, Structural Transformation and Natural Resources*.

Beaulieu, E. (1990), *Structural Change in Kenya: 1967-86*, Technical Paper 90-09, Nairobi: Ministry of Planning and National Development.

Bess, R. and Ambargis, Z.O. (2011), *Input-Output Models for Impact Analysis: Suggestions for Practitioners Using RIMS II Multipliers*, Presented at the 50th Southern Regional Science Association Conference March 23-27, New Orleans, Louisiana.

Carmignani, F. and Mandeville, T. (2010), Never Been Industrialized: A Tale of African Structural Change, Macroeconomics Research Group, School of Economics, University of Queensland, Australia.

Coughlin, C. and Thomas B. M. (1991), "A Consumer's Guide to Regional Economic Multipliers," Federal Reserve Bank of St. Louis Review, January/February, Vol. 73(1): 19-32.

European Commission (2008), *Eurostat Manual of Supply, Use and Input-Output Tables*, EUROSTAT Methodologies and Working Papers.

Forssell, O. (1988), *Growth and Changes in the Structure of the Finnish Economy in the 1960s and 1970s, In Input-Output Analysis: Current Developments*, London: Chapman and Hall.

Gertz, G. (undated), "Kenya's Trade Liberalization of the 1980s and 1990s: Policies, Impacts, and Implications," in*The Impact of the Doha Round on Kenya*, Available at http://carnegieendowment.org/files/kenya_background.pdf

Government of Kenya - GoK (2012), *Sessional Paper No. 10 of 2012 on Kenya Vision 2030*, Nairobi: Office of the Prime Minister Ministry of State for Planning, National Development and Vision 2030.

Grady, P. and Muller, R.A. (1988), "On the Use and Misuse of Input-Output Based Impact Analysis in Evaluation," *The Canadian Journal of Program Evaluation*,Vol. 3(2): 49-61.

Guo, J. and Planting, M.A. (2000), *Using Input-Output Analysis to Measure US Economic Structural Change Over a 24 Year Period*, WP 2000-01, Paper Presented at the 13th International Conference on Input-Output Techniques, Macerata, Italy, August 21-28.

International Monetary Fund–IMF (2014), Regional Economic Outlook: Sub-Saharan Africa, Fostering Durable and Inclusive Growth, World Economic and Financial Surveys, Washington DC.

Kingombe, C. and te Velde, D.W. (2013), "Structural Transformation and Employment Creation," *World Development Report*, Overseas Development Institute, United Kingdom.

Kweka, J., orrissey, O. and Blake, A. (2003). "The Economic Potential of Tourism in Tanzania," *Journal of International Development*, Vol. 15: 335–351.

Herrendorf, B., Rogerson, R. and Valentinyi, A. (2013), *Growth and Structural Transformation*, Paper Prepared for the Handbook of Economic Growth, Available at https://www.imf.org/external/np/seminars/eng/2013/spr/pdf/rrog2.pdf

Mazumder, M.N.H., Ahmed, E.M. and Al-Amin, A.Q. (2009), "Does Tourism Contribute Significantly to the Malaysian Economy? Multiplier Analysis Using I-O Technique," *International Journal of Business and Management*, Vol. 4(7).

Mills, Edwin C. (1993), "The Misuse of Regional Economic Models," *Cato Journal*, Vol. 13(1): 29-39.

Monga, C. (2012), "Shifting Gears: Igniting Structural Transformation in Africa," J*ournal of African Economies, Africa Economic Research Consortium-AERC*, Supplement 2, Vol. 21: ii19–ii54.

Ng, F. and Yeats, A. (2005), K*enya: Export Prospects and Problems*, World Bank Africa Region Working Paper Series No. 90.

Reis, H. and Rua, A. (2006), *An Input-Output Analysis: Linkages versus Leakages, Estudos e Documentos de Trabalho*, Working Papers 17.

Sachs, J.D. (2004), Stages of Economic Development, Speech at the Chinese Academy of Arts and Sciences, Beijing, June 19.

Surugiu, C. (2009), "The Economic Impact of Tourism: An Input-Output Analysis," *Romanian Journal of Economics,* Institute of National Economy, Vol. 29(2(3)): 142-161.

Thurlow, J., Kiringai, J., Wanjala, B., Waiyaki, N., Mutunga, C., Njenga, M., Mutua, J. and Nafula, N. (2007), *A 2003 Social Accounting Matrix for Kenya: A Methodological Note*, KIPPRA Discussion Paper No. 72, Nairobi: KIPPRA.

United Nations (1999), *Handbook of Input-Output Table Compilation and Analysis: Studies in Methods*, Handbook of National Accounting Series FNo. 74.

Valle, E. and Yobesia, M.N. (2009), "Economic Contribution of Tourism in Kenya," *Tourism Analysis*, Vol. 14: 401–414.

Wanjala, B. and Were, M. (2009), "Gender Disparities and Economic Growth Options in Kenya: A Social Accounting Matrix Approach," *Journal of Feminist Economics*, Vol. 15(3): 227-251.

Wanjala, B. and Kiringai, J. (2007), *Sources of Economic Growth in Kenya: A Redux*, KIPPRA Discussion Paper No. 79, Nairobi: KIPPRA.

Were, M, Ndung'u, N.S, Geda, A and Karingi, S.N. (2002), *Analysis of Kenya's Export Performance: An Empirical Evaluatio*n, KIPPRA Discussion Paper No. 22, Nairobi: KIPPRA.

Zakariah, A. R. and Ahmad, E.E. (1999), "Sources of Industrial Growth Using the Factor Decomposition Approach: Malaysia, 1978-87," *The Developing Economies,* Vol. 37(2): 162-96.

Zaman, G., Surugiu, M. and Surugiu, C. (2010), "Propagation Effects of Taxes in Romania: An Input-Output Analysis," *Romanian Journal of Economics. Institute of National Economy*, Vol. 30: 76-94.

Appendices

Appendix 1

Table 1: A simplified supply table

Products	Industries			Imports	Total
	Agriculture	Manufacturing	Services		
Agriculture Manufacturing Services	Output by product and by industry			Imports by product	Total supply by product
Total	Total output by industry			Total imports	Total supply

Table 2: A simplified use table

	Industries			Final Uses			Total
Products	Agriculture	Manufacturing	Services	Final consumption	Gross Fixed Capital Formation	Exports	
Agriculture Manufacturing Services	Intermediate consumption by product and by industry			Final Uses by product and category			Total use by product
Value added	Value added by component and by industry						Total value added
Total	Total output by industry			Total final uses by category			

Table 3: A simplified supply and use table (SUT)

	Industries			Industries			Final Uses			Total
Products	Agriculture	Manufacturing	Services	Agriculture	Manufacturing	Services	Final consumption	Gross Fixed Capital Formation	Exports	
Agriculture Manufacturing Services				Intermediate consumption by product and by industry			Final Uses by product and category			Total use by product
Agriculture Manufacturing Services	Output of industries by product									Total output by industry
Value Added				Value added by component and by industry						Total value added
Imports	Total imports by product			Total imports						
Total	Total supply of product			Total output by industry			Total final uses by category			

Table 4: A simplified symmetric Input-Output table (product by product)

	Industries			Final Uses			Total
	Agricul-ture	Manufac-turing	Services	Final consumption (C+G)	Gross Fixed Capital Formation	Exports	
Products Agriculture Manufacturing Services	Intermediate consumption by product and by industry			Final Uses by product and category			Total use by product
Value Added	Value added by component and by industry						
Imports	Total imports by product						
Total	Total supply of products			Total final uses by category			

Appendix 2: Mapping products into industries

	Industry	**Products**
1	Growing of crops	Maize; Other cereals; Beans, other leguminous crops and oil seeds; Rice; Potatoes and other root crops; Vegetables; Sugar cane; Tobacco; Fibre crops (sisal, cotton); Pyrethrum and other non-perennial crops; Fruit and nuts; spice crops; Coffee; Tea; Other perennial crops (wattle, khat); Cut flowers; Plantation developments, land improvement.
2	Animal production	Cattle; Camels; Sheep and goats; Pigs; Poultry; Eggs; Raw milk; Manure; Other animals; Other animal products
3	Support act to agriculture	Support services to agriculture
4	Forestry and logging	Hardwood and soft wood; Firewood and charcoal; Non-wood forest products; Support services to forestry
5	Fishing and aquaculture	Fish and other fishing products
6	Mining and quarrying	Coal; Crude petroleum and natural gas; Metal ores; Stone, sand and clay; Gold; Fluorspar; Soda and soda ash; Other minerals; Mineral exploration
7	Processing and preservation of meat	Meat and meat products; Hides and skins
8	Processing and preservation of fish	Processed and preserved fish, crustaceans and molluscs.
9	Processing and preservation of fruit and vegetables	Processed and preserved fruit and vegetables

10	Manufacture of vegetable, animal oils and fats	Vegetable and animal oils and fats
11	Manufacture of dairy products	Dairy products
12	Manufacture of grain mill products	Grain mill products, starches and starch products; milling services, preparation of animal feed
13	Manufacture of bakery products	Bakery products
14	Manufacture of sugar	Sugar and molasses
15	Processing of coffee	Coffee
16	Processing of tea	Tea
17	Manufacture of other food products	Other food products
18	Manufacture of beverages	Spirits and wine; Beer; Non-alcoholic beverages
19	Man of tobacco products	Tobacco products
20	Manufacture of textiles and clothing	Textiles; Wearing apparel
21	Manufacture of leather and products	Leather and leather products; Footwear
22	Manufacture of wood and products	Wood and of products of wood and cork, except furniture
23	Manufacture of paper and paper products	Paper products
24	Printing and reproduction	Printed and recorded media
25	Manufacture of refined petroleum products	Refined petroleum products
26	Manufacture of basic chemicals	Basic chemicals; Fertilizers and pesticides; Paints and varnishes; Soaps, detergents, cleaning preparations; toiletries
27	Manufacture of chemical products	Chemical products, manmade fibres
28	Manufacture of pharmaceuticals	Pharmaceutical products
29	Manufacture of rubber and plastics production	Rubber and rubber products; plastic products
30	Manufacture of other non-metallic mineral products	Glass and glass products; other porcelain and ceramic products; Non-metallic mineral products n.e.c.
31	Manufacture of metals and metallic products	Basic metals, fabricated metal products
32	Manufacture of machinery & equipment	Computer, electronic and optical products; Electrical equipment; Machinery and equipment n.e.c.

33	Manufacture of transport equipment	Motor vehicles and bodies for motor vehicles; trailers; Parts and accessories for motor vehicles; Other transport equipment
34	Manufacture of furniture	Furniture
35	Other manufacturing	Other manufactured products n.e.c.
36	Repair and install	Repair and installation of machinery and equipment
37	Electric power generation and distribution	Electricity
38	Water treatment and supply	Water
39	Sewerage, waste management	Sewage and waste collection & treatment
40	Construction	Buildings and structures (including repair services)
41	Motor trade	Repair services, motor vehicles
42	Wholesale and retail trade	Trade services (trade margins)
43	Transport via railways	Transport via railways
44	Passenger road transport	Passenger road transport
45	Freight transport by road	Freight transport by road
46	Transport via pipeline	Transport via pipeline
47	Water transport	Water transport
48	Air transport	Air transport
49	Warehousing and storage	Warehousing and storage
50	Activities incidental to water transport	Service incidental to water transport
51	Activities incidental to air transport	Service incidental to air transport
52	Cargo handling	Cargo handling; other transportation support services
53	Postal activities	Postal services
54	Courier activities	Courier services
55	Accommodation and food service activities	Accommodation services; food and beverage services
56	Publishing and broadcasting	Publishing; Motion picture, video and television programme production; music; Television programming and broadcasting
57	Telecommunications	Wired telecommunications services; Wireless telecommunications services; Satellite TV
58	IT and other information service activities	IT and other information services
59	Central banking	Central bank services
60	Other monetary intermediation	Other financial intermediation services

61	Other financial service act	Other financial services
62	Insurance and pension funding	Life insurance; Non-life insurance; Reinsurance
63	Finance and insurance	Auxiliary services to finance and insurance
64	Real estate act	Dwellings and real estate
65	Professional, scientific and technical activities	Professional, scientific and technical services; veterinary services
66	Renting and leasing act	Renting and leasing services
67	Travel agencies	Travel agency, tour operator and reservation services
68	Other administration and support service activities	Other administrative and support services
69	Public administration	Public administration, defense services, social security
70	Primary education	Pre-primary and primary education
71	General secondary education	General secondary education
72	Special secondary education	Specialized secondary education
73	Higher education	Higher education
74	Other education	Other education and support services
75	Human health act	Human health services
76	Social work activities	Social work
77	Arts, entertain and recreation	Arts, entertainment and recreation
78	Activities of membership organizations	Services of membership organizations
79	Repair of computers, personal and household goods	Repair of computers and personal and household goods
80	Other personal service activities	Other personal services
81	Domestic workers	Domestic services

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