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Social Accounting Matrix of Kenya 2014

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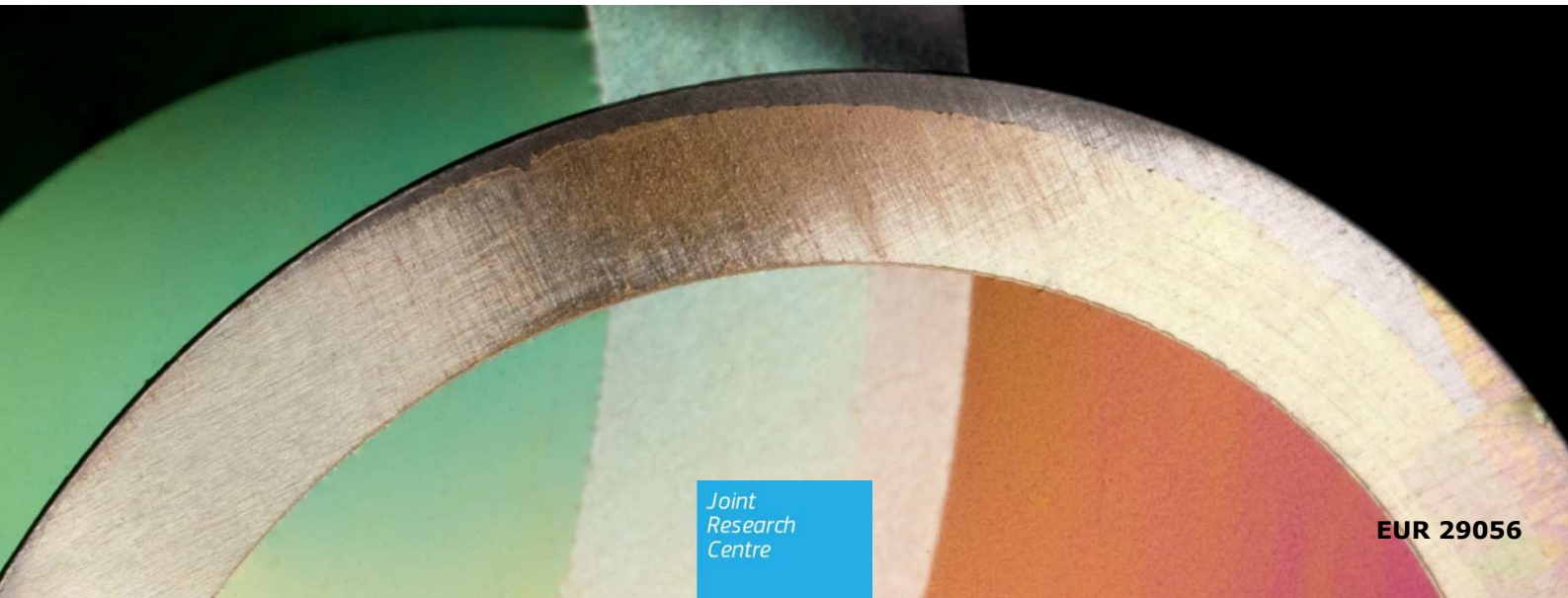

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Abstract

A Social Accounting Matrix (SAM) is a comprehensive and economy-wide database recording data about all transactions between economic agents in a certain economy during a certain period of time. SAMs have a triple use: on the one hand, they offer in themselves a detailed description of the economic structure and circular flows of the income of a country or region; on the other, a battery of indicators and multipliers can be obtained from them, applying directly intuitive linear models; and, finally, they are the reference database for the calibration and exploitation of Computable General Equilibrium (CGE) Models. This report presents the Social Accounting Matrix of Kenya for the year 2014, describing its specific structure and the basis for its estimation. In this sense, it is necessary to highlight the special structure of this SAM to reflect the Home Production for Home Consumption (HPHC) issue and a high disaggregation of agricultural and food sectors, both aspects so relevant in developing countries. In addition, some results of the exploitation of the SAM are presented, both descriptive (aggregate macroeconomic variables, sectoral value added and household income and consumption) and from the application of linear multipliers analysis (backward linkages, value chain decomposition and Structural Path Analysis). Finally, a complete on-line application is presented, both for the download of the SAM, and for the visualization of some indicators derived directly from it.

1 Introduction

One of the objectives of the European Commission is to cooperate with developing countries to find solutions to issues related to nutrition and food security. This is implemented by carrying out the corresponding assessment of policies related to this issue, facilitating access for researches from these countries to analytical tools that enable such assessments to be carried out autonomously. In this sense, the Joint Research Centre (JRC), the European Commission's in-house science service, is committed under the Administrative Arrangement JRC №33272-2013-10 DEVCO 325-863 between DG Development And Cooperation – Europeaid and DG Joint Research Centre (DG JRC) to provide support for: i) improvement of information systems on agriculture, nutrition and food security, ii) policy and economic analysis to support policy decision-making process and iii) scientific advice on selected topics concerning sustainable agriculture and food and nutrition security.

In particular, the Economic of Agriculture Unit of the JRC Directorate D, Sustainable Resources, is responsible to elaborate the methodology and tools to provide macroeconomic analysis related to sustainability of policies in the sectors of agriculture, social transfer and fight against food and nutrition insecurity. The analyses and tools proposed should support the EU institutions, DG DEVCO and the partner countries for the elaboration and assessment of policies and demand-driven technical and scientific advice. Among possible scientific tools, economic simulation models represent interrelationships between selected economic variables and provide a simplified representation of economic reality to be used to quantify impacts of policy changes (i.e., ex-ante policy analysis).

Kenya is one of the first countries analysed in this context, and the main pillar in the macroeconomic analysis is the use of a tailored version of a single-country Computable General Equilibrium (CGE) to analyse some of the agricultural and rural policy priorities to improve foods security, taking into account the specificities of the Kenyan economy (e.g., high rates of subsistence and small-holder farming, multi-output structure of production, endogenous labour supply decision of households, segmented labour markets, migration etc…). The calibration of this model requires a complex database system, called Social Accounting Matrix (SAM).

The estimation of a new SAM for Kenya is an important achievement itself, because it provides a lot of information about the economic structure of the country and serves, also, as main database for linear multisectoral models.

The rest of the report is structured as follows: Section 2 introduces the concept and general issues of Social Accounting Matrices, while section 3 describes the Kenya SAM structure in detail. That section begins with a kind of introduction of the Home Production for Home Consumption issue, a key aspect of this new SAM and the subsequent analysis. Later, description of structure, flows and databases used in Kenya SAM is presented. Section 4 shows a description of the Kenyan Economy structure using SAM data and in Section 5 a multiplier analysis is presented to illustrate the usefulness of the SAM linear models in policy impact assessment. Finally, additional information related to previous Kenya SAM and databases used has been added in the annex.

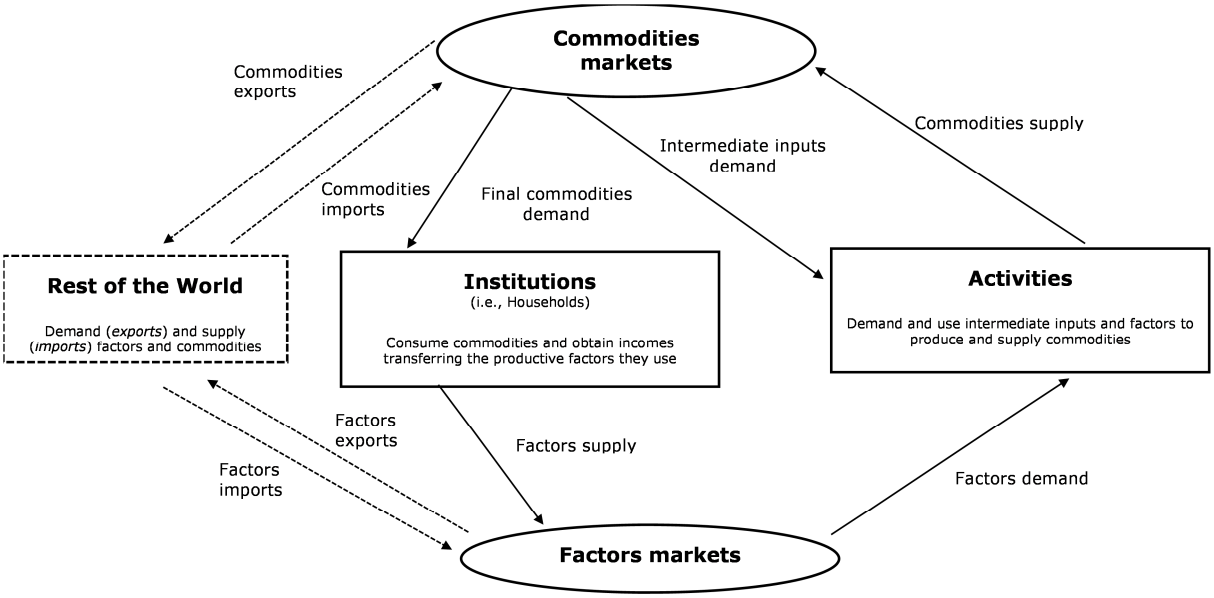
2 Social Accounting Matrices. Concept and general issues

A Social Accounting Matrices (SAM) is the reference database for all Computable General Equilibrium (CGE) modellers. A SAM is a comprehensive and economy-wide database recording data on all transactions between economic agents in a certain economy during a certain period of time; its interest is twofold: provides data for economic modelling (multi-sectorial linear models or the more complex CGE models) and shows a complete but intuitive snapshot picture of the economy at stake.

A Social Accounting Matrix extends the traditional Input-Output tables([1]), not by using of satellite accounts, but in an integrated way and in the same table or matrix, using a more disaggregated income and expenditure structure reflecting the integration of the links of the institutional sectors with productive activities, commodities (goods and services) and intermediate inputs as well as themselves. To achieve this aim, main sources are statistical systems of National Accounts, together with socio-economic statistical operations, such as household budget surveys and similar, labour force surveys or those dealing with the behaviour of foreign sector and trade.

The underlying foundation of a SAM is the concept of the circular flow of income. The concept of the 'circular-economy' or 'circular-flow' is represented ([2]) in Figure 1.

Figure 1. The circular flow (simple version)



Source: Own elaboration

In this way, the objective of closing economic flow is achieved, being the SAM a coherent framework to analyse jointly the aspects relating to production and monetary flows between institutions, representing in a full, flexible and disaggregated form all transactions of a socio-economic system. A SAM reflects the full process of production,

([1]) Input-output analysis primary aim is to provide a tool to analyse the production side of the economy, focussing on the intermediate input requirements and final outputs of industries. In a sense, the Social Accounting Matrices are an extension of the Input-Output analysis, but even though the traditional Input-Output framework is a key tool in the economic analysis since its origins (Leontief, 1936), providing a useful description, explanation and analysis of multi-sectorial relations the usefulness of many of these analyses is limited in the attempt to reflect the complete behaviour of the economic system, since it does not incorporate all economic transactions in the system (the circular flow). To overcome this limitation, one preferred option is to build a SAM.

([2]) The circular flow is actually more complicated, existing multiple transactions between institutions (savings, direct taxes, transfers, etc.) other flows as taxes on commodities or activities, but basics of the circular flow remain.

trade, income generation and its redistribution between institutional sectors (Pyatt and Round, 1985; Pyatt and Thorbecke, 1976). This allows, with the required savings-investment accounts balance and the households budget constraint (implicit by definition of SAM), perform a reliably analysis about the distribution of wealth and income. Anyway, it should be noted that some problems of I-O frameworks are still present in the SAMs, for example the use of coefficients and fixed prices for inputs and finished products.

The concept of Social Accounting Matrices begins with Stone (1947), whose pioneering work on social accounting includes most of the conventions which will later be followed by economic and statistical organisations developing this tool. Pyatt and Thorbecke (1976) subsequently formalised the concept of what is a SAM and thereby allows its use as a formal framework for economic analysis and planning (see also Pyatt and Round, 1985). A SAM provides an appropriate framework for the analysis of the key socio-economic issues such as employment, poverty, growth and income distribution, trade, etc. By the integration of data on households' behaviour in National Accounts, a SAM capture macro transactions of an economic system based on micro level transfers between all agents in the economy (Pyatt and Round, 1985; Reinert and Roland-Holst, 1997). It can incorporate various dimensions that are descriptive of the income distribution by disaggregating the households using socio-economic characteristics (e.g. income level, rural-urban division, etc.).

As mentioned previously, the estimation of a SAM contributes itself to the study of any economic system, since it collects in detail most of a country's macroeconomic (and even microeconomic) transactions. But its usefulness as a database is enormous, both in the direct application of multi-sector linear models (type multipliers) and in its use for the calibration of the sophisticated CGE models. It is also flexible in its structure and in its geographical area (national, regional, multi-regional, etc.) and time frame, allowing its use in the analysis of multitude of economic issues.

A SAM is represented by a square matrix in which each account (representative of an activity, commodity, factor or institutional sector) is represented by a row and a column. Each cell shows the payment by column account to the account in the row. Therefore, "receipts" or incomes of an account are shown along the row and "expenditures/payments" by the column. Because the double entry system of accounting ( ), for each account a SAM its total revenues correspond exactly to the total payments, and, as a result, the total of each row corresponds to the corresponding column.

Typically, a Social Accounting Matrix has six basic groups of accounts:

- Activities or Commodities (or both, separated)
- (Production) Factors
- (Private) Institutions - Households and Corporations/Enterprises-
- Government (public institution)
- (Combined) Capital accounts
- Accounts for the Rest of the World.

The final dimensions of the matrix are determined by the level of disaggregation of these six basic groups. Figure 2 shows the basic structure of an standard SAM and illustrates the complexity of the works necessary to compile it ([3]). Anyway, it should be noted that concepts and assumptions sustaining a SAM are so flexible and a lot of alternative structures could be considered. Also, the order of types or groups of account is irrelevant to the information content.

([3]) Anyway, the general characteristic of this structure, as well as specific issues of its definition and composition can be found in European Commission (2013), Eurostat (2008), Mainar et al. (2018) and Miller and Blair (2009).

Figure 2. A Social Accounting Matrix (SAM) standard structure

	Commodities	**Margins**	**Activities**	**Factors**	**Households**	**Enterprises / Corporations**	**Government**	**Savings-Investment**	**Rest of the World**	***Total***
Commodities (C)		$\mathbf{T_{C,M}}$ Transaction costs (trade / transport)	$\mathbf{T_{C,A}}$ Intermediate (inputs) consumption		$\mathbf{T_{C,H}}$ Household consumption		$\mathbf{T_{C,G}}$ Government expenditure	$\mathbf{T_{C,S\text{-}I}}$ Investment and stock changes	$\mathbf{T_{C,RoW}}$ Exports	*Demand*
Margins (M)	$\mathbf{T_{M,C}}$ Transaction costs (trade / transport)									*Margins*
Activities (A)	$\mathbf{T_{A,C}}$ Domestic production									*Gross output / Production (activity income)*
Factors (F)			$\mathbf{T_{F,A}}$ Remuneration of factors / Factor income						$\mathbf{T_{F,RoW}}$ Factor income from RoW	*Factor income*
Households (H)				$\mathbf{T_{H,F}}$ Factor income distribution to households	$\boldsymbol{(T_{H,H})}$ *(Inter Households transfers)*	$\mathbf{T_{H,E}}$ Distribution of corporations income to households	$\mathbf{T_{H,G}}$ Government transfers to households		$\mathbf{T_{H,RoW}}$ Transfers to Households from RoW	*Household income*
Enterprises / Corporations (E)				$\mathbf{T_{E,F}}$ Factor income distribution to enterprises			$\mathbf{T_{E,G}}$ Government transfers to enterprises		$\mathbf{T_{E,RoW}}$ Transfers to Enterprises from RoW	*Enterprise income*
Government (G)	$\mathbf{T_{G,C}}$ Net taxes on products		$\mathbf{T_{G,A}}$ Net taxes on production	$\mathbf{T_{G,F}}$ Factor income to Government / Factor taxes	$\mathbf{T_{G,H}}$ Direct Household taxes / Transfers to Government	$\mathbf{T_{G,E}}$ Direct Enterprise taxes / Transfers to Government			$\mathbf{T_{G,RoW}}$ Transfers to Government from RoW	*Government income*
Savings-Investment (S-I)				$\boldsymbol{(T_{S\text{-}I,F})}$ *(Depreciation)*	$\mathbf{T_{S\text{-}I,H}}$ Household savings	$\mathbf{T_{S\text{-}I,E}}$ Enterprise savings	$\mathbf{T_{S\text{-}I,G}}$ Government savings	$\boldsymbol{(T_{S\text{-}I,S\text{-}I})}$ *(Capital accounts transfers)*	$\mathbf{T_{S\text{-}I,RoW}}$ Capital transfers from RoW (Balance of Payments)	*Savings*
Rest of the World (RoW)	$\mathbf{T_{RoW,C}}$ Imports			$\mathbf{T_{RoW,F}}$ Factor income distribution to RoW	$\mathbf{T_{RoW,H}}$ Household transfers to RoW	$\mathbf{T_{RoW,E}}$ Corporations income to Row	$\mathbf{T_{RoW,G}}$ Government transfers to RoW			*Payments to RoW*
Total	*Supply*	*Margins*	*Costs of production activities*	*Expenditure on factors*	*Household expenditure*	*Enterprise expenditure*	*Government expenditure*	*Investment*	*Incomes from RoW*	

Source: Aragie et al. (2017), Kiringai et al. (2007), Mainar et al. (2018), Round (2003) and own elaboration.

Activities and Commodities (goods and services)

The accounts of Activities represent the agents carrying out the production of Commodities, representing goods and services which are not factors of production. SAM flows can be valued at production costs in the accounts of Activities and at market prices (including indirect taxes on raw materials and transaction costs or margins) in the Commodities accounts. Sum of values of Activities is the domestic production (at production prices). Adding imports, net taxes on products and margins, total supply of commodities (at purchaser's prices) is obtained. Supplied commodities are sold domestically or exported.

Activity accounts details the cost structures in production and payments to factors. By columns, Activities cells show the use of Commodities as inputs, reflecting the intermediate demand, while the cross with rows of Factors show the use of factors of production (labour, capital, etc., quantified by salaries, wages, mixed income, rents, interest, etc.) needed for the operation of Activities. The amount of such remuneration of the factors, together with taxes less subsidies on production, results in the value added by Activities. By rows, Activities accounts show the value of the Commodities produced, identifying the commodities made by each Activity. Usually, only incomes to the activity accounts from the sale of commodities are recorded.

Commodities accounts collect, by columns, the domestic production by Activities, imports (Rest of the World accounts) and payment of taxes -including VAT ([4])- or receipt of subsidies on products, domestic and imported, in the cross with the accounts of Government. So, Commodities supply is valued at purchaser prices. By rows, Commodities accounts record the intermediate consumption (by Activities) and the final demand: consumption of institutional sectors (Household and Government) as well as investments and exports.

Regarding margins, in a SAM, trade flows (national and international) are associated with the transaction costs (trade and transport). For each product (goods or services), the SAM realises the costs associated with imports, margins, and the marketing of exports (i.e. each product incorporating trade and transport costs).

Factors

The production factors consist essentially in capital and labour, although other may be added, such as land or other natural resources. The production factors receive income by transferring them to productive activities and to the Rest of the World. These incomes (wages, rent, etc.) are distributed (as expenditure by columns) to owners of factors of production: domestic institutional sectors (Households – as labour income and distributed profits-, incorporated business enterprises –as non-distributed profits- and Government – as taxes and payment for owned resources-), and the Rest of the World ([5]).

Households

Families/Households receive income from Factors on domestic or foreign markets (as owners of labour, capital and land or natural resources) and transfers from Government, Enterprises, the Rest of the World and (sometimes) other households. Household incomes from Enterprises are basically distributed profits (and sometimes direct transfers), receiving from Government mostly direct transfers. Payments from abroad come usually for labour services (capital services are most often paid to enterprises).

([4]) Value Added Tax (VAT) is a tax on (final demand) commodities and NOT a tax on value added
([5]) See Pyatt (1991) and Defourney and Thorbecke (1984).

These revenues are used on the consumption of commodities (goods and services, marketed and valued at purchase prices including margins and taxes), payment of direct taxes (income taxes, etc.) and transfers to other institutions (domestic and foreign, including other groups of households when they are broken down). The remainder (or the need of financing, if applicable) is computing as savings (negative, if applicable). Anyway, difficult to verify data on savings by households can result in estimates of savings being derived as a residual (as saving/dissaving).

Traditionally, SAMs estimation has followed the Representative Household Group (RHG) approach, supposing different households group, each represented by an account in the SAM. The hypothesis is that all individual household of a specific RHG is affected in the same average manner by a policy shock,

Corporations

Corporations, such as families, receive payments related to the transfer of property (in this case capital and land or natural resources, since the labour factor can only supply natural persons, in this case represented by households) and income by transfers from other institutions. Those revenues should be used in the payment of direct taxes (on profits, as the corporation tax), transfers to other institutions or converted in savings. Although corporations refer to business, they do not consume raw materials or inputs such as activities (they are the institutional part of the productive sector).

Government

Government accounts refer to the Public Administration as an institutional sector. Its share as "productive activity" (public corporations) and marketed goods and services resulting from its activities are recorded in the respective accounts of Activities and Commodities. Incomes of Government are intended for the acquisition of goods and services (consumption demand of public services), transfers to other institutional sectors (households and corporations) in the form of benefits or subsidies, current transfers to other countries (development assistance or international aid, for example). The difference between income and expenditure is shown as savings (negative in case of public deficit).

Saving-Investment (capital combined accounts)

This account records in its row the savings generated by the domestic institutional sectors, both private and general Government, as well as transfers of either positive or negative capital from outside (accounts of Rest of the World, balance on the capital account). By column, reflects the Gross Fixed Capital Formation (GFCF) and changes in inventories in the accounts of Commodities, including investment in the economy.

Rest of the World

The Rest of the World account includes as income, the value of imports of goods and services (Commodities), payments to the factors of production from outside and transfers from the domestic institutions to institutional sectors elsewhere. Foreign sector accounts expenditures are the purchase of goods and services (exports), payments to national factors of production used abroad and transfers recorded from other economies. The balance reflects the surplus or deficit with the Rest of the World.

3 Kenya SAM 2014

3.1 Home Production for Home Consumption (HPHC) SAMs

A key issue in the economies of developing countries is the existence of *home production for home consumption* (HPHC) and hence the fact that the dual roles of producers and consumers are non-separable. For many people living in developing countries HPHC represents a major component of both their incomes and expenditures; this is especially so for the very poorest who overwhelmingly live and work in rural communities.

The Home Production for Home Consumption (HPHC) issue arises when households act as producing units consuming part or all of their output. The failure to account for this behaviour may have serious impacts on simulation results and associated policy proscriptions (Tiberti, 2011; Taylor and Adelman, 2003) due to misrepresentation of the difference in price formation processes between HPHC and marketed commodities. Factors ranging from high transaction costs, commodity and factor market imperfections, to perceived differences between own produced and marketed commodities/factors are indicated in the literature as some of the causes of HPHC (Aragie et al., 2017).

A decision by a researcher to incorporate HPHC in the model for analysis has implications for the model's functional relationships and the database. Apart from the required model development to account for the implied changes in behavioural specifications, it equally requires adjusting the structure of the SAM so that it can accommodate the actual economic and institutional relationships in accounting for HPHC.

The first step in incorporating HPHC involves expanding the structure of a SAM by adding information on HPHC. This requires including extra sets of columns and rows as sub-columns and sub-rows of the commodity and activity accounts. The additional rows and columns in the commodity accounts distinguish between commodities that are marketed and those that are HPHC, e.g., farmers may grow maize some of which they retain for home consumption and some of which they sell, and they may also, later in the year, also purchase maize for consumption. Thus, the additional commodity accounts identify the differences in the costs structures of marketed and HPHC commodities.

The activity accounts are somewhat different. HPHC commodities can only be produced by the RHGs that consume those commodities, and thus, each RHG must simultaneously be a household and an activity; this requires that RHGs that can engage in HPHC are paired with an activity. These paired activities only engage in the production of commodities (goods and services) that are within the System of National Accounts (SNA) production activities; these activities can use intermediate inputs, the paired RHGs own factors and purchase factors from other RHG. Practically most of these RHG and activity pairs will be rural households, since HPHC within the production boundary will primarily relate to agricultural commodities and commodities where access to markets limits the scope of households to purchase marketed commodities

The data requirements of a SAM for including HPHC are slightly greater compared to a typical SAM, because estimates are required for the additional commodity and activity accounts. Suffice to say that some estimation techniques are necessary so that data from different sources (surveys and censuses) collected for different purposes can be reconciled. This task is even more difficult as statistically agencies usually conduct a limit number of surveys each year so the reconciliation process requires 'bridging' different time periods. However, the additional data work is justifiable if policy decisions are to be evidence based, since the credibility of policy advice relies on the quality of the database.

Data for HPHC requires segmenting consumption demand between marketed and HPHC commodities and identifying the costs structures used in production. Typically, this will require reconciling data from different sources, especially household income and expenditure, labour force and agricultural (production) surveys.

All the tax and trade and transport costs incurred should be allocated solely to the marketed component of the commodity.

3.2 Structure and estimation of the 2014 Kenya SAM

To adequately approach the problem of HPHC, a virtually new SAM for Kenya (base year 2014) was estimated with an original structure. This new SAM incorporates specific accounts for the treatment of HPHC and a high level of regionalization based on agro-economic zoning and social characteristics. Accordingly, this new framework would make feasible to address specific issues such as semi-subsistence economic systems, agricultural production, mobility of factors, and other elements with a regional dimension. To develop this SAM, data from different sources were used and some updates (when necessary) have been applied in specific structural relationships, obtaining values, consistent with latest national statistics, in particular those related to the value added and its functional distribution among the SAM's different accounts. In this way, the 2014 Kenya SAM is a novel contribution combining and integrating available data in a coherent way.

The SAM is based on the standard structure that considers activities and commodities separately. However, there are peculiarities that make Kenya SAM 2014 deviate from the other classical structural assumptions. The structure and a short version of the SAM is summarised in Table 1. In summary, the 2014 Kenya SAM consists of 195 accounts: 53 activities, 73 commodities, 27 labour accounts, 5 types of capital, 5 types of taxes, 23 RHG, 5 saving- investment accounts and respective accounts for margins, enterprises, government and rest of the world. In Annex 4 can be found the way to download the complete 2014 Kenya SAM.

Accounts and data sources

Commodities and activities rows and columns are populated initially with estimations using data from the new rebased National Accounts (including a short version of Supply and Use Tables) for Kenya (KNBS, 2015a, 2015b) as well as the micro-data from Kenya Integrated Household Budget Survey (KIHBS) 2005/06 (see Annex) (Kenya National Bureau of Statistics, KNBS, 2007). Tables 3a and 3b shows the fundamental use of this survey in Kenya SAM building. Also, when no data or references were found for certain accounts, disaggregation or divisions, the production structure of previous SAMs elaborated by IFPRI was updated and employed (Kiringai et al., 2006; Thurlow et al., 2007; Thurlow and Benin, 2008).

Aforementioned HPHC concept is introduced in the SAM by assuming that each household also has a "productive activity". Besides the classic Representative Household Groups (RHG) that collect household behaviour as consumers of goods and services and as providers of factors of production (and receptor-contributors of transfers), in the Kenya 2014 SAM new accounts are presented showing the behaviour of households as units of production of commodities. These accounts incorporate the economic behaviour of households as producers of food commodities (agricultural and livestock products for food) as well as cash crops. This requires also separate accounts for commodities produced by these households for own consumption (HPHC as input or as a final product) and other marketed commodities (produced both by households and by conventional productive activities). Rows of these commodity accounts reflect HPHCs use as intermediate inputs in the productive activities of households and their consumption in final demand of households (RHG). Their row sums must be equal to the sums of the columns that summarize the contributions of the activities of households to each of these goods. Similarly, columns of the households activities show how they use inputs (HPHC and marketed), while rows show the destination of their production as inputs, own-consumption goods or marketed commodities. It is necessary to point out that households considered as producers have been broken down regionally (according to the criteria that we will mention later), while commodities produced are taken at national level in unique accounts.

Table 1. Kenya SAM 2014 (abbreviate version). Kshs '000 million.

	ch	cm	m	ahf	ahc	a	flab	fland	flivst	fcap_ag	fcap_na	hh	enter	gov	dirtax	indtax	saltax	facttax	imptax	i_s	row	Total
HPHC commodities (ch)				150.7								161.1								0.9		313
Marketed commodities (cm)			292.5	293.9	50.1	3,158.5						4,162.0		750.4						1,144.2	954.0	10,806
Margins (m)		292.5																				292
Households as activities food (ahf)	312.7	1,045.8																				1,358
Households as activities cash-crops (ahc)		197.7																				198
Activities (a)		7,087.1																				7,087
Labour factor (flab)				92.7	14.6	1,545.9															15.9	1,669
Land factor (fland)				536.2	113.7	206.8																857
Livestock (flivst)				141.2		33.6																175
Capital agricultural (fcap_ag)				98.7	19.3	77.3																195
Capital non-agricultural (fcap_na)				45.1		1,912.3																1,957
Households (hh)							1,600.2	856.1	174.7	195.2	455.4		1,048.5	41.6							324.3	4,696
Enterprises (enter)								0.3			1,501.0			505.4								2,007
Government (gov)															554.0	152.7	207.0	7.9	160.7		25.7	1,108
Direct taxes (dirtax)												311.6	242.4									554
Indirect taxes (indtax)						152.7																153
Sales taxes (saltax)		207.0																				207
Factor taxes (facttax)							6.6	0.3	0.1	0.1	0.9											8
Imports taxes (imptax)		160.7																				161
Save/Investment (i_s)												51.3	715.8	-213.9							592.0	1,145
Rest of the World (row)		1,815					62					10		25								1,912
Total	313	10,806	292	1,358	198	7,087	1,669	857	175	195	1,957	4,696	2,007	1,108	554	153	207	8	161	1,145	1,912	

Source: Own elaboration.

One of the main characteristics of this Kenya SAM is the high disaggregation of agricultural and food activities and commodities. In terms of agricultural production, the SAM accounts for three types of production agents. There are 8 agricultural household activities (one per each AEZ region) that produce 18 "subsistence commodities" not marketed and consumed at home and 17 marketed crops. Three regional households produce one or more of the 6 exported cash crops (cotton, sugar, coffee, tea, tobacco and other crops manly flowers). Then, the business enterprise sectors which at national level produces food and cash crops. These activities represent the market oriented larger holder producers. For primary sector accounts estimation, other relevant databases related to agriculture (e.g. Government of Kenya, 2015) were used.

In summary, the 2014 Kenya SAM includes195 accounts, with 53 activities (11 of them accounts of households as producers) producing 55 marketed and 18 HPHC commodities. The breakdown of commodities and activities is summarised in in Table 2.

Accounts related to households were mostly estimated with *KIHBS 2005/06 data (see **Tables 3a and 3b).*** In order to form the Representative Household Groups (RHG), households as institutions have been further disaggregated into rural and urban, according to the area of residence. Moreover, the two metropolises Nairobi and Mombasa have been broken down by income quintiles. As a result, the 2014 Kenya SAM contains 22 RHG, a number allowing for a good analysis of redistributive aspects and specific impact of different policies.

Regarding factors accounts, labour accounts are highly disaggregated to allow better subsequent socioeconomic analysis. According to the classification of work, there are three types of labour in the SAM: skilled, semi-skilled and unskilled labour. Each labour factor is also regionalized, giving the eight regions of reference plus a rest of the world aggregated region (to include immigrants). Hence, the SAM takes into account 27 different types of labour. The main data sources have been official data about labour markets (KNBS, 2015a,b) and the KIHBS 2005/06 (KNBS, 2007). Also, 5 types of capital are considered: agricultural, non-agricultural, livestock and land (irrigated and non-irrigated). Data used come from KNBS official statistics (Economic survey and Statistical Abstract), KIHBS and previous SAMs

For modelling and analysis purposes, *saving – investment* issue is represented by 5 accounts in Kenya SAM 2014: a single account collects savings from Institutions (Household, Corporations, Government and Rest of the World) and allocates them into four accounts representing different kinds of investments (roads, irrigation, other infrastructures and other investments). These accounts demand investment commodities in different ways, according to its characteristics. Data used for the estimation of this accounts comes from KIHBS, Economic Survey (KNBS, 2015a) and Statistical Abstract (2015b).
Regarding taxes and subsidies, 5 types of taxes has been disaggregated: direct, indirect, sales, factors and imports taxes. Taxes related to activities and commodities have been estimated in conjunction with those accounts and using their same data sources (as in the case of enterprises/ corporations), while those for those relating to households has been estimated using KIHBS data.

Residual estimation and final adjustment and balancing

The use of different data sources and estimations resulted in an unbalanced SAMs. The discrepancies were corrected using RAS and Cross Entropy methods (McDougall, 1999; Robinson et al., 2001). Also, these methods were used to ensure the smooth estimation of some specific SAM cells without enough information, subject to known targets for accounts and cells or submatrices for which statistical information were available as well as the macroeconomic targets.

Table 2. Kenya SAM 2014 activities and commodities

HPHC commodities	***Marketed commodities***	***Representative Households Groups as activities***	***Activities***
Maize	Maize	***Food***	Food crops
Wheat	Wheat	Nairobi	Cotton
Rice	Rice	Mombasa	Sugarcane
Other cereals	Other cereals	High Rainfall	Coffee
Roots and tubers	Roots and tubers	Semi-Arid North	Tea
Pulses and oil seeds	Pulses and oil seeds	Semi-Arid South	Tobacco
Fruits	Fruits	Coast	Others crops
Vegetables	Vegetables	Arid North	Livestock
Beef	Cotton	Arid South	Dairy
Dairy	Sugarcane		Fishing
Poultry	Coffee		Forestry
Sheep, goat…	Tea	***Cash crops***	Mining
Other livestock	Tobacco	High Rainfall	Meat and dairy
Fishing	Others crops	Semi-Arid North	Grain milling
Sugar and bakery…	Beef	Semi-Arid South	Sugar and bakery…
Beverages and tobacco	Dairy		Beverages and tobacco
Other manufactured food	Poultry		Other manufactured food
Water	Sheep, goat…		Textile and clothing
	Other livestock		Leather and footwear
	Fishing		Wood and paper
	Forestry		Printing and publishing
	Mining		Petroleum
	Meat and dairy		Chemicals
	Grain milling		Fertilizers Nitrogen
	Sugar and bakery…		Fertilizers Phosphorus
	Beverages & tobacco		Fertilizers Potassium
	Other manufactured food		Metals and machines
	Textile and clothing		Non-metallic products
	Leather and footwear		Other manufactures
	Wood and paper		Water
	Printing and publishing		Electricity
	Petroleum		Construction
	Chemicals		Trade
	Fertilizers Nitrogen		Hotels
	Fertilizers Phosphorus		Transport
	Fertilizers Potassium		Communication
	Metals and machines		Finance
	Non-metallic products		Real estate
	Other manufactures		Other services
	Water		Administration
	Electricity		Health
	Construction (Roads)		Education
	Construction (Irrigation)		
	Construction (Other infrastructures)		
	Construction (Others)		
	Trade		
	Hotels		
	Transport		
	Communication		
	Finance		
	Real estate		
	Other services		
	Administration		
	Health		
	Education		

Source: Own elaboration.

Table 3a. Sections and information of KIHBS used in estimation and split of Household account columns in the sub-matrices of 2014 Kenya SAM.

	Households (RHG) as 'activities'		Households (RHG)	
Commodities	***Section N***	***Agricultural Holding***	***Section G***	***Housing***
		Cost structure (by parcels x RHG)		Expenditures on rent/house loan
	Section O	***Agricultural Output***	***Section H1/H2***	***Water Sanitation / Energy***
		Harvested and used (quantity by crops)		Energy and water costs (value)
	Section P1	***Livestock***	***Section I***	***Consumption of Food***
		Cost structure (by type of livestock)		Purchased food value and quantity
		Purchased livestock		Own production quantity consumed
			Sections J/K/L	***Regular / Non regular non food ítems expenditures***
				Purchased ítems quantities and values
				Other sources quantities and values
			Section M	***Expenditures on durables***
				Purchased quantities and values
			Section O	***Agricultural Output***
				Harvested and self-consumed (quantity)
			Section P1	***Livestock***
				Self-consumed animals (quantity)
			Section P2	***Livestock output***
				Self-consumed animals (quantity)
			Section Q	***Household Enterprises***
				Business cost estructure (x activity)
Factors	***Section E***	***Labour / Employment***		
		Time worked in hhd own farm / enterprise (hours)		
	Section Q	***Household Enterprises***		
		Household workers (x activity)		
		Employees (x activity)		
		Business cost estructure (x activity)		
Households			***Section R***	***Transfers***
				Cash received/ given by/to other households
				Food received/given by/to others households (value)
				Other items received/given by/to others households (value)
Taxes			***Section E***	***Labour / Employment***
			+	Salaries
			Kenya Revenue Authority	P.A.Y.E.* tables (* Pay As Your Earn)
S-I			***Sections O, E, P1, P2, Q, R, S***	Incomes
			Sections G, H1, H2, I, J/K/L, M, N, O, E, P1, P2, Q, R, S	Expenditures

Table 3b. Sections and information of KIHBS used in estimation and split of Household account rows in the sub-matrices of 2014 Kenya SAM

	Commodities	
Households (RHG) as 'activities'	***Section I***	***Consumption of Food***
		Own production quantity consumed
	Section O	***Agricultural Output***
		Harvested and sold (quantity by crops)
	Section P1	***Livestock***
		Animals sold
	Section Q	***Household Enterprises***
		Sales (x activity)

	Factors		*Households*	
Households (RHG)	***Section E***	***Labour / Employment***	***Section R***	***Transfers***
		Salaries (x category x activity)		Cash received/ given by/to other households
	Section S	***Other income***		Food received/given by/to others households (value)
		Incomes from properties / capital		Other items received/given by/to others households (value)

	Government		*RoW*	
Households (RHG)	***Section R***	***Transfers***	***Section R***	***Transfers***
		Cash received by government		Cash received from outside Kenya
		Food received by government (value)		Food received from outside Kenya (value)
		Other items received by government (value)		Other items received from outside Kenya (value)
	Section S	***Other income***		
		Incomes from a government pension		

Regional breakdown

The regional breakdown in the 2014 Kenya SAM is based on agro-ecological characteristics. Thus, the country has been divided into six AEZs, in addition to the two major metropolises, i.e., Nairobi and Mombasa (see Tables 4a and 4b). Based on previous studies (Mabiso et al., 2012; Thurlow and Benin, 2008; Kiringai et al.,2006) and own assumptions, these AEZs distinguish the characteristics of the primary sector production in different regions of the country, enabling specific analysis of the effects of different policies focusing on territories, products or specific activities. The eight regions considered are (i) Nairobi, (ii) Mombasa, (iii) High Rainfall, (iv) Semi-Arid North, (v) Semi-Arid South, (vi) Coast, (vii) Arid North and (viii) Arid South. This regional breakdown has been applied to both households, as productive units or activities, and households, as institutional units.

Table 4a. Districts of Kenya by Agro Ecological Zones in Kenya SAM 2014.

Nairobi	Mombasa	High Rainfall		Semi-Arid North	Semi-Arid South	Coast	Arid North	Arid South
Nairobi	Mombasa	Kiambu	Bondo	Nyeri	Taita Taveta	Kilifi	Isiolo	Tana River
		Kirinyaga	Nyando	Mbeere	Kitui	Kwale	Marsabit	Garissa
		Muranga	Bomet	Mwingi	Makueni	Lamu	Moyale	
		Nyandarua	Keiyo	Nyambene	Kajiado	Malindi	Mandera	
		Thika	Kericho	Tharaka	Narok		Wajir	
		Maragua	Koibatek	Laikipia	Trans Mara		Baringo	
		Embu	Marakwet	West Pokot			Samburu	
		Machakos	Nakuru				Turkana	
		Meru Central	Nandi					
		Meru South	Trans Nzoia					
		Gucha	Uasin Gishu					
		Homa Bay	Buret					
		Kisii	Bungoma					
		Kisumu	Busia					
		Kuria	Mt. Elgon					
		Migori	Kakamega					
		Nyamira	Lugari					
		Rachuonyo	Teso					
		Siaya	Vihiga					
		Suba	Butere/Mumias					

Source: Own elaboration.

Table 4b. Provinces (old) of Kenya by Agro Ecological Zones in Kenya SAM 2014

Nairobi	Mombasa	High Rainfall	High Rainfall	Semi-Arid North	Semi-Arid South	Coast	Arid North	Arid South
Nairobi	Coast	Central	Rift Valley	Central	Coast	Coast	Eastern	Coast
		Eastern	Western	Eastern	Eastern		North Eastern	North Eastern
		Nyanza		Rift Valley	Rift Valley		Rift Valley	

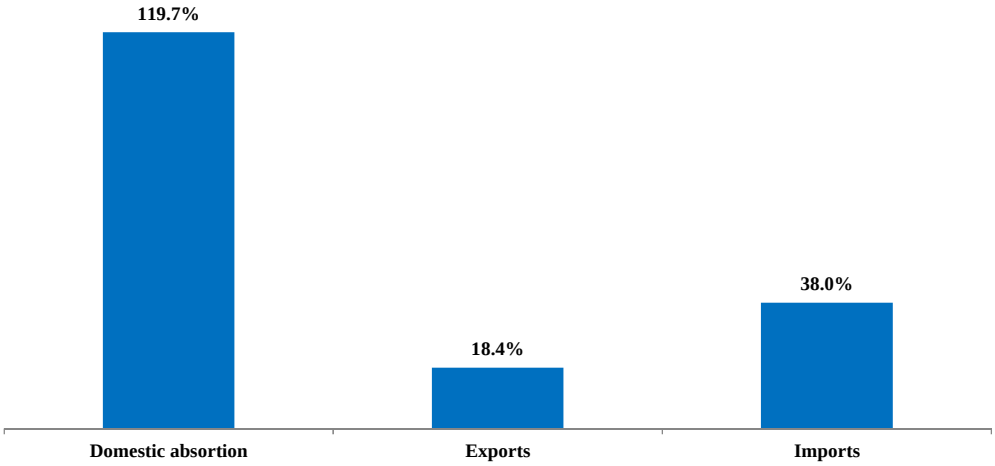
Source: Own elaboration.

4 The Kenyan Economy structure with SAM data

Using a SAM it is possible to characterize the main features of an economy using the interrelationships among economic agents analysed in it. Depending on the disaggregation used, this description may be more or less detailed, simply including macroeconomic or incorporating socio-economic issues related to institutional sectors, especially household aspects. In the case of the SAM of Kenya, the high level of disaggregation used allows to analyse a variety of aspects of the economy of this country, showing the main results below. In Annex 4 an application is presented to visualize on-line some results and indicators.

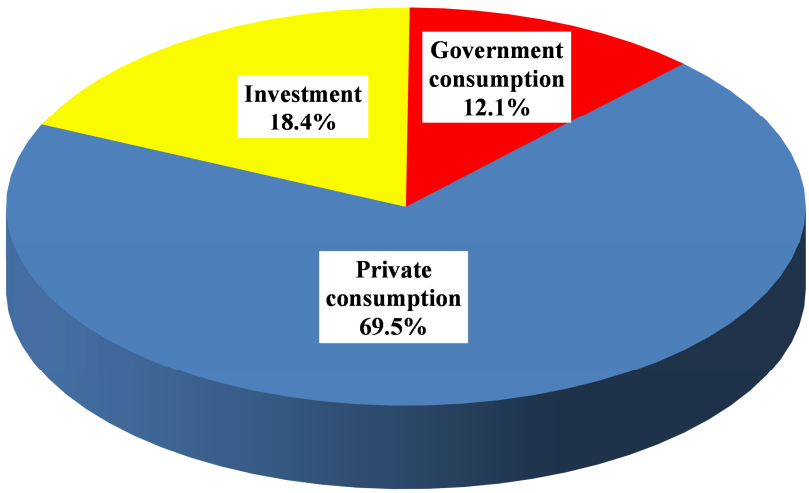
Commencing with the macroeconomic aspects, the Kenya SAM shows how domestic absorption reaches almost 120% of the GDP of the country (Figure 3), being its basic composition private consumption (69.5% of this absorption, compared to just over 18% involving expenditure investment) (Figure 4). However, a clear external dependency is shown, with exports exceeding 18% of GDP compared with 38% of GDP value of imports (Figure 3).

Figure 3. Domestic absorption, exports and imports as % of GDP. Kenya, 2014.



Data source: Kenya Social Accounting Matrix 2014 (own elaboration)

Figure 4. Composition of domestic absorption. Kenya, 2014.



Data source: Kenya Social Accounting Matrix 2014 (own elaboration)

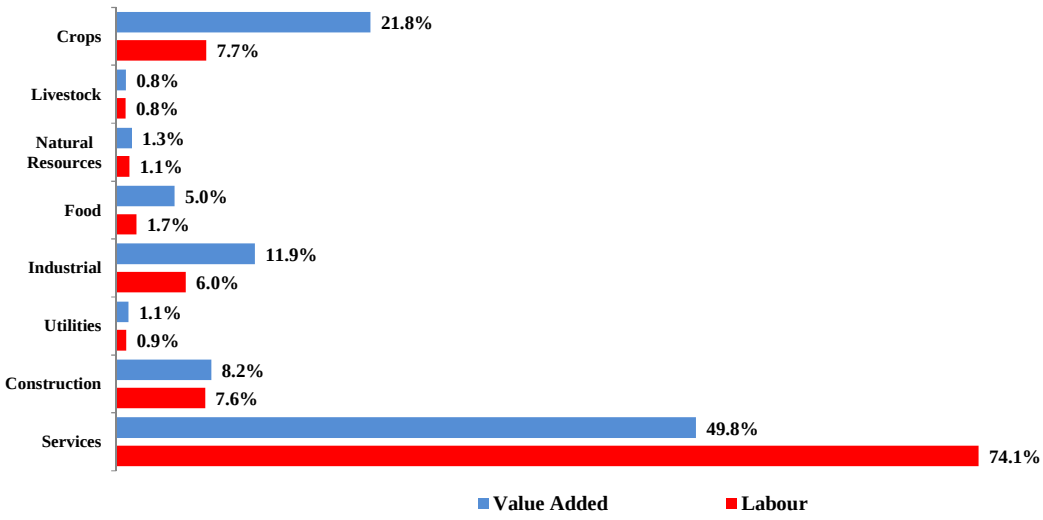
Despite the great importance of agriculture in the economy of Kenya, the largest contribution to the value added comes from the services sector, reaching almost half of the total (49.8%), compared with 21.8% of crops or 5% of agrifood activities (Figure 5). In addition, this predominance of the services sector becomes much more evident when considering labour, since 74.1% of remuneration this factor occur in service activities, and also includes about 72% of the non-agricultural capital used (Table 5).

Table 5. Distribution of Labour factor and non-agricultural Capital by aggregate activities. Kenya, 2014.

	Crops + Livestock	Natural Resources	Food	Industrial	Utilities	Construction	Services
Labour	8.6%	1.1%	1.7%	6.0%	0.9%	7.6%	74.1%
Capital (non-agricultural)	2.3%	1.0%	3.1%	13.3%	1.8%	6.9%	71.7%

Data source: Kenya Social Accounting Matrix 2014 (own elaboration)

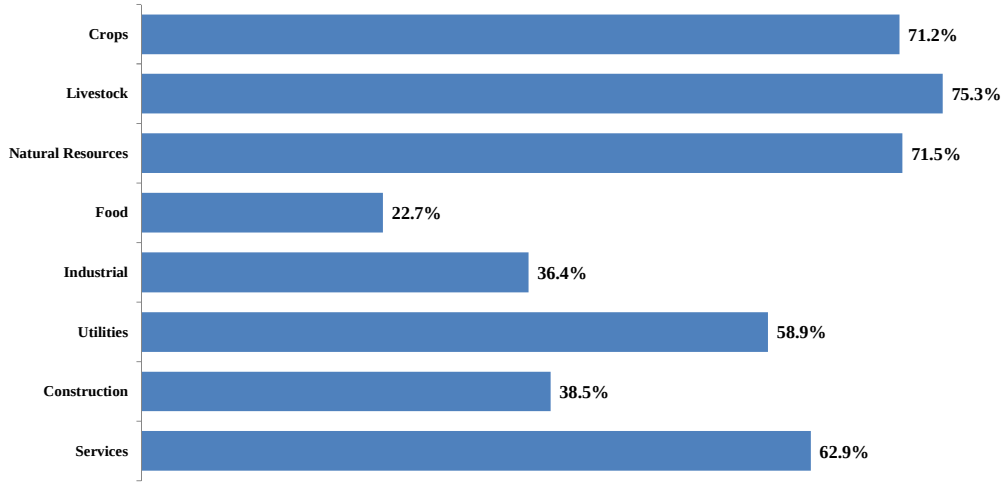
Figure 5. Distribution of Labour factor and Value Added by aggregate activities. Kenya, 2014.



Data source: Kenya Social Accounting Matrix 2014 (own elaboration)

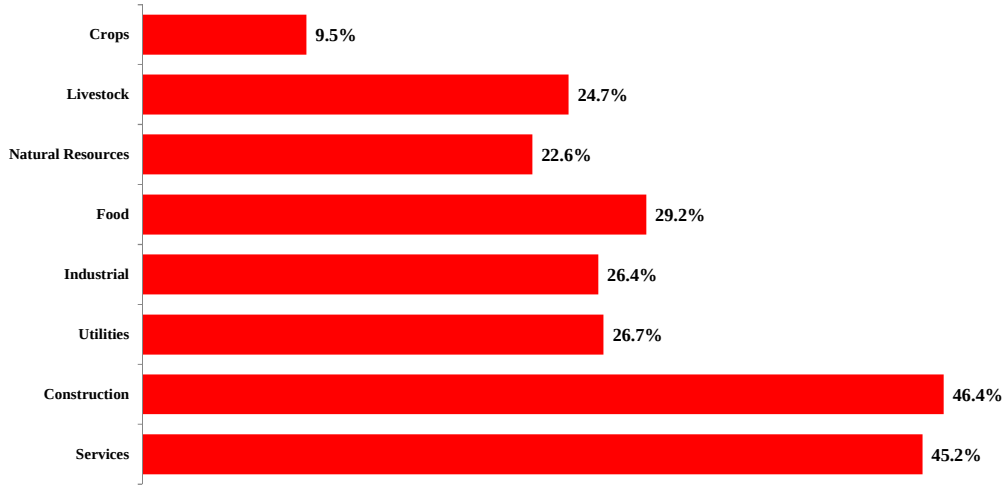
It is precisely the primary activities which show greater added value in relation to its gross output, exceeding 70%, above the ratio observed in Services, which does not reach 63% (62.9%). However, these relationships change when you consider the weight of the labour factor in the added value. In the Construction and Services, this percentage is 46.4 and 45% of the value added generated by the sector, while only reaches 9.5% in crops, although reaches 29.2% in food activities.

Figure 6. Value Added/Gross Output ratio by aggregate activities. Kenya, 2014.



Data source: Kenya Social Accounting Matrix 2014 (own elaboration)

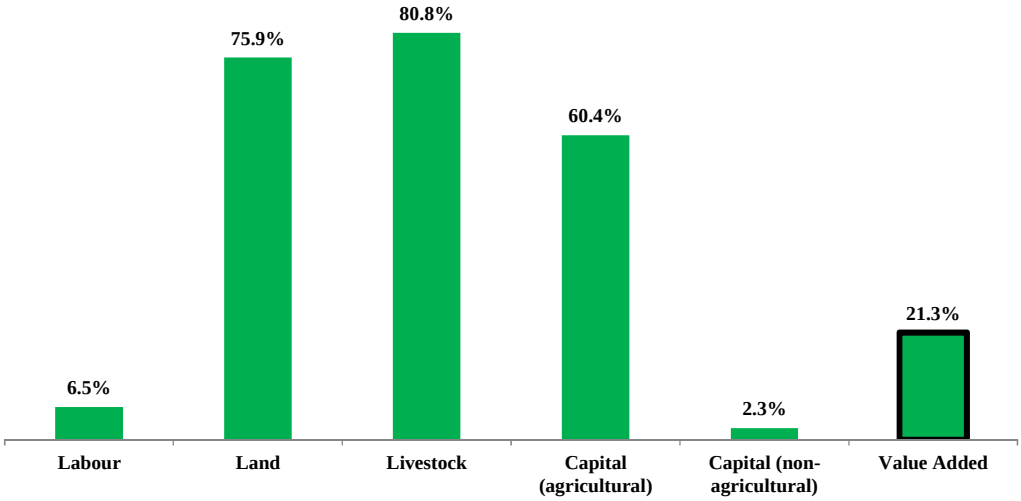
Figure 7. Labour factor/Value Added ratio by aggregate activities. Kenya, 2014.



Data source: Kenya Social Accounting Matrix 2014 (own elaboration)

Another important aspect related to the value added generated in the economy of Kenya that can be analysed with the estimated SAM, is the weight of households as activities within that generation of value. Thus, as shown in the corresponding chart, livestock production factors, land and agricultural capital are concentrated in a majority in homes that act as activities (HPHC), with percentages of 75.9%, 80.8% and 60.4% of the total respectively. However, only 6.5% of the remuneration to labour corresponds to these activities.

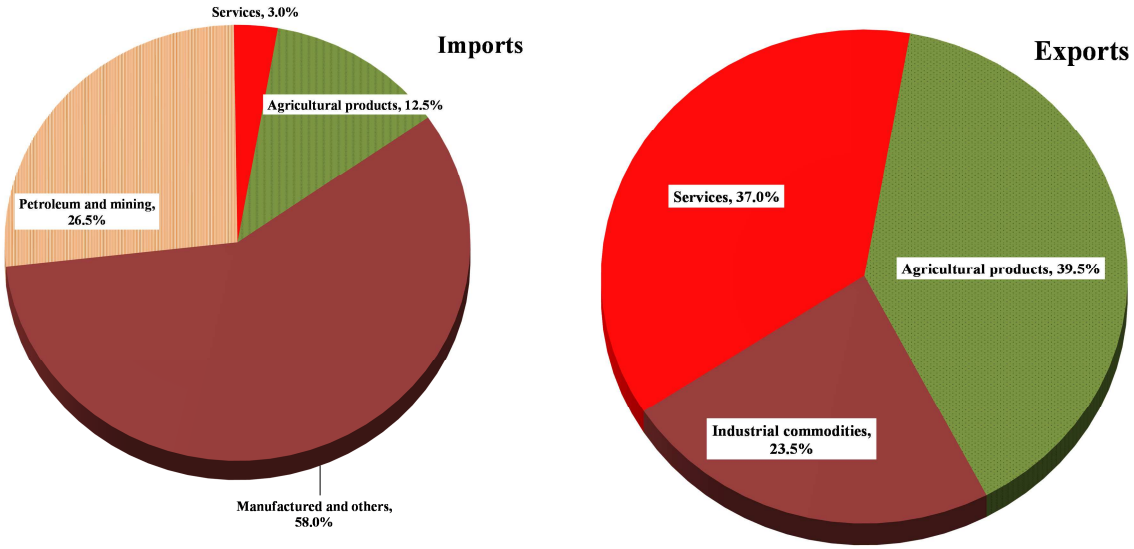
Figure 8. Share of HPHC activities in production factors. Kenya, 2014.



Data source: Kenya Social Accounting Matrix 2014 (own elaboration)

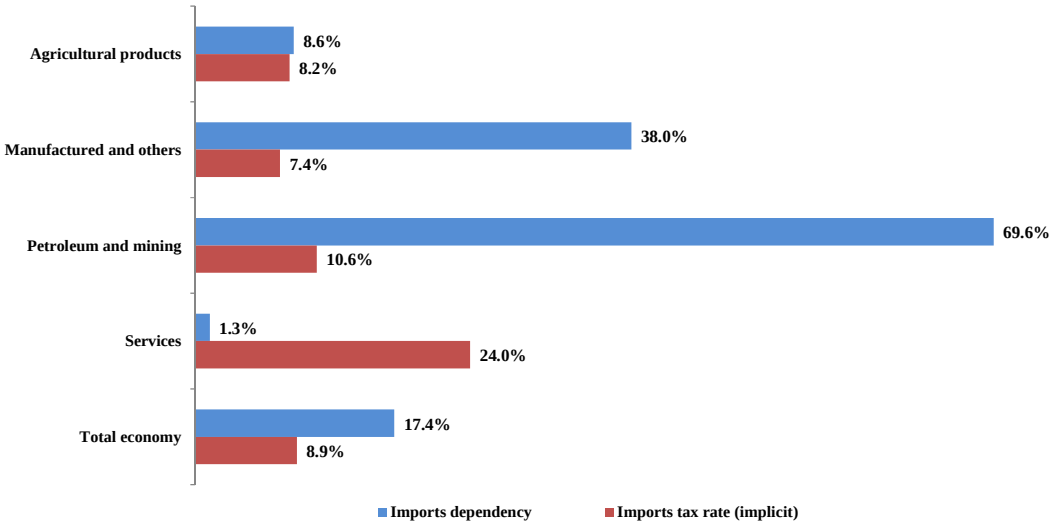
Finally, referring to the main macroeconomic issues, it should be necessary to explain the composition of exports and imports. Almost 40% of sales of goods abroad correspond to agricultural products, while 37% are service charges. However, 58% of exports correspond to manufactured and industrial products, and 28.5% of purchases of oil and other energy products. The import dependence on the total supply in the country is especially relevant in petroleum and mining (69.6%) as well as manufactured and industrial products (38%). Implicit tax rates on those sectors imports are 7.4 and 10% respectively, while in services (with a dependency ratio of only 1.3%) up to 24%. For agricultural products, dependence is 8.6%, with a rate of 8.2%. In the whole of the Kenyan economy, 17.4% of the supply of goods and services corresponding to imported products, with an average 8.9% implicit tax rate (Figure 10).

Figure 9. Imports and exports composition. Kenya, 2014.



Data source: Kenya Social Accounting Matrix 2014 (own elaboration)

Figure 10. Imports dependency and implicit imports tax rate . Kenya, 2014.



Data source: Kenya Social Accounting Matrix 2014 (own elaboration)

Table 6. Distribution of households' income. Kenya, 2014.

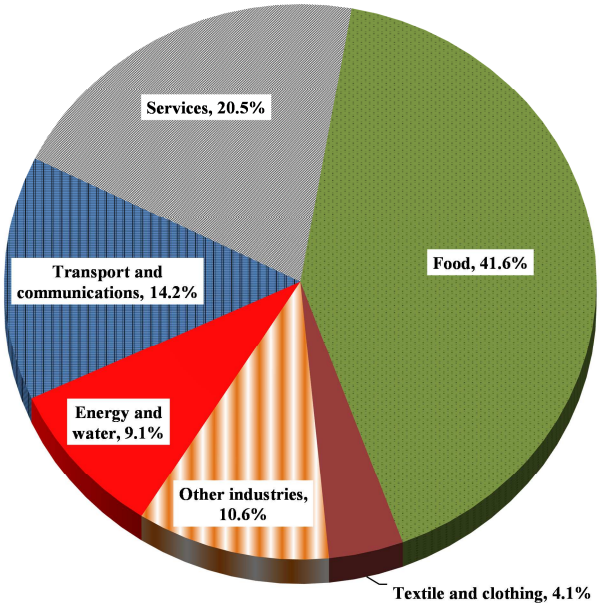
	Factors income					Transfers		
	Labour	**Land**	**Livestock**	**Capital (agricultural)**	**Capital (non-agricultural)**	**Enterprises**	**Government**	**Rest of the World**
Kenya	*34.1%*	*18.2%*	*3.7%*	*4.2%*	*9.7%*	*22.3%*	*0.9%*	*6.9%*
Rural	35.5%	30.7%	6.3%	2.7%	6.6%	11.4%	1.2%	5.6%
Urban	32.3%	2.9%	0.6%	5.9%	13.6%	35.8%	0.5%	8.5%
Nairobi	32.3%	0.2%	0.0%	7.4%	8.3%	38.8%	0.6%	12.4%
Mombasa	55.5%	2.3%	0.0%	3.5%	4.4%	29.0%	0.3%	4.9%
High Rainfall	32.7%	24.6%	4.4%	3.3%	12.4%	17.7%	0.5%	4.4%
Semi-Arid North	33.1%	33.5%	8.6%	2.7%	2.6%	12.9%	0.5%	6.1%
Semi-Arid South	31.0%	30.2%	9.6%	2.0%	6.8%	12.7%	2.1%	5.6%
Coast	45.5%	3.7%	0.8%	3.6%	2.4%	25.2%	5.5%	13.3%
Arid North	53.3%	14.0%	3.3%	2.9%	5.4%	8.4%	4.3%	8.4%
Arid South	46.3%	2.4%	0.5%	3.2%	4.0%	11.9%	9.5%	22.1%

Data source: Kenya Social Accounting Matrix 2014 (own elaboration)

Analysing the socio-economic aspects, the structure of the SAM of Kenya 2014 can also allow determine how households obtain their income, overall and disaggregating by the type of habitat (urban / rural) or region or AEZ of residence. As shown in Table 6, 34.1% comes from compensation to labour, being transfers from the Enterprises (22.3%) and

the Land factor (18.2%), both as return on capital, the following main sources of income. Differentiating households according to their urban or rural environment, logically increases in the urban the importance of Non-agricultural Capital (also from transfers from Enterprises), while Land is a key factor in total income in the rural ones. However, in all case, transfers from the Government are relatively unimportant, while those from the Rest of the World are relatively significant in some rural areas, especially in Arid South and Coast, and in the metropolitan area of Nairobi.

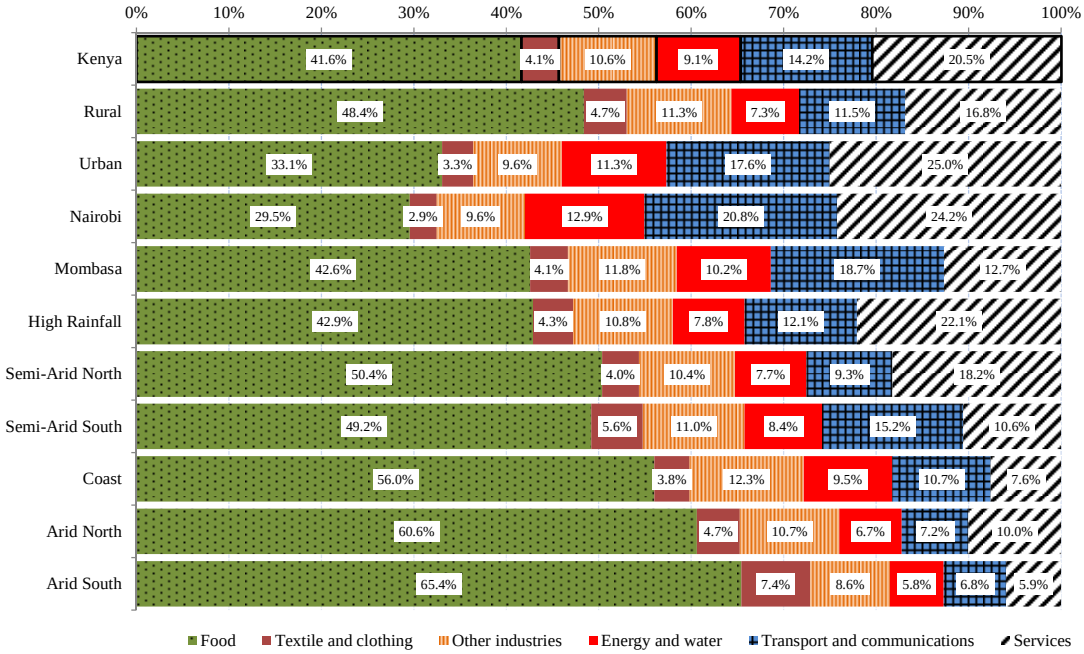
Figure 11. Households consumption pattern. Kenya, 2014.



Data source: Kenya Social Accounting Matrix 2014 (own elaboration)

The composition of consumption patterns of households can also be observed. The average consumption pattern in Kenya indicates that 41.6% of household spending corresponds to food products and the second most important one is the related to services, 34.7% of total expenditure (14.2% in transport and communications and 20.5% in other services). Energy accounts for 9.1% of total expenditure, while 14.7% are industrial and manufactured goods (4.1% textiles and clothing). These patterns are modified by considering different residential areas, being more relevant spending on food commodities in rural areas, especially in lower income ones, while the reverse trend is observed in services.

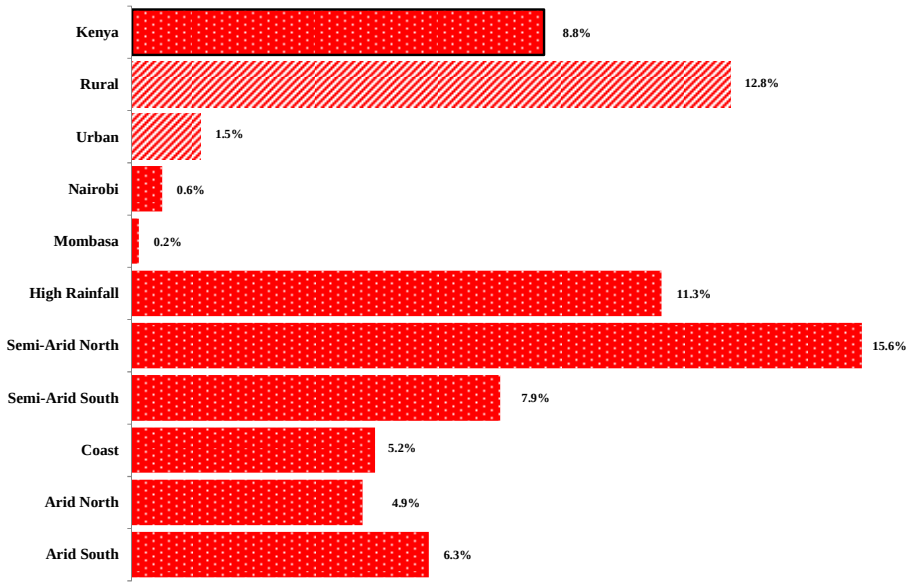
Figure 12. Households consumption patterns (global, by rural/urban habitat and by AEZ). Kenya, 2014.



Data source: Kenya Social Accounting Matrix 2014 (own elaboration)

Finally, it is important to make reference, with information provided by the SAM, to food commodities demand. Because of the importance given in the development of the database to the role of households as productive activities, it is relevant to analyse the weight of HPHCs food commodities consumption in total consumption. As shown in Figure 13, 8.8% of food commodities demand correspond to activities HPHCs, but this percentage rises to 12.8% among rural households (1.5% among urban), being especially relevant in High Rainfall (11.3%) and Semi-Arid South (15.6%).

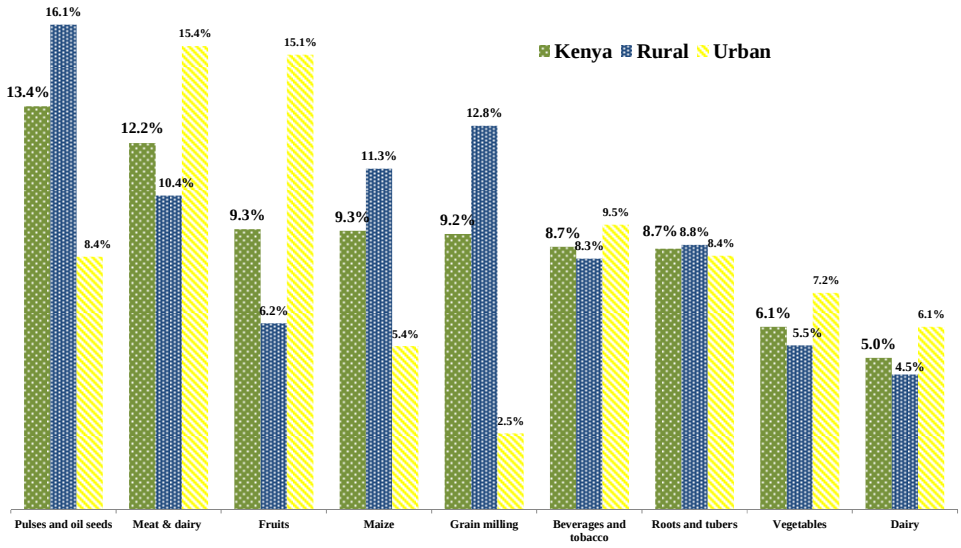
Figure 13. HPHC food consumption rate of total food consumption (global, by rural/urban habitat and by AEZ). Kenya, 2014.



Data source: Kenya Social Accounting Matrix 2014 (own elaboration)

Regarding the specific consumption pattern of food, pulses and oil represent the main part of the budget, especially in rural households (16.1%), followed by meat and dairy products (12.2% of household spending in food in Kenya). In urban areas, this is the main item (15.4% of spending) followed by fruits (15.1%) (Figure 14).

Figure 14. Principal food commodities consumed as share of total food consumption (global and by rural/urban habitat). Kenya, 2014.



Data source: Kenya Social Accounting Matrix 2014 (own elaboration)

5 Linear multipliers analysis

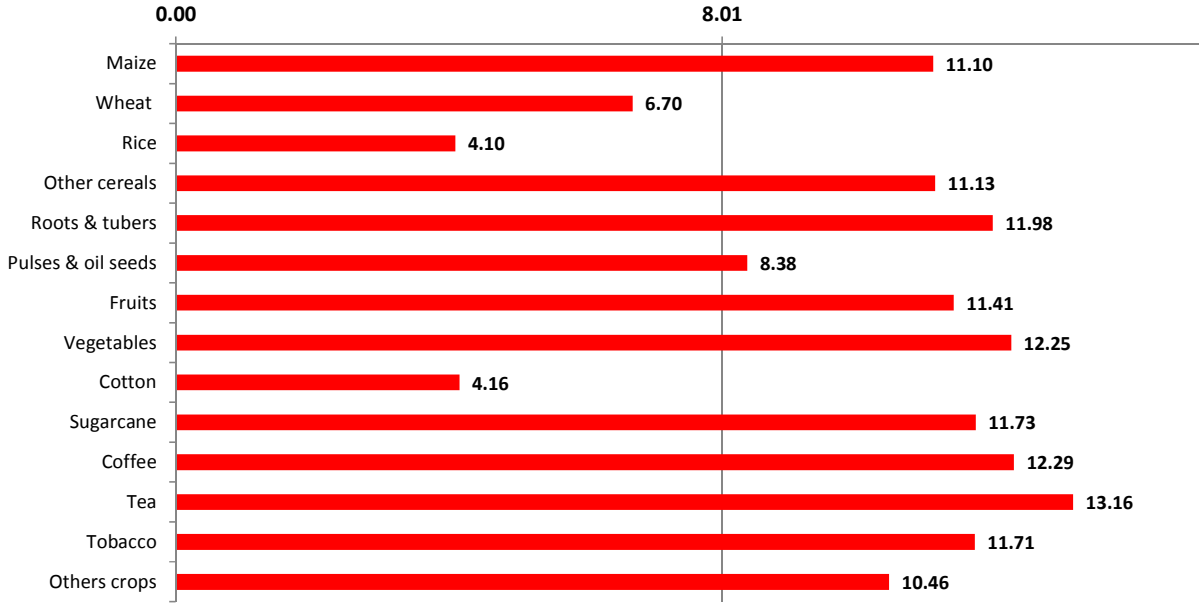
This section presents a description of the Kenyan economy, with focus on the agricultural and food value chains, based on the existing SAM, developed by the JRC. Well-known multi-sectoral analytical tools like linear multipliers, key sectors analysis, and Structural Path Analysis (SPA) and value chain participations are used to this end[6].
Checking the relative importance of agricultural and food industry sectors in growth and jobs generation key sectors of Kenyan economy is determined. Then, are quantified impacts (output, employment and value added) which are caused either directly (from final consumption in the same sector) or indirectly (form final consumption in other sectors). This analysis show which value chains have the greatest impact in terms of output, employment and value added.

5.1 Multipliers and backward linkages analysis

The analysis of multipliers can provide an initial overview of the potential of economic sectors to generate output, employment and value added. Although the assumptions made in estimation the multiplier suggest that their exact value is subject to some variability and must be taken with some caution, its validity, comparability and multisectoral qualitative analysis is clear and its usefulness to the ex-ante evaluation of policies very significant.

By adding multiplier values by commodities columns and dividing by the average value for all sectors (using in this case domestic supply weights to avoid scale effects), we obtain the so-called backward linkages. They provide a direct comparability among sectors on the capacity and potential to create wealth and employment. Tables 7 and 8 and Figure 15 show the values of multipliers and the backward linkages.

Figure 15. Employment multipliers of agricultural commodities (average: 8.01)



Data source: Kenya Social Accounting Matrix 2014 (own elaboration)

[6] Annex 3 contains a brief description of multipliers analysis. For more details, see Pyatt and Round (1979), among many others.

Table 7. Linear multipliers and backward linkages of primary sector and food industry commodities, 2014

	Multipliers			Backward linkages		
	Output	**Employment**	**Value added**	**Output**	**Employment**	**Value added**
Maize	2.97	11.10	1.85	1.17	1.39	1.25
Wheat	1.79	6.70	1.10	0.70	0.84	0.74
Rice	1.10	4.10	0.66	0.43	0.51	0.45
Other cereals	3.01	11.13	1.88	1.19	1.39	1.27
Roots & tubers	3.17	11.98	1.98	1.25	1.49	1.33
Pulses & oil seeds	2.16	8.38	1.35	0.85	1.05	0.91
Fruits	3.12	11.41	1.96	1.23	1.42	1.32
Vegetables	3.17	12.25	1.97	1.25	1.53	1.33
Cotton	0.92	4.16	0.59	0.36	0.52	0.40
Sugarcane	2.52	11.73	1.57	0.99	1.46	1.06
Coffee	2.74	12.29	1.72	1.08	1.53	1.15
Tea	3.07	13.16	2.02	1.21	1.64	1.36
Tobacco	2.04	11.71	1.19	0.80	1.46	0.80
Others crops	3.09	10.46	2.06	1.22	1.30	1.39
Beef	3.15	17.30	1.95	1.24	2.16	1.31
Dairy	3.15	16.13	1.94	1.24	2.01	1.30
Poultry	2.98	17.58	1.85	1.17	2.19	1.24
Sheep, goat,...	3.08	16.78	1.88	1.21	2.09	1.26
Other livestock	3.12	17.10	1.90	1.23	2.13	1.28
Fishing	3.09	16.74	1.92	1.22	2.09	1.29
Forestry	2.86	12.43	1.95	1.13	1.55	1.31
Meat	2.99	10.51	1.43	1.18	1.31	0.96
Grain milling	2.77	9.01	1.33	1.09	1.12	0.89
Sugar & bakery ...	2.52	9.99	1.50	0.99	1.25	1.01
Beverages/tobacco	2.82	10.14	1.67	1.11	1.27	1.12
Other manuf. food	1.89	9.07	1.09	0.74	1.13	0.74

Data source: Kenya Social Accounting Matrix 2014 (own elaboration)

Focusing on the analysis on the backward linkages, among food crops maize multipliers have values clearly above average, as is the case for fruit and vegetables. On the other hand, wheat (0.70, 0.84 and 0.74) and more particularly rice (0.43, 0.51, 0.45), have a weaker impact on the economy, both in production and employment and value added. Looking at cash crops, tea and coffee show values clearly greater than average, especially tea (1.21, 1.64 and 1.36). Sugar cane values are around average in output (0.99) and value added (1.06), but is significantly higher for employment (1.46). Tobacco clearly surpass average employment value (1.46) but is less relevant in output (0.80) and value added (0.80). Cotton shows values (0.36, 0.52 and 0.40) which are significantly below the average.

All livestock products show major backward effects on Kenya economy. In all cases values are higher than average: in output (around 1.2), value added (around 1.3), and especially in employment where they double the average. This is also the case for the fishing and forestry sectors, although in the latter the employment multiplier is 1.55 times the average.

As regards the agrifood industry sectors, value added values are around the average (with meat, grain milling and other manufactured food below) and very close to it in output, although the linkages are noteworthy in employment, around 1.3 (excluding grain milling -1.12-).

For the other sectors of the economy of Kenya, the multipliers of the manufactures commodities are lower than the average, being backward linkages less than 1 for output and employment and value added. The construction is slightly above the average in output and value added, but only 0.79 for employment. Something similar is for the services sectors, although with slightly higher values. Only trade, which is almost twice the global average, and "other services" show linkages of employment above the unit.

Table 8. Linear multipliers and backward linkages of manufactures, services and other sectors commodities, 2014

	Multipliers			Backward linkages		
	Output	**Employment**	**Value added**	**Output**	**Employment**	**Value added**
Mining	1.67	3.88	0.93	0.66	0.48	0.63
Textile & clothing	0.87	3.39	0.45	0.34	0.42	0.30
Leather & footwear	1.88	4.55	0.88	0.74	0.57	0.59
Wood & paper	1.91	5.27	0.89	0.75	0.66	0.60
Printing- publish.	1.47	3.66	0.67	0.58	0.46	0.45
Petroleum	0.54	1.25	0.22	0.21	0.16	0.15
Chemicals	0.51	1.50	0.24	0.20	0.19	0.16
Fertilizers	0.79	2.19	0.41	0.31	0.27	0.28
Metals and machi.	0.53	1.46	0.22	0.21	0.18	0.15
Non-metallic prod.	1.98	4.32	1.19	0.78	0.54	0.80
Other manufactures	1.33	4.40	0.64	0.52	0.55	0.43
Water	3.12	9.09	1.89	1.23	1.13	1.27
Electricity	2.49	4.54	1.43	0.98	0.57	0.96
Construction	2.70	5.70	1.38	1.06	0.71	0.93
Trade	2.74	14.29	1.57	1.08	1.78	1.05
Hotels	2.47	6.54	1.36	0.97	0.82	0.92
Transport	2.72	5.91	1.66	1.07	0.74	1.12
Communication	3.10	6.33	1.46	1.22	0.79	0.98
Finance	2.90	6.25	1.66	1.14	0.78	1.11
Real estate	2.51	4.62	1.79	0.99	0.58	1.21
Other services	2.82	11.31	1.78	1.11	1.41	1.20
Adminsitration	2.71	5.74	1.59	1.07	0.72	1.07
Health	2.86	6.10	1.71	1.12	0.76	1.15
Education	3.03	7.04	1.84	1.19	0.88	1.24

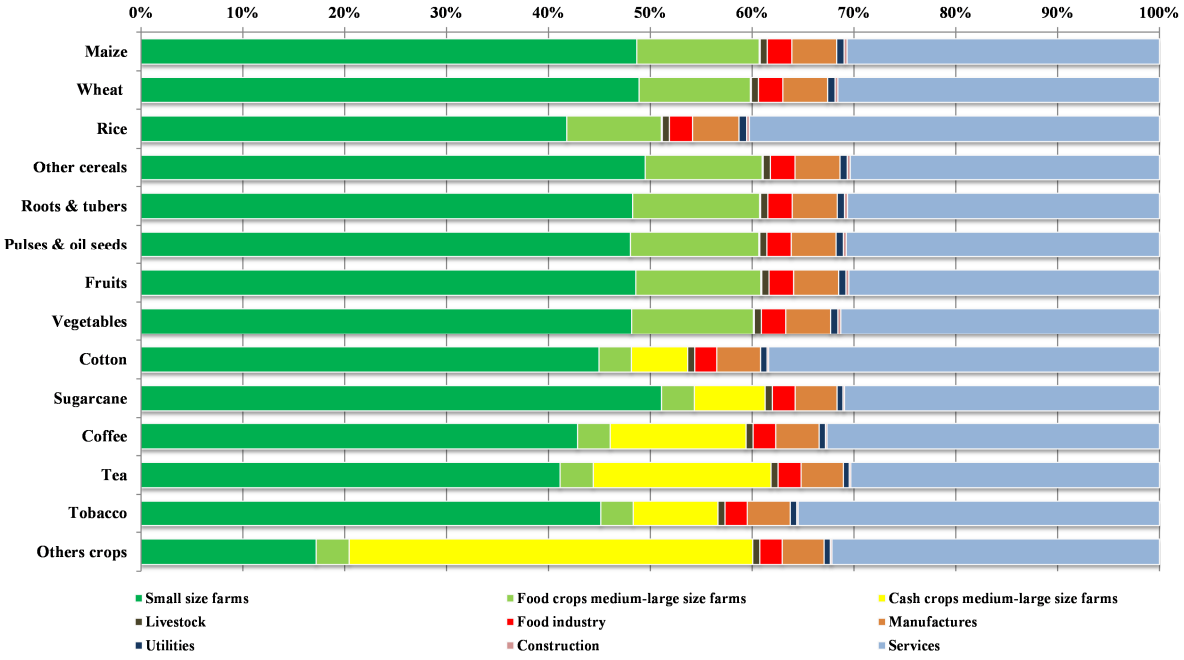
Data source: Kenya Social Accounting Matrix 2014 (own elaboration)

5.2 Value chain analysis

This analysis of the value chain of a product provides information about the areas of activity that ultimately benefit by an exogenous increase in demand for a specific commodity, either directly or indirectly. The demand for a product or service and the domestic production needed for its supply, irrespective of the quantity imported, propels not only the direct demand of factors needed to produce a given product (which forms what might be called the direct added value effect), but also demand for intermediate inputs in other sectors. The domestically produced inputs have their own demand of factors and intermediate inputs in an endless cycle, which results in the embodied value added, linked to any initial demand injection. In this way, it is possible to obtain information on the way that economic shocks in one sector can directly impact the same sector or indirectly other related ones.

In the case of the primary sector, it is particularly interesting to analyse this distribution because of its relevance in Kenya's economy. The main destination of the value added generated in Kenya's economy by agricultural products is, essentially, the agricultural sector themselves, with rates around 60 %. However it is very significant that around 30 % of the total value added is created in the services sectors. This value increases to reach almost 40 % in some cash crops. The relative importance of the trade and distribution sectors for such products is the reason why such an important share of value added is indirectly created in the service sectors.

Figure 16. Distribution by groups of activities of embodied value added in agricultural commodities demand, 2014, %



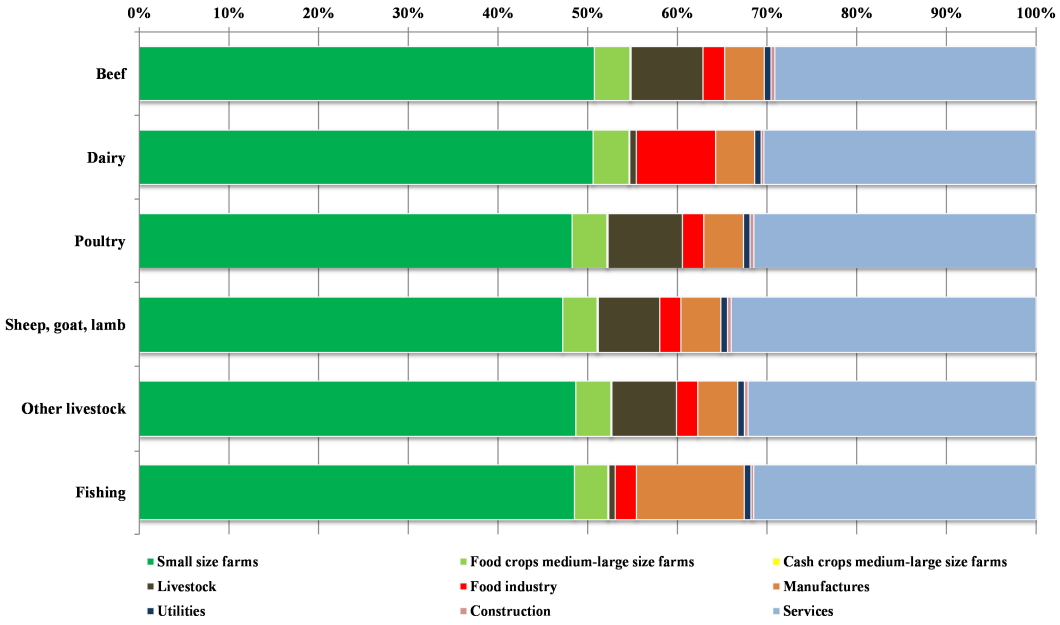
Data source: Kenya Social Accounting Matrix 2014 (own elaboration)

In the food crops, about 50 % of the value added generated is allocated to small farmers (familiar or with some degree of cooperatives), with the exception of rice cultivation, where this rate is just above 40%. The rest of the value added embodied in primary sectors (around 10 %) is allocated to large or medium-sized farms, with shares over 5% for manufacturing.

In the case of cash crops, while the total percentage for the primary sector is similar to other agricultural sectors, significant changes to the distribution rates of their value added appear. In the production of these products a greater share of value added is allocated to large agricultural farmers, to the detriment of the share of small farmers. Although this more unequal distribution of added value for cash crops is due to the typology of the product, it is very significant that, except for the crops listed in 'other crops', in Kenya a major participation of small farms in value added is maintained. This pattern can be explained by the specific Kenyan characteristics of products such as tea and coffee where small farmers cultivate the product for larger companies which then process it for subsequent use in the food industry.

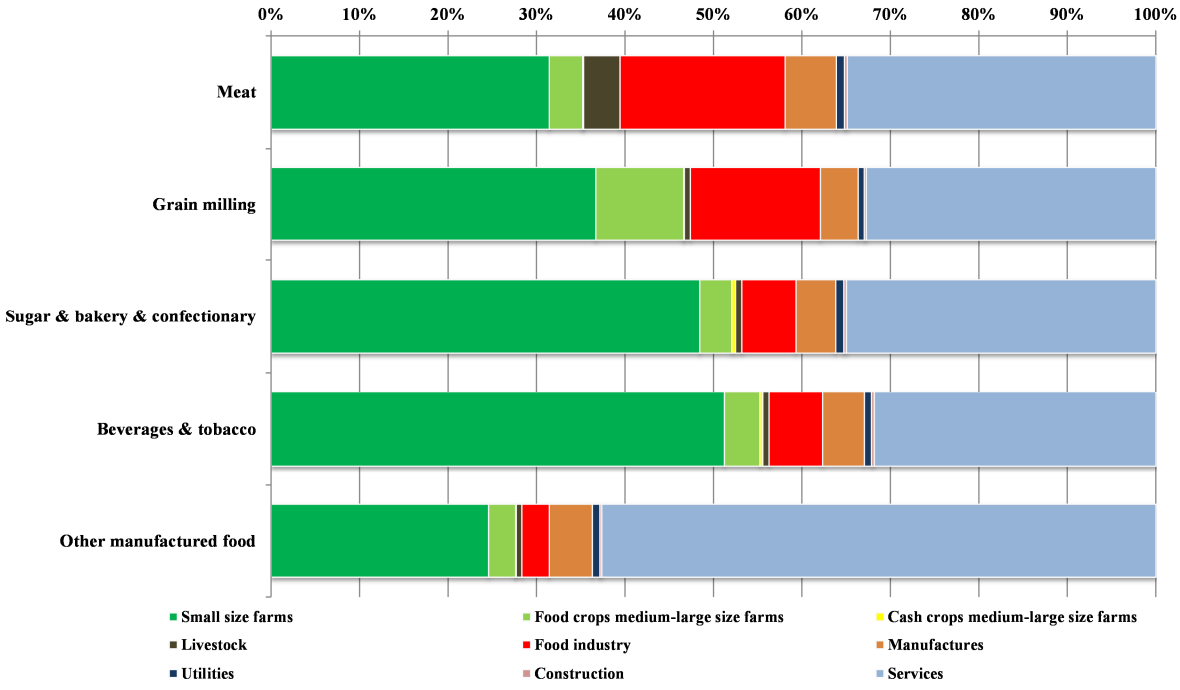
For livestock products and fisheries, the contribution of the primary sector as a whole is between 55 and 60%, and it looks very relevant that the majority of the embodied value added (over 50 %) is allocated to small farms, while the share of the commercial farms is between 5 and 10% in livestock and slightly less than 5% in food crops. Again, services sectors share in value added is greater than 30 %.

Figure 17. Distribution by groups of activities of embodied value added in livestock commodities demand, 2014, %



Data source: Kenya Social Accounting Matrix 2014 (own elaboration)

Figure 18. Distribution by groups of activities of embodied value added in food industry commodities demand, 2014, %



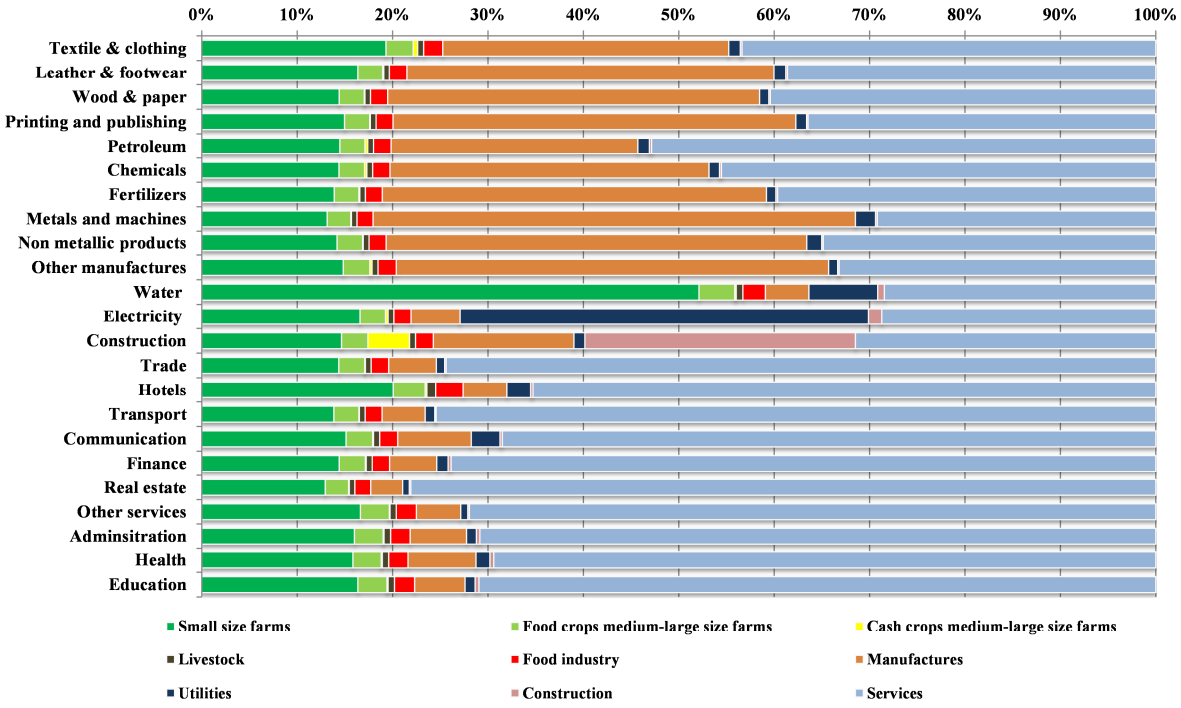
Data source: Kenya Social Accounting Matrix 2014 (own elaboration)

As regards the agrifood industry, meat demand generates around 40% of their embodied value added in the primary sector, with a participation of more than 30 % of small agricultural activities, while 5% is allocated to livestock. The meat sector allocates to itself slightly more than 18% of the produced value added, with more than one third of the total going into services.

The main processed products (bakery, beverages and tobacco) have increased participation by small farms, to the detriment of the agro-food industry and holdings of food crops. However, all the goods included in 'other manufactured food' generates more than 60 % of its embodied value added in the services sector, not reaching 30% agricultural products and with low participation of the agrifood industry.

Finally, in all other sectors of the economy, a very important part of the embodied value added is allocated to services. This share is obviously even greater for the service sectors themselves. Manufactures and construction sectors' own weight vary between 25 and 40 %. It is necessary to highlight, as for services, the relatively high (between 15 and 20 %) participation of the primary sector, especially small farms, in total value added generated by manufacturing and services activities, resulting from the significant weight in the total production and the income of the farming and food sectors.

Figure 19. Distribution by groups of activities of embodied value added in rest of sectors commodities demand, 2014, %

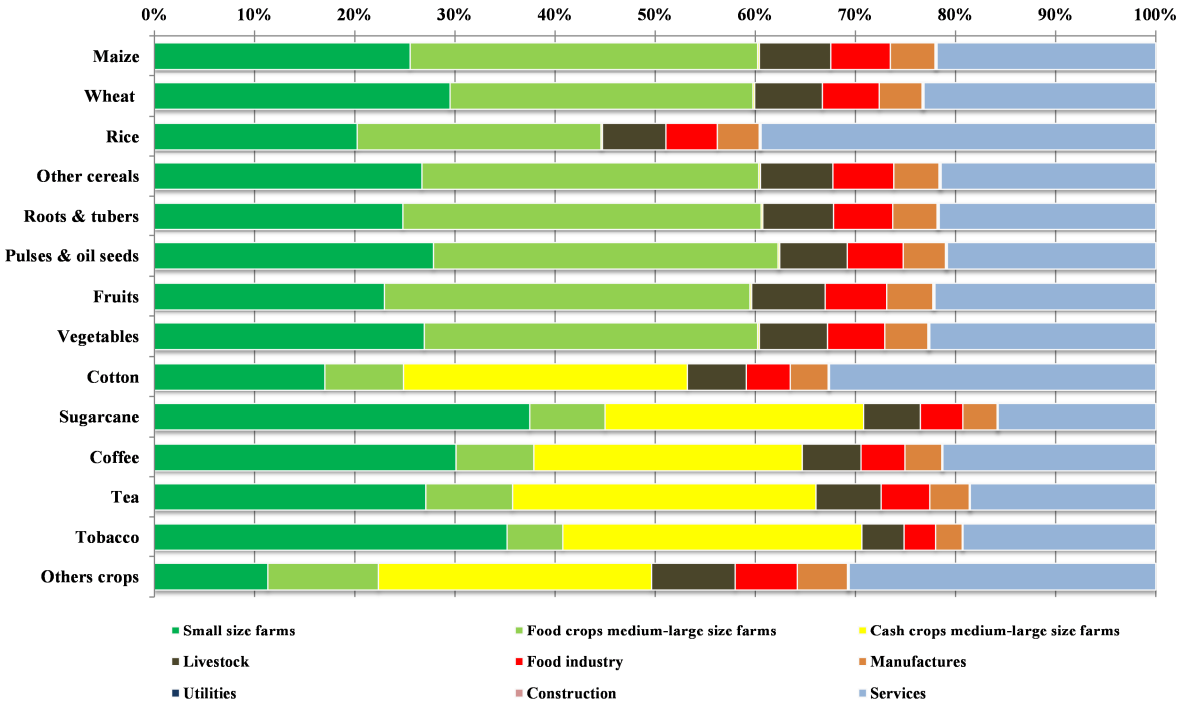


Data source: Kenya Social Accounting Matrix 2014 (own elaboration)

An additional extension of the value chains analysis is the estimation of the number of jobs generated by exogenous shocks both directly and indirectly. In the case of Kenya, the distribution of employment embodied in final demand is similar to that of added value, but with some very significant differences:

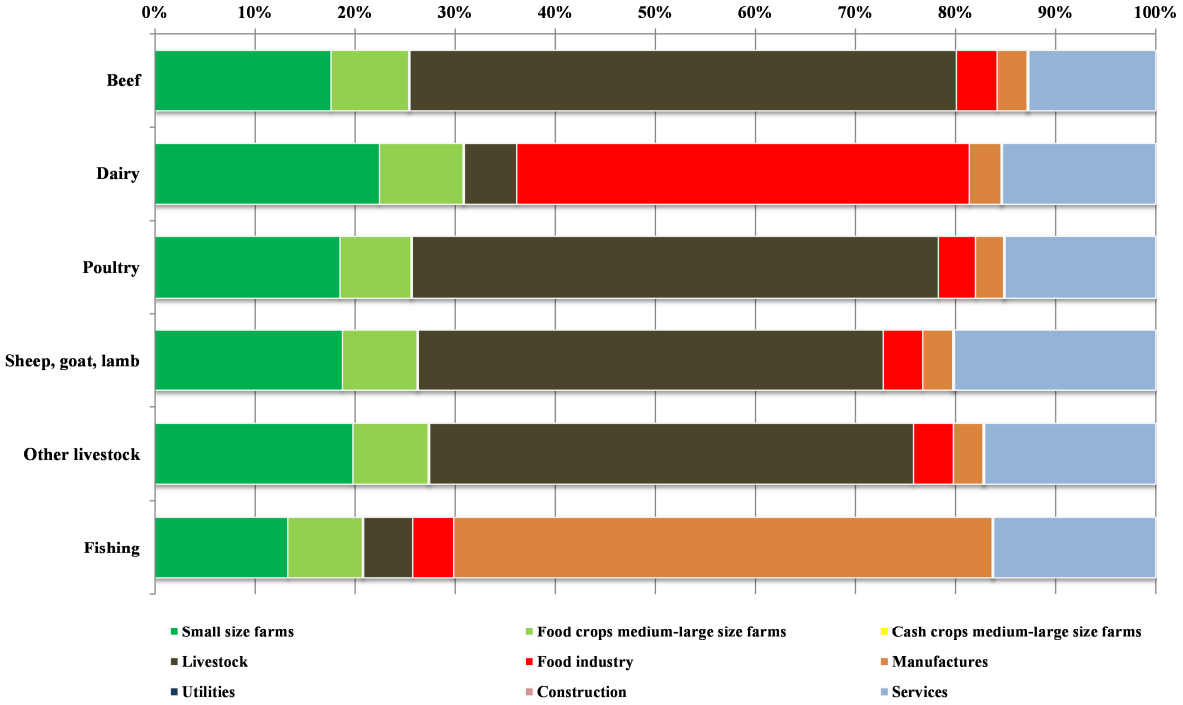
- In general, a stronger share in employment generation of large farms, most notably for agricultural products for export.
- The participation of livestock farming in the embodied employment in demand for primary commodities is much more significant, especially in the livestock products (contrary to what is observed for added value).
- The same effect of the previous point, albeit to a lesser extent, it applies to the agrifood industry, particularly for dairy products and to a lower extent for processed foodstuffs itself.
- The share allocated to the services sector is generally smaller than the one observed in value-added.

Figure 20. Distribution by groups of activities of embodied employment in agricultural commodities demand, 2014, %



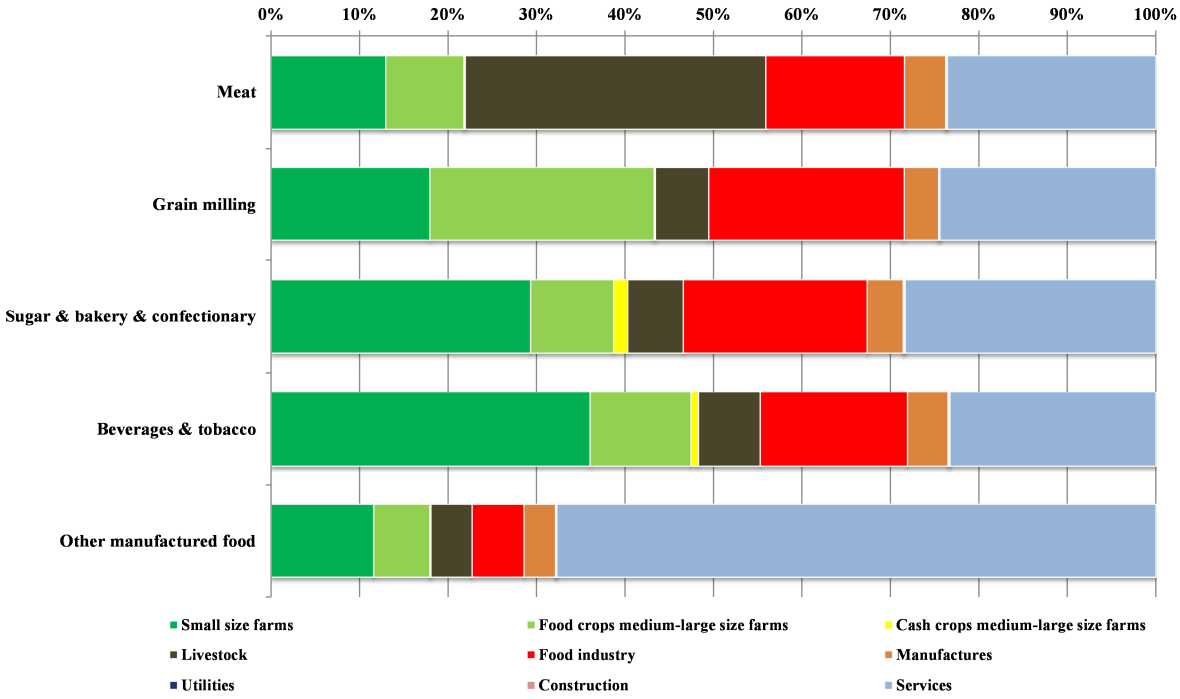
Data source: Kenya Social Accounting Matrix 2014 (own elaboration)

Figure 21. Distribution by groups of activities of embodied employment in livestock commodities demand, 2014, %



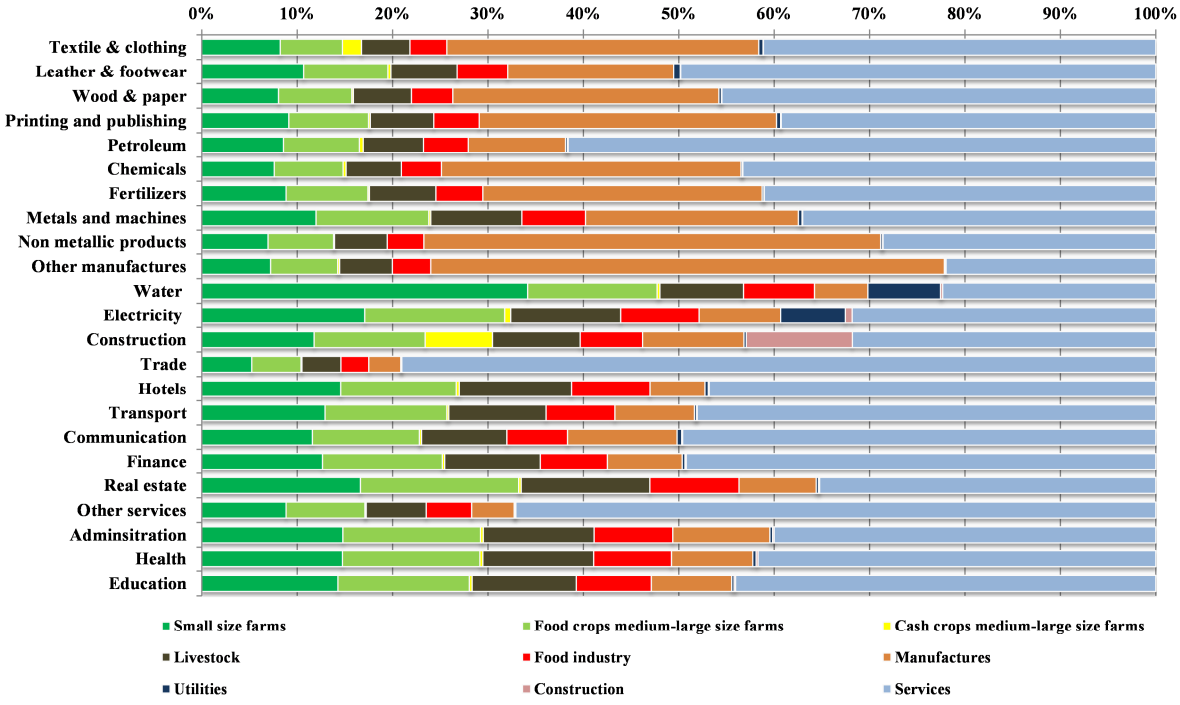
Data source: Kenya Social Accounting Matrix 2014 (own elaboration)

Figure 22. Distribution by groups of activities of embodied employment in food industry commodities demand, 2014, %



Data source: Kenya Social Accounting Matrix 2014 (own elaboration)

Figure 23. Distribution by groups of activities of embodied value added in rest of sectors commodities demand, 2014, %



Data source: Kenya Social Accounting Matrix 2014 (own elaboration)

5.3 Structural Path Analysis (SPA)

The multipliers and value chains analysis is complemented by a more detailed description of transmission mechanisms of the described effects. This can be done, among other techniques, by applying the so-called Structural Path Analysis (SPA) (Defourny and Thorbecke, 1984). Using this technique, the effects between commodities demand and the generated value (output, employment, value added,...) can be decomposed between the different paths that can link both accounts. For Kenya's economy, the main paths have been calculated for each of the output (these links can be extended to employment and added value) and for income multipliers. Those corresponding to the highest multipliers generated by agricultural and food commodities demand are presented below (Tables 9, 10 and 11).

Table 9 shows how possible shocks in Tea demand (either through investment exports or in other ways) would generate the largest increases in the income of rural households in Kenya (global multiplier effect of 1.63). This global effect comes from the confluence of several transmission paths, highlighting those presented in the table and that together show 76% of the overall effect (the remaining 24% is given by infinity of different paths with less specific weight). Thus, it can be seen that 40.9% of the overall effect (1.63) of Tea demand on the income of these households is given through a mechanism of this type: the demand for Tea induces an increase in the production of this commodity by the households (as soon as these are small farmers) that causes a higher remuneration of the land factor, which supposes an increase in the income of this type of households.

As shown in Table 9, Other Crops, Beef, Roots and tubers or Dairy products are the commodities with a greater effect on the income of rural households. Regarding transmission mechanisms, these can be generalized, with greater or lesser contributions to the overall effect, in an initial effect on the output, either of households as producers (small farmers), or of the activities themselves (medium-large farmers). This increase finally reverts to the income of rural households either through remuneration to capital or land use, or through the payment of labour factor. In general, the main paths described in the table cover between 60-70% of the global effects in each case, with the remaining 30-40% defined by other indirect means.

Regarding urban households (Table 10), agricultural or food commodities whose demand could generate greater increase in their income, are those derived from Forestry, Other Crops and Fishing, with multipliers of 1.19, 0.93 and 0.93 respectively. The transmission paths are mainly defined by increases in the output (from households as producers or from corporate activities themselves) that result in increases in household income through the remuneration of capital and labour factors. However, unlike in the case of rural households, the effects are blurred between a greater number of indirect paths, just describing the sum of the most significant 30% of the overall effects (except in Forestry, where they represent 64.7% of the total).

Finally, Table 11 shows the main effects between the demands for agricultural and food commodities and this kind of activities. The results here show very direct relationships between commodities and activities with direct correspondence, either as households (small farmers) or corporate activities themselves (medium-large farmers). However, effects between the demand for processed food and livestock with crops of all types can also be highlighted, although with relatively small effects.

Table 9. Main effects of agricultural and food commodities on Rural Households income

Global effects (multipliers)		Pole 1		Pole 2		Pole 3		Pole 4	Total effect	% total / global
Tea	**1.63**	Tea	--->	Households as acitiv.	--->	Land non-irrigated	--->	Rural HH	0.666	40.9%
		Tea	--->	Tea (activ.)	--->	Land non-irrigated	--->	Rural HH	0.473	29.0%
		Tea	--->	Households as acitiv.	--->	Capital (agricultural)	--->	Rural HH	0.047	2.9%
		Tea	--->	Tea (activ.)	--->	Capital (agricultural)	--->	Rural HH	0.030	1.8%
		Tea	--->	Tea (activ.)	--->	Semi-Skilled Labour	--->	Rural HH	0.028	1.7%
Others crops	**1.62**	Others crops	--->	Others crops (activ.)	--->	Land non-irrigated	--->	Rural HH	0.989	61.1%
		Others crops	--->	Others crops (activ.)	--->	Capital (agricultural)	--->	Rural HH	0.138	8.5%
Beef	**1.60**	Beef	--->	Households as acitiv.	--->	Land non-irrigated	--->	Rural HH	0.675	42.2%
		Beef	--->	Livestock (activ.)	--->	Livestock	--->	Rural HH	0.203	12.7%
		Beef	--->	Households as acitiv.	--->	Livestock	--->	Rural HH	0.188	11.7%
		Beef	--->	Livestock (activ.)	--->	Semi-Skilled Labour	--->	Rural HH	0.062	3.9%
		Beef	--->	Households as acitiv.	--->	Capital (agricultural)	--->	Rural HH	0.051	3.2%
Roots & tubers	**1.59**	Roots & tubers	--->	Households as acitiv.	--->	Land non-irrigated	--->	Rural HH	0.600	37.8%
		Roots & tubers	--->	Food crops (activ.)	--->	Land non-irrigated	--->	Rural HH	0.317	19.9%
		Roots & tubers	--->	Households as acitiv.	--->	Livestock	--->	Rural HH	0.167	10.5%
		Roots & tubers	--->	Households as acitiv.	--->	Capital (agricultural)	--->	Rural HH	0.045	2.9%
		Roots & tubers	--->	Food crops (activ.)	--->	Capital (agricultural)	--->	Rural HH	0.022	1.4%
Dairy	**1.58**	Dairy	--->	Households as acitiv.	--->	Land non-irrigated	--->	Rural HH	0.661	41.9%
		Dairy	--->	Households as acitiv.	--->	Livestock	--->	Rural HH	0.184	11.7%
		Dairy	--->	Dairy (activ.)	--->	Livestock	--->	Rural HH	0.182	11.5%
		Dairy	--->	Households as acitiv.	--->	Capital (agricultural)	--->	Rural HH	0.050	3.2%
		Dairy	--->	Dairy (activ.)	--->	Unskilled labour	--->	Rural HH	0.027	1.7%
Fruits	**1.57**	Fruits	--->	Households as acitiv.	--->	Land non-irrigated	--->	Rural HH	0.633	40.4%
		Fruits	--->	Food crops (activ.)	--->	Land non-irrigated	--->	Rural HH	0.278	17.7%
		Fruits	--->	Households as acitiv.	--->	Livestock	--->	Rural HH	0.176	11.2%
		Fruits	--->	Households as acitiv.	--->	Capital (agricultural)	--->	Rural HH	0.048	3.1%
		Fruits	--->	Food crops (activ.)	--->	Capital (agricultural)	--->	Rural HH	0.020	1.2%
Vegetables	**1.57**	Vegetables	--->	Households as acitiv.	--->	Land non-irrigated	--->	Rural HH	0.620	39.6%
		Vegetables	--->	Food crops (activ.)	--->	Land non-irrigated	--->	Rural HH	0.263	16.8%
		Vegetables	--->	Households as acitiv.	--->	Livestock	--->	Rural HH	0.173	11.0%
		Vegetables	--->	Households as acitiv.	--->	Capital (agricultural)	--->	Rural HH	0.047	3.0%
		Vegetables	--->	Food crops (activ.)	--->	Capital (agricultural)	--->	Rural HH	0.019	1.2%
Other livestock	**1.53**	Other livestock	--->	Households as acitiv.	--->	Land non-irrigated	--->	Rural HH	0.608	39.7%
		Other livestock	--->	Livestock (activ.)	--->	Livestock	--->	Rural HH	0.172	11.2%
		Other livestock	--->	Households as acitiv.	--->	Livestock	--->	Rural HH	0.169	11.0%
		Other livestock	--->	Livestock (activ.)	--->	Semi-Skilled Labour	--->	Rural HH	0.053	3.5%
		Other livestock	--->	Households as acitiv.	--->	Capital (agricultural)	--->	Rural HH	0.046	3.0%
Sheep, goat and lamb for slaughter	**1.50**	Sheep, goat and l	--->	Households as acitiv.	--->	Land non-irrigated	--->	Rural HH	0.568	37.8%
		Sheep, goat and l	--->	Livestock (activ.)	--->	Livestock	--->	Rural HH	0.160	10.6%
		Sheep, goat and l	--->	Households as acitiv.	--->	Livestock	--->	Rural HH	0.158	10.5%
		Sheep, goat and l	--->	Livestock (activ.)	--->	Semi-Skilled Labour	--->	Rural HH	0.049	3.3%
		Sheep, goat and l	--->	Households as acitiv.	--->	Capital (agricultural)	--->	Rural HH	0.043	2.9%
Fishing	**1.49**	Fishing	--->	Households as acitiv.	--->	Land non-irrigated	--->	Rural HH	0.636	42.5%
		Fishing	--->	Households as acitiv.	--->	Livestock	--->	Rural HH	0.177	11.8%
		Fishing	--->	Fishing (activ.)	--->	Capital (agricultural)	--->	Rural HH	0.088	5.9%
		Fishing	--->	Households as acitiv.	--->	Capital (agricultural)	--->	Rural HH	0.048	3.2%
		Fishing	--->	Fishing (activ.)	--->	Unskilled labour	--->	Rural HH	0.027	1.8%
		Fishing	--->	Fishing (activ.)	--->	Semi-Skilled Labour	--->	Rural HH	0.023	1.6%
Poultry	**1.49**	Poultry	--->	Households as acitiv.	--->	Land non-irrigated	--->	Rural HH	0.566	37.9%
		Poultry	--->	Livestock (activ.)	--->	Livestock	--->	Rural HH	0.201	13.5%
		Poultry	--->	Households as acitiv.	--->	Livestock	--->	Rural HH	0.157	10.5%
		Poultry	--->	Livestock (activ.)	--->	Semi-Skilled Labour	--->	Rural HH	0.062	4.2%
		Poultry	--->	Households as acitiv.	--->	Capital (agricultural)	--->	Rural HH	0.043	2.9%
Other cereals	**1.49**	Other cereals	--->	Households as acitiv.	--->	Land non-irrigated	--->	Rural HH	0.625	41.9%
		Other cereals	--->	Food crops (activ.)	--->	Land non-irrigated	--->	Rural HH	0.230	15.4%
		Other cereals	--->	Households as acitiv.	--->	Livestock	--->	Rural HH	0.174	11.6%
		Other cereals	--->	Households as acitiv.	--->	Capital (agricultural)	--->	Rural HH	0.047	3.2%
		Other cereals	--->	Food crops (activ.)	--->	Capital (agricultural)	--->	Rural HH	0.016	1.1%
Maize	**1.46**	Maize	--->	Households as acitiv.	--->	Land non-irrigated	--->	Rural HH	0.592	40.4%
		Maize	--->	Food crops (activ.)	--->	Land non-irrigated	--->	Rural HH	0.251	17.1%
		Maize	--->	Households as acitiv.	--->	Livestock	--->	Rural HH	0.165	11.3%
		Maize	--->	Households as acitiv.	--->	Capital (agricultural)	--->	Rural HH	0.045	3.1%
		Maize	--->	Food crops (activ.)	--->	Capital (agricultural)	--->	Rural HH	0.018	1.2%

Data source: Kenya Social Accounting Matrix 2014 (own elaboration)

Table 10. Main effects of agricultural and food commodities on Urban Households income

Global effects (multipliers)		Pole 1		Pole 2		Pole 3		Pole 4	Total effect	% total / global
Forestry	**1.19**	Forestry	--->	Forestry (activ.)	--->	Capital (agricultural)	--->	Urban HH	0.740	62.0%
		Forestry	--->	Forestry (activ.)	--->	Semi-Skilled Labour	--->	Urban HH	0.032	2.7%
Others crops	**0.93**	Others crops	--->	Others crops (activ.)	--->	Capital (agricultural)	--->	Urban HH	0.213	22.8%
		Others crops	--->	Others crops (activ.)	--->	Land non-irrigated	--->	Urban HH	0.082	8.8%
Fishing	**0.93**	Fishing	--->	Fishing (activ.)	--->	Capital (agricultural)	--->	Urban HH	0.135	14.5%
		Fishing	--->	Households as acitivities	--->	Capital (agricultural)	--->	Urban HH	0.092	9.9%
		Fishing	--->	Households as acitivities	--->	Land non-irrigated	--->	Urban HH	0.056	6.0%
		Fishing	--->	Fishing (activ.)	--->	Unskilled labour	--->	Urban HH	0.018	1.9%
		Fishing	--->	Households as acitivities	--->	Livestock	--->	Urban HH	0.014	1.5%
		Fishing	--->	Fishing (activ.)	--->	Semi-Skilled Labour	--->	Urban HH	0.010	1.1%
Sheep, goat and lamb	**0.87**	Sheep, goat and lamb (slaughter)	--->	Households as acitivities	--->	Capital (agricultural)	--->	Urban HH	0.082	9.4%
		Sheep, goat and lamb (slaughter)	--->	Households as acitivities	--->	Land non-irrigated	--->	Urban HH	0.050	5.7%
		Sheep, goat and lamb (slaughter)	--->	Livestock (activ.)	--->	Semi-Skilled Labour	--->	Urban HH	0.022	2.5%
		Sheep, goat and lamb (slaughter)	--->	Households as acitivities	--->	Livestock	--->	Urban HH	0.012	1.4%
		Sheep, goat and lamb (slaughter)	--->	Livestock (activ.)	--->	Livestock	--->	Urban HH	0.011	1.2%
Dairy	**0.87**	Dairy	--->	Households as acitivities	--->	Capital (agricultural)	--->	Urban HH	0.096	11.0%
		Dairy	--->	Households as acitivities	--->	Land non-irrigated	--->	Urban HH	0.058	6.7%
		Dairy	--->	Dairy (activ.)	--->	Unskilled labour	--->	Urban HH	0.018	2.1%
		Dairy	--->	Households as acitivities	--->	Livestock	--->	Urban HH	0.014	1.7%
		Dairy	--->	Dairy (activ.)	--->	Livestock	--->	Urban HH	0.012	1.4%

Data source: Kenya Social Accounting Matrix 2014 (own elaboration)

Table 11. Main effects of agricultural and food commodities on agricultural output

Global effects (multipliers)				Pole 1		Pole 2		Pole 3		Pole 4	Total effect	% total / global
Others crops	--->	**Others crops (activ.)**	**0.96**	Others crops	--->	Others crops (activ.)					0.956	100.0%
Grain milling	--->	**Grain milling (activ.)**	**0.95**	Grain milling	--->	Grain milling (activ.)					0.955	100.0%
Forestry	--->	**Forestry (activ.)**	**0.80**	Forestry	--->	Forestry (activ.)					0.801	100.0%
Sugarcane	--->	**Households as acitivi**	**0.73**	Sugarcane	--->	Households as acitivities					0.730	100.0%
Tea	--->	**Households as acitivi**	**0.64**	Tea	--->	Households as acitivities					0.639	99.8%
Coffee	--->	**Households as acitivi**	**0.60**	Coffee	--->	Households as acitivities					0.598	99.8%
Tobacco	--->	**Households as acitivi**	**0.50**	Tobacco	--->	Households as acitivities					0.504	99.9%
Tea	--->	**Tea (activ.)**	**0.40**	Tea	--->	Tea (activ.)					0.396	100.0%
Roots & tubers	--->	**Food crops (activ.)**	**0.39**	Roots & tubers	--->	Food crops (activ.)					0.318	81.7%
Fruits	--->	**Food crops (activ.)**	**0.35**	Fruits	--->	Food crops (activ.)					0.281	80.2%
Vegetables	--->	**Food crops (activ.)**	**0.34**	Vegetables	--->	Food crops (activ.)					0.263	76.7%
Maize	--->	**Food crops (activ.)**	**0.32**	Maize	--->	Food crops (activ.)					0.262	81.9%
Coffee	--->	**Coffee (activ.)**	**0.32**	Coffee	--->	Coffee (activ.)					0.317	100.0%
Other cereals	--->	**Food crops (activ.)**	**0.31**	Other cereals	--->	Food crops (activ.)					0.226	73.2%
Beef	--->	**Livestock (activ.)**	**0.24**	Beef	--->	Livestock (activ.)					0.237	97.1%
Poultry	--->	**Livestock (activ.)**	**0.24**	Poultry	--->	Livestock (activ.)					0.226	93.1%
Dairy	--->	**Dairy (activ.)**	**0.23**	Dairy	--->	Dairy (activ.)					0.228	100.0%
Pulses & oil seeds	--->	**Food crops (activ.)**	**0.22**	Pulses & oil seeds	--->	Food crops (activ.)					0.180	80.6%
Cotton	--->	**Households as acitivi**	**0.22**	Cotton	--->	Households as acitivities					0.215	99.8%
Beverages & tobacco	--->	**Beverages & tobacco**	**0.22**	Beverages & tobacco	--->	Beverages & tobacco (activ.)					0.215	100.0%
Other livestock	--->	**Livestock (activ.)**	**0.21**	Other livestock	--->	Livestock (activ.)					0.193	91.4%
Sheep, goat and lamb (slaughter)	--->	**Livestock (activ.)**	**0.20**	Sheep, goat and lamb (slaughter)	--->	Livestock (activ.)					0.181	91.5%
Fishing	--->	**Fishing (activ.)**	**0.20**	Fishing	--->	Fishing (activ.)					0.198	100.0%
Grain milling	--->	**Food crops (activ.)**	**0.18**	Grain milling	--->	Grain milling (activ.)	--->	Maize	--->	Food crops (activ.)	0.069	38.5%
				Grain milling	--->	Grain milling (activ.)	--->	Wheat	--->	Food crops (activ.)	0.035	19.5%
				Grain milling	--->	Grain milling (activ.)	--->	Other cereals	--->	Food crops (activ.)	0.016	8.9%
Sugar & bakery	--->	**Sugar & bakery & cor**	**0.17**	Sugar & bakery	--->	Sugar & bakery (activ.)					0.167	100.0%
Tobacco	--->	**Tobacco (activ.)**	**0.16**	Tobacco	--->	Tobacco (activ.)					0.163	100.0%
Sugarcane	--->	**Sugarcane (activ.)**	**0.16**	Sugarcane	--->	Sugarcane (activ.)					0.162	100.0%
Wheat	--->	**Food crops (activ.)**	**0.15**	Wheat	--->	Food crops (activ.)					0.104	70.0%
Meat & dairy	--->	**Grain milling (activ.)**	**0.15**	Meat & dairy	--->	Meat & dairy (activ.)	--->	Grain milling	--->	Grain milling (activ.)	0.081	55.4%
Dairy	--->	**Food crops (activ.)**	**0.12**	Dairy	--->	Dairy (activ.)	--->	Maize	--->	Food crops (activ.)	0.008	6.6%
Beef	--->	**Food crops (activ.)**	**0.12**	Beef	--->	Livestock (activ.)	--->	Maize	--->	Food crops (activ.)	0.006	4.7%
Other livestock	--->	**Food crops (activ.)**	**0.12**	Other livestock	--->	Livestock (activ.)	--->	Maize	--->	Food crops (activ.)	0.005	4.0%
Sheep, goat and lamb (slaughter)	--->	**Food crops (activ.)**	**0.11**	Sheep, goat and lamb (slaughter)	--->	Livestock (activ.)	--->	Maize	--->	Food crops (activ.)	0.004	3.8%
Beverages & tobacco	--->	**Food crops (activ.)**	**0.11**	Beverages & tobacco	--->	Beverages & tobacco (activ.)	--->	Fruits	--->	Food crops (activ.)	0.006	5.2%
Poultry	--->	**Food crops (activ.)**	**0.11**	Poultry	--->	Livestock (activ.)	--->	Maize	--->	Food crops (activ.)	0.005	4.8%
Beverages & tobacco	--->	**Grain milling (activ.)**	**0.11**	Beverages & tobacco	--->	Beverages & tobacco (activ.)	--->	Grain milling	--->	Grain milling (activ.)	0.011	10.4%

Data source: Kenya Social Accounting Matrix 2014 (own elaboration)

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List of abbreviations and definitions

A	Activities accounts
C	Commodities accounts
CAP	Common Agricultural Policy
CEM	Cross Entropy Method
CGE	Computable General Equilibrium
CIF	Cost, Insurance and Freight
CSV	Comma separated value
DataM	JRC data portal of agro-economic modelling
E	Enterprise accounts
ECHP	European Community Household Panel,
F	Factors accounts
FOB	Free on Board
G	Government accounts
HBS	Household Budget Survey
HPHC	Home Production for Home Consumption
H	Households accounts
IFPRI	International Food Policy Research Institute
M	Margins accounts
QR	Quick response
RHG	Representative Households Groups
RoW	Rest of the World accounts
S-I	Saving – Investment / Combined Capital accounts
SAM	Social Accounting Matrix
SIOT	Symmetric Input Output Table
SUIOT	Supply and Use Input Output Tables
VAT	Value Added Tax
XLSX	Microsoft Excel file format

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Annexes

Annex 1. The Kenya Integrated Household Budget Survey 2005/06 (KIHBS 05/06).

In preparing Kenya SAM have been used other relevant databases related with labour market, and agriculture, furthermore updates of previous Kenya SAMs, but the major additional source of information will be the Kenya Integrated Household Budget Survey 2005/06 (KIHBS 05/06).

This survey covered all the 70 districts including rural and urban clusters. KIHBS used both diary and recall methods in collecting household consumption and purchase information. Specifically, the KIHBS was designed to update and strengthen three vital aspects of the national statistical database, notably: the Consumer Price Index (CPI), poverty and inequality; and the System of National Accounts (SNA). The data collection phase of this survey took 12 months and data on demographics, housing, education, health, agriculture and livestock, enterprises, expenditure and consumption, among others, was collected.

The Survey was conducted in 1,343 randomly selected clusters across all districts in Kenya and comprised 861 rural and 482 urban clusters. 10 households were randomly selected with equal probability in each cluster resulting in a total sample size of 13,430 households, allocated into 136 explicit strata: the urban and rural areas of all districts except Nairobi and Mombasa, which are entirely urban. However, in the six districts that contain municipalities, clusters in the urban sample were further stratified into six groups: five socio-economic classes in the municipality itself and other urban areas in the district. This ensured that different types of neighbourhoods and social classes within municipal areas are all represented in the sample. The total sample sizes in rural and urban areas were 8,610 and 4,820 households respectively.

The year-long survey was organised into 17 cycles of 21 days each, during which enumerators conducted household interviews in the clusters.

The KIHBS microdata allow break down the Household account in the sub-accounts necessary for the estimation of the SAM according to the planned structure. The use of this survey in this task is illustrated by Tables 3a and 3b.

Annex 2. Previous Kenya SAMs

There exist, to our knowledge, five previous Social Accounting Matrices for Kenya:

— A 2001 SAM elaborated in 2004 by Peter Wobst (IFPRI) and Benjamin Schraven (Center for Development Research, University of Bonn), as a part of IFPRI's analytic support to USAID's Action Plan for Kenya. This SAM was the base for a dynamic computable general equilibrium (CGE) model of Kenya, which is an extension of the standard CGE modelling framework developed at IFPRI. The SAM disaggregates the entire Kenyan economy into 33 production sectors, of which 15 are agricultural sectors. Several structural and annual data sources such as national accounts, government accounts, balance of payments and foreign trade data, as well as the most recent IO table, SAMs for earlier base years and the 1997 Welfare Monitoring Survey for Kenya were used for the construction of the SAM.

— A 2003 Kenya SAMs, constructed by the Kenya Institute for Public Policy Research and Analysis (KIPPRA) and the International Food Policy Research Institute (IFPRI). The initial SAM for this year was developed by Jane Kiringai, James Thurlow and Bernadette Wanjala with funding provided by the Food and Agriculture Organization of the United Nations (FAO) (Kiringai, Thurlow, & Wanjala, 2006).

— For the same year (2003) another Kenya SAM was built by the same authors, but including Agro-Ecological Zones (AEZ) in it already. This version was never published the detailed version, but its available by kind permission of authors and IFPRI.

— There is a 2007 SAM with activities disaggregated by administrative region. This SAM was never documented/released, and it probably never will be now that the country has rebased its national accounts. This SAM was estimated by James Thurlow and Sam Benin for IFPRI in 2008 (in an unpublished work for Kenya's Comprehensive Africa Agricultural Development Programme (CAADP) Roundtable Discussion). This SAM was constructed using 2007 national accounts and the supply-use tables from the 2003 IFPRI-KIPPRA SAM (Kiringai, Thurlow, & Wanjala, 2006). Province-level agricultural production and area data were provided by the Ministry of Agriculture (MOA) from their 2007 provincial agricultural production database.

— Furthermore there is a second revision of the 2007 SAM including a partial update with agro-ecological regions rather than admin areas, elaborated by Karl Pauw (IFPRI) and unpublished.

Annex 3. The multipliers methodology.

Assuming Leontief technologies (i.e. fixed prices, no substation elasticities), multipliers are based on the SAM Leontief inverse $\mathbf{M} = (\mathbf{I}-\mathbf{A})^{-1}$, where each element m_{ij} in M depicts the output requirements of account i to increase final demand of account j by one unit and employing the same logic, the input requirements of account i to produce one unit by account j. These are the so-called output multipliers. The employment multipliers are the result of a new diagonal matrix **E** containing priors on the ratio of the number of jobs per unit of output value. This matrix is multiplied by the part of the Leontief inverse Ma that incorporates the rows corresponding to the productive accounts and the columns corresponding to commodities. When the final demand (by increasing exports, household consumption or investment) of a commodity is exogenously increased, the analysis of the employment multipliers reveal the number of jobs created (or loss if the shock is negative) in the economy obtained via the matrix **E**. The expression of the employment multiplier, $\mathbf{M_e}$, is $\mathbf{M_e=E*M_a}$.

Each element in $\mathbf{M_e}$ is the increment in the number of jobs of the account i when the account j receives a unitary exogenous injection (final demand in this case). The sum of the columns gives the global effect on employment resulting from an exogenous increase in demand. The rows show the increment in employment that each account undergoes when the rest of the accounts receive an exogenous monetary unit. In other words, the multipliers reveal the number of additional jobs per million of additional output from each activity. More specifically, the employment multipliers calculates the resulting 'direct', 'indirect' and 'induced' ripple effects resulting from an increase or decrease in output value in activity 'j'. Thus, the direct employment effect is related to the output increase in the specific shocked activity 'j', the indirect employment effect is the result of an exogenous shock in other activities linked through production relationships (intermediate consumption), whilst the induced employment effect is driven by changes in household labour income which drives changes in household consumption for sector 'j'.

Using a vector of value added ratios instead of the jobs or employment vector, value added multipliers are obtained. Using the above mentioned multipliers technique, output, demand and supply values and value chains are estimated, providing the distribution of generated value added embodied in final demand shocks.

Annex 4. On-line resources.

The 2014 Social Accounting Matrix of Kenya is available on the public website "JRC agro-economic portal DataM". Links can be also accessed with the below QR codes.

Figure A1. QR code – DataM URL

https://datam.jrc.ec.europa.eu

Source: JRC, 2018.

Bulk download

Using DataM, users can make a bulk download of the SAM in a ZIP file (Dataset_JRC_-_Social_accounting_matrix_-_Kenya_-_2014.zip) containing an homonymous CSV file. The hyperlink for the direct bulk download is in Figure A2

Figure A2. QR Code – direct bulk data download

https://datam.jrc.ec.europa.eu/datam/perm/od/2f0d7a66-93fd-4ecb-9b45-879a83ab3cba/download/dataset.zip

Source: JRC, 2018.

In the bulk download, the SAM is presented in a standard flat format as CSV file with header row. Conceptually, it contains a column for the spending agent, a column for the receiving agent and a column for the value in Kenyan currency. See Figure A3.

Figure A3. Bulk download of the matrix in flat table format

	A	B	C	D	E	F	G
1	Year	Receiving Agent	Receiving Agent - Code	Spending Agent	Spending Agent - Code	Value	UOM
2	2014	Administration (commodity)	c_admn	Government	govt	409102.4447	KSh MLN
3	2014	Administration (production)	a_admn	Administration (commodity)	c_admn	409102.4447	KSh MLN
4	2014	Africa	afr	Arid North - Rural	hAN_RU	103.8891251	KSh MLN
5	2014	Africa	afr	Arid North - Urban	hAN_UR	52.80656988	KSh MLN
6	2014	Africa	afr	Arid South - Rural	hAS_RU	43.1368727	KSh MLN
7	2014	Africa	afr	Arid South - Urban	hAS_UR	25.9874596	KSh MLN
8	2014	Africa	afr	Beef (Marketed commodity)	c_beef	2.579797766	KSh MLN
9	2014	Africa	afr	Beverages & tobacco (Marketed comm	c_bevt	301.8466496	KSh MLN
10	2014	Africa	afr	Chemicals (commodity)	c_chem	32970.41918	KSh MLN
11	2014	Africa	afr	Coast - Rural	hCO_RU	136.9028581	KSh MLN
12	2014	Africa	afr	Coast - Urban	hCO_UR	73.10454771	KSh MLN
13	2014	Africa	afr	Coffee (commodity)	c_coff	1063.474827	KSh MLN
14	2014	Africa	afr	Cotton (commodity)	c_cott	6442.429475	KSh MLN
15	2014	Africa	afr	Dairy (Marketed commodity)	c_dair	142.660833	KSh MLN
16	2014	Africa	afr	Fertilizers Nitrogen (commodity)	c_FerN	1202.351177	KSh MLN
17	2014	Africa	afr	Fertilizers Phosphorus (commodity)	c_FerP	390.1639806	KSh MLN
18	2014	Africa	afr	Fertilizers Potassium (commodity)	c_FerK	252.542505	KSh MLN
19	2014	Africa	afr	Finance (commodity)	c_fsrv	1332.048805	KSh MLN
20	2014	Africa	afr	Forestry (commodity)	c_fore	314.9240725	KSh MLN
21	2014	Africa	afr	Fruits (Marketed commodity)	c_frui	256.016344	KSh MLN
22	2014	Africa	afr	General Investment Saving	i_s	186236.9538	KSh MLN
23	2014	Africa	afr	Government	govt	18384.39	KSh MLN
24	2014	Africa	afr	Grain milling (commodity)	c_gmil	847.1939522	KSh MLN

Source: DataM, provided by the European Commission – Joint Research Centre. Dataset: JRC – Social accounting matrix – Kenya - 2014, accessed on 21/03/2018.

In fact, the file contains also columns for the codes internally used in GAMS for the agents, the Year (always 2014) and the Unit of Measurement (always KSh Millions). These extra columns help for using the data in modelling tools, and for characterizing this file among other SAM's that will be published by JRC.

Interactive download

DataM includes also a function for interactive download, which allows filtering the only part of interest of the datasets and to preview results on the screen. This function is accessible from the "datasets" section. Find the direct link for the SAM in the Figure A4.

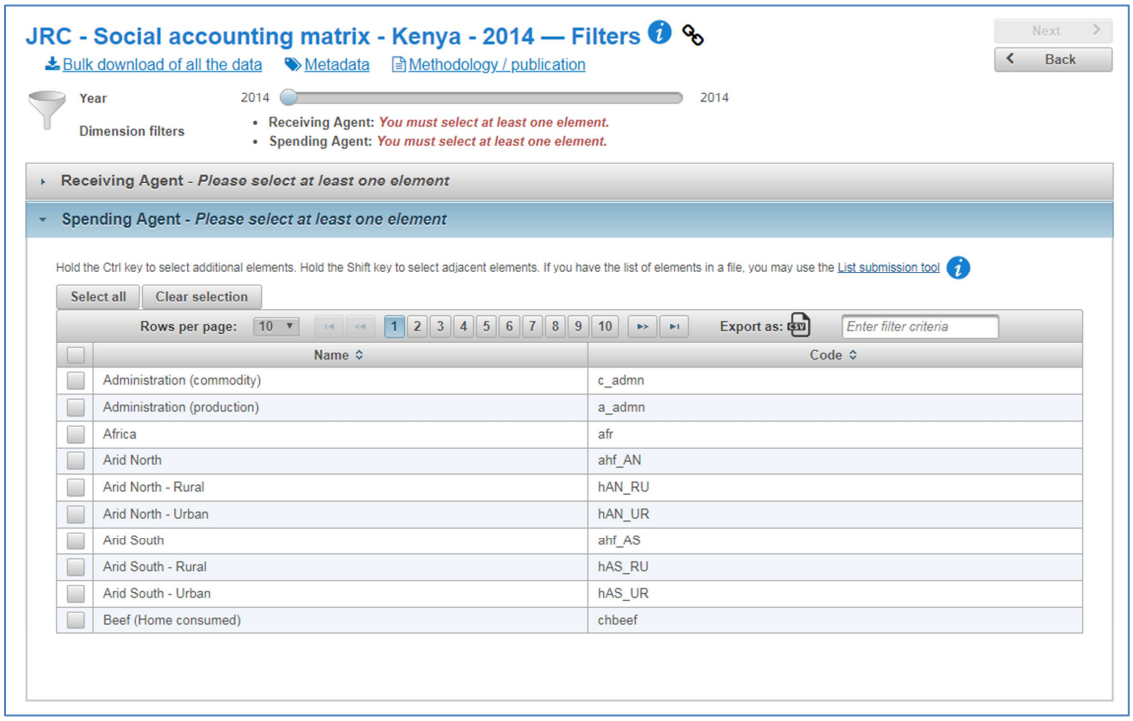
Figure A4. QR Code – direct link to the datasets page

https://datam.jrc.ec.europa.eu/datam/perm/od/2f0d7a66-93fd-4ecb-9b45-879a83ab3cba

Source: JRC, 2018.

The link gives access to the screen in the Figure A5.

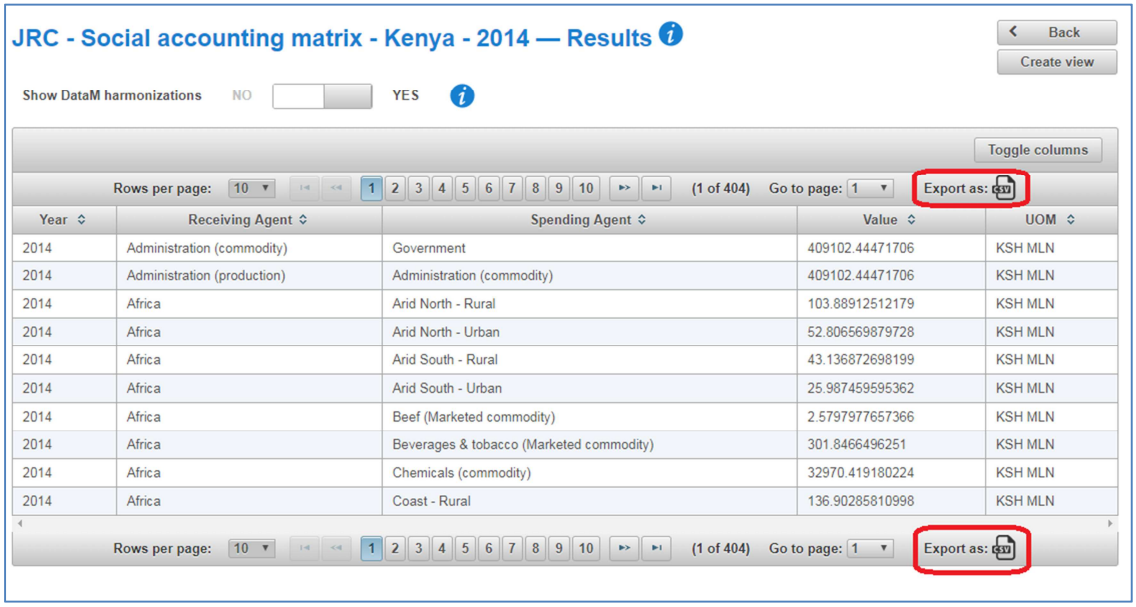
Figure A5. Datasets page of the Kenya SAM 2014



Source: DataM, JRC, 2018.

After specifying some filtering and pushing on the "Next" button, the data is visualised on the screen, see Figure A6.

Figure A6. Visualising the SAM on the screen



Source: DataM, JRC, 2018.

The "export as CSV" option would produce a file similar to the one obtained in the bulk download, but only with the records reflecting the selection operated. See Figure A7.

Figure A7. Exporting only part of the SAM in flat format

	A	B	C	D	E	F
1	Year	Receiving Agent	Spending Agent	Value in JRC - Social accounting matrix - Kenya - 2014	UOM	Provider
2	2014	Administration (commodity)	Government	409102.4447	KSh MLN	JRC - Social accounting matrix - Kenya - 2014
3	2014	Administration (production)	Administration (commodity)	409102.4447	KSh MLN	JRC - Social accounting matrix - Kenya - 2014
4	2014	Africa	Arid North - Rural	103.8891251	KSh MLN	JRC - Social accounting matrix - Kenya - 2014
5	2014	Africa	Arid North - Urban	52.80656988	KSh MLN	JRC - Social accounting matrix - Kenya - 2014
6	2014	Africa	Arid South - Rural	43.1368727	KSh MLN	JRC - Social accounting matrix - Kenya - 2014
7	2014	Africa	Arid South - Urban	25.9874596	KSh MLN	JRC - Social accounting matrix - Kenya - 2014
8	2014	Africa	Beef (Marketed commodity)	2.579797766	KSh MLN	JRC - Social accounting matrix - Kenya - 2014
9	2014	Africa	Beverages & tobacco (Marketed commodity)	301.8466496	KSh MLN	JRC - Social accounting matrix - Kenya - 2014
10	2014	Africa	Chemicals (commodity)	32970.41918	KSh MLN	JRC - Social accounting matrix - Kenya - 2014
11	2014	Africa	Coast - Rural	136.9028581	KSh MLN	JRC - Social accounting matrix - Kenya - 2014
12	2014	Africa	Coast - Urban	73.10454771	KSh MLN	JRC - Social accounting matrix - Kenya - 2014
13	2014	Africa	Coffee (commodity)	1063.474827	KSh MLN	JRC - Social accounting matrix - Kenya - 2014
14	2014	Africa	Cotton (commodity)	6442.429475	KSh MLN	JRC - Social accounting matrix - Kenya - 2014
15	2014	Africa	Dairy (Marketed commodity)	142.660833	KSh MLN	JRC - Social accounting matrix - Kenya - 2014
16	2014	Africa	Fertilizers Nitrogen (commodity)	1202.351177	KSh MLN	JRC - Social accounting matrix - Kenya - 2014
17	2014	Africa	Fertilizers Phosphorus (commodity)	390.1639806	KSh MLN	JRC - Social accounting matrix - Kenya - 2014
18	2014	Africa	Fertilizers Potassium (commodity)	252.542505	KSh MLN	JRC - Social accounting matrix - Kenya - 2014
19	2014	Africa	Finance (commodity)	1332.048805	KSh MLN	JRC - Social accounting matrix - Kenya - 2014
20	2014	Africa	Forestry (commodity)	314.9240725	KSh MLN	JRC - Social accounting matrix - Kenya - 2014
21	2014	Africa	Fruits (Marketed commodity)	256.016344	KSh MLN	JRC - Social accounting matrix - Kenya - 2014
22	2014	Africa	General Investment Saving	186236.9538	KSh MLN	JRC - Social accounting matrix - Kenya - 2014
23	2014	Africa	Government	18384.39	KSh MLN	JRC - Social accounting matrix - Kenya - 2014
24	2014	Africa	Grain milling (commodity)	847.1939522	KSh MLN	JRC - Social accounting matrix - Kenya - 2014

Source: DataM, provided by the European Commission – Joint Research Centre. Dataset: JRC – Social accounting matrix – Kenya - 2014, accessed on 21/03/2018.

Interactive dashboard

Finally, users may explore and analyse the data through an interactive dashboard placed in the "Model inputs, baselines and social accounting matrices (SAMs)" visualisation section of the website (Figure A8).

Figure A8. QR Code – direct link to the interactive dashboard

https://datam.jrc.ec.europa.eu/datam/mashup/SAM_KE_2014

Source: JRC, 2018.

The interactive dashboard allows users to undertake their own analysis of the dataset.

It consists of a number of sheets that allow analysing data from different perspectives.

Figure A9. Navigating within the sheets

Source: DataM, JRC, 2018.

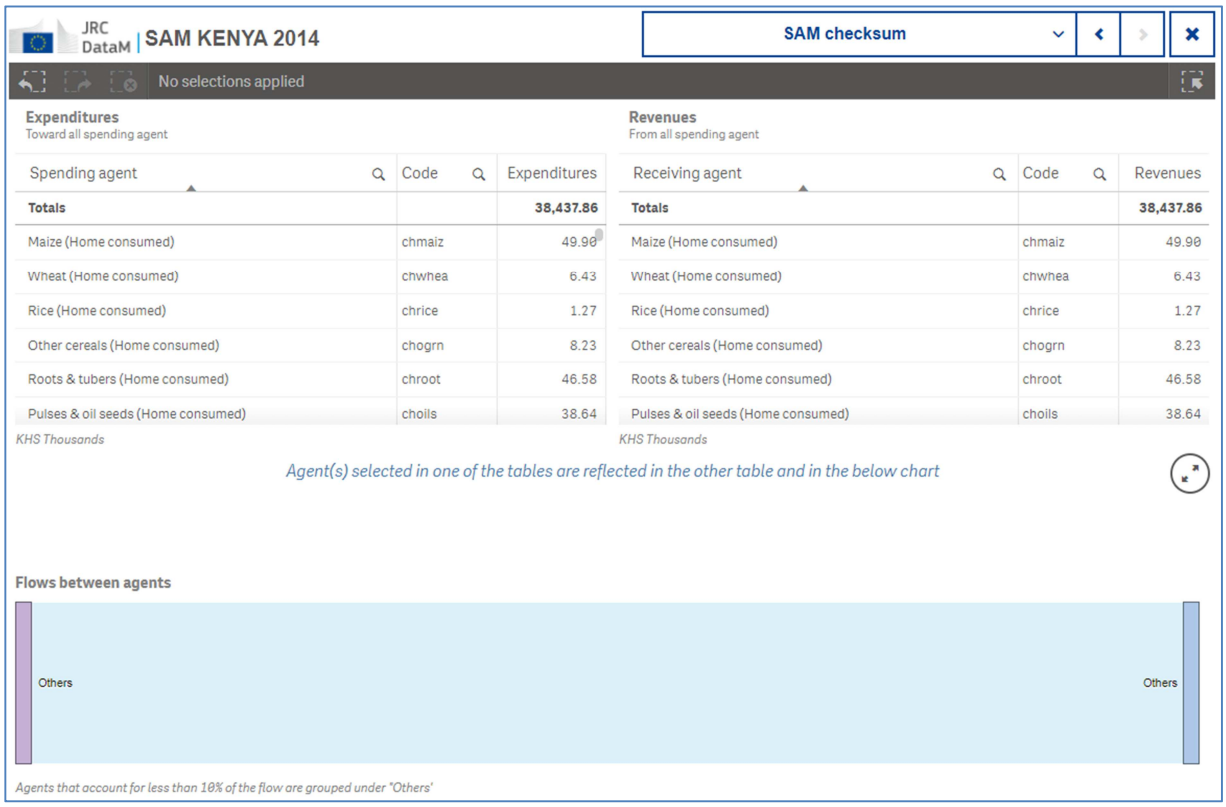
Each sheet consists of a screen with a number of different visualisations (tables, charts and maps) and some filtering boxes.

The key strength of the tool is that all these visualisations are interactive and interrelated. This allows users to study the data by means of simple mouse gestures.

The DataM visualisation framework is quite intuitive; some basic guidelines to facilitate its use will follow.

All DataM dashboards are similar to the example shown in Figure A10.

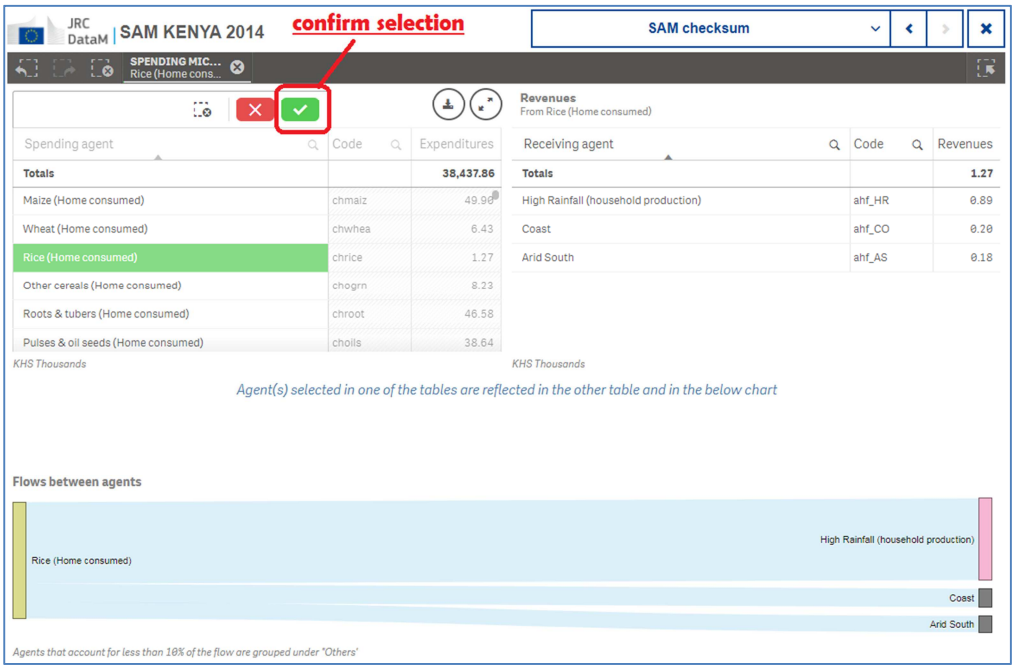
Figure A10. A generic dashboard



Source: DataM, provided by the European Commission – Joint Research Centre. Dashboard: SAM - Kenya - 2014, accessed on 21/03/2018.

By clicking on any visualisation, for example by clicking on "Rice (Home consumed)" in the left table by spending agent, all the visualisations are recalculated using data concerning only Rice.

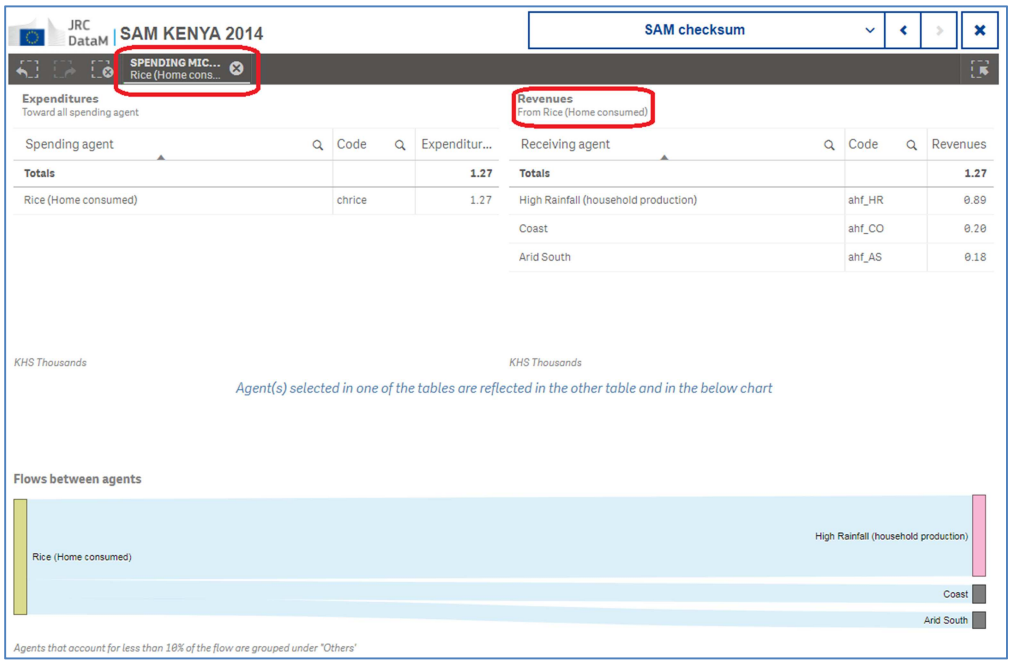
Figure A11. Making an interactive selection



Source: DataM, provided by the European Commission – Joint Research Centre. Dashboard: SAM - Kenya - 2014, accessed on 21/03/2018.

For example, in Figure A12 the right table now shows all the agents that receives from Rice and the below diagram illustrates these flows.

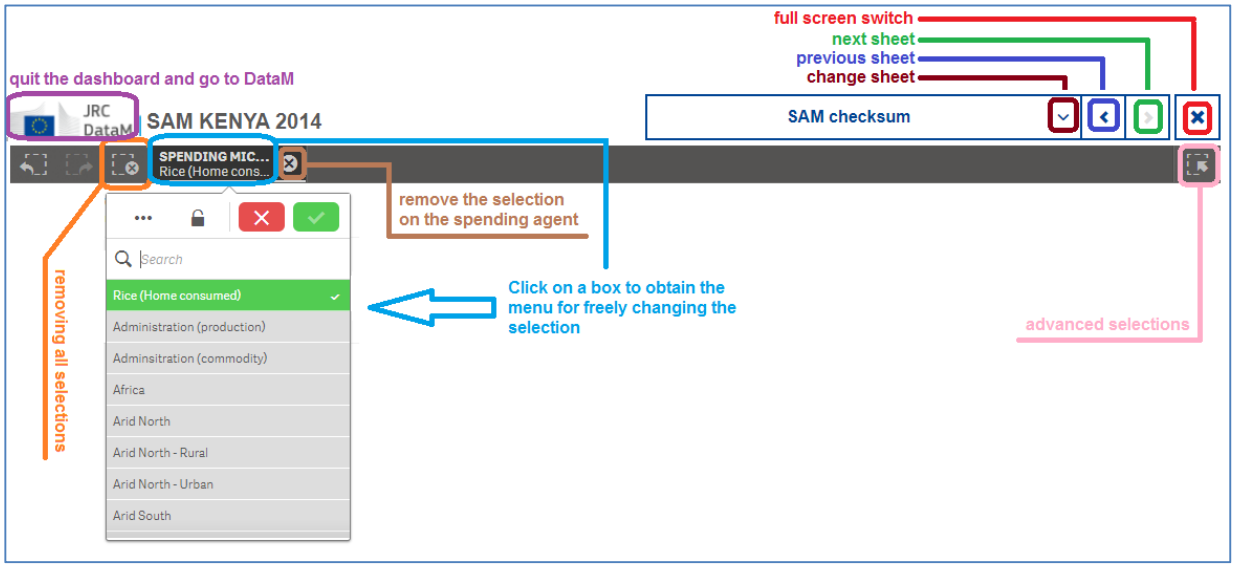
Figure A12. Result of an interactive selection



Source: DataM, provided by the European Commission – Joint Research Centre. Dashboard: SAM - Kenya - 2014, accessed on 21/03/2018.

The currently active selections are always shown in the dark-grey bar at the top. Selections can be cancelled or changed as explained in Figure A13.

Figure 13. Instructions to change selections

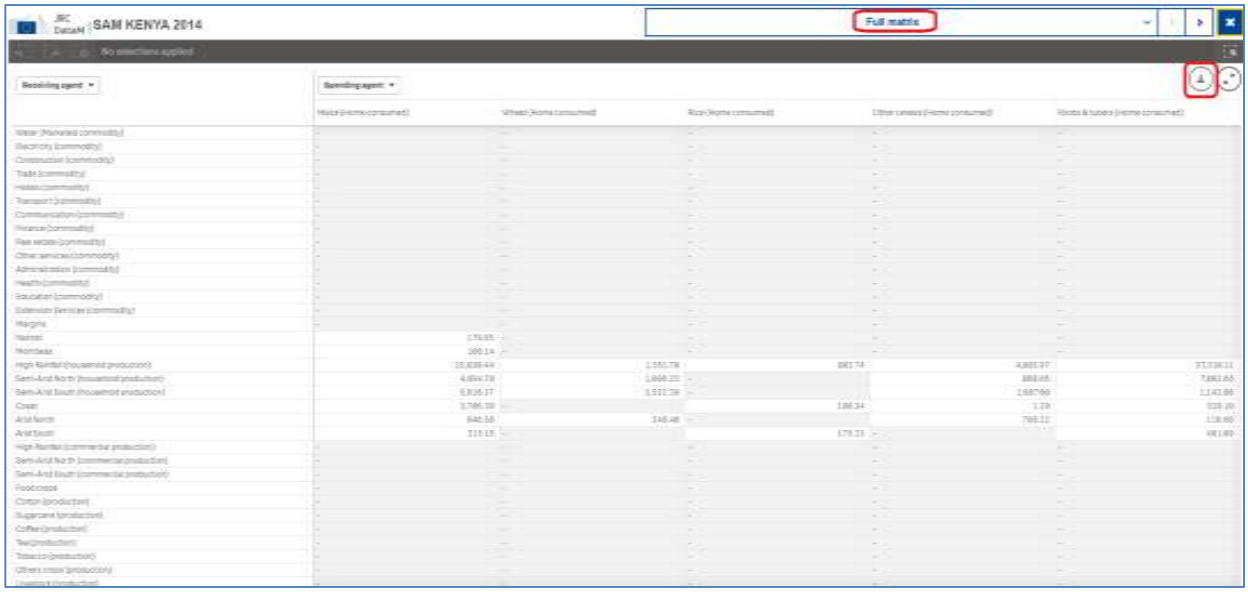


Source: DataM, provided by the European Commission – Joint Research Centre. Dashboard: SAM - Kenya - 2014, accessed on 21/03/2018.

Downloading the traditional matrix

From the "Full matrix" sheet of the interactive dashboard, users can visualize and make the download in "xlsx" format of the SAM in traditional sparse-matrix aspect.

Figure A14. How to download the matrix in traditional format

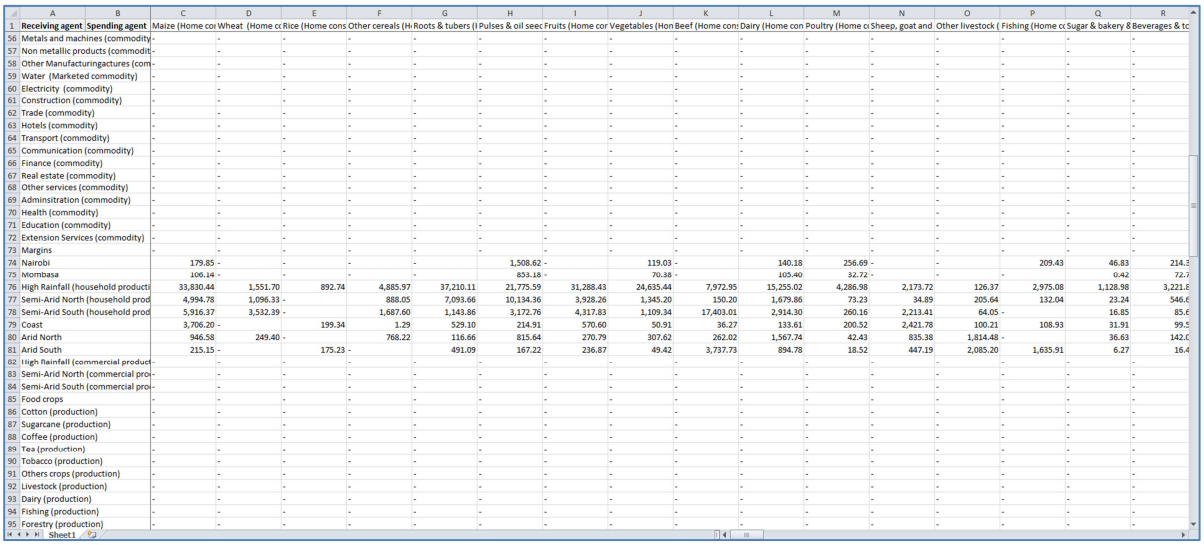


Source: DataM, provided by the European Commission – Joint Research Centre. Dashboard: SAM - Kenya - 2014, accessed on 21/03/2018.

The download icon at the top-right corner of the chart (see Figure A14), which is visible when passed over with the mouse; allow the data for the chart to be downloaded. The other icon is to show the chart in full-screen mode.

See the aspect of the downloaded file in Figure A15.

Figure A15. Traditional matrix outcome



	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
1	Receiving agent	Spending agent	Maize (Home co	Wheat (Home c	Rice (Home cons	Other cereals (H	Roots & tubers (I	Pulses & oil seec	Fruits (Home cor	Vegetables (Hon	Beef (Home cons	Dairy (Home con	Poultry (Home c	Sheep, goat and	Other livestock (	Fishing (Home c	Sugar & bakery f	Beverages & tc
56	Metals and machines (commodity		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
57	Non metallic products (commodit		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
58	Other Manufacturingactures (com		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
59	Water (Marketed commodity)		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
60	Electricity (commodity)		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
61	Construction (commodity)		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
62	Trade (commodity)		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
63	Hotels (commodity)		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
64	Transport (commodity)		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
65	Communication (commodity)		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
66	Finance (commodity)		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
67	Real estate (commodity)		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
68	Other services (commodity)		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
69	Adminsitration (commodity)		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
70	Health (commodity)		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
71	Education (commodity)		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
72	Extension Services (commodity)		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
73	Margins		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
74	Nairobi		179.85	-	-	-	-	1,508.62	-	119.03	-	140.18	256.69	-	-	209.43	46.83	214.3
75	Mombasa		106.14	-	-	-	-	853.18	-	70.38	-	103.40	32.72	-	-	-	0.42	72.7
76	High Rainfall (household product		33,830.44	1,551.70	892.74	4,885.97	37,210.11	21,775.59	31,288.43	24,635.44	7,972.95	15,255.02	4,286.98	2,173.72	126.37	2,975.08	1,128.98	3,221.6
77	Semi-Arid North (household prod		4,994.78	1,096.33	-	888.05	7,093.66	10,134.36	3,928.26	1,345.20	150.20	1,679.86	73.23	34.89	205.64	132.04	23.24	546.6
78	Semi-Arid South (household prod		5,916.37	3,532.39	-	1,687.60	1,143.86	3,172.76	4,317.83	1,109.34	17,403.01	2,914.30	260.16	2,213.41	64.05	-	16.85	85.6
79	Coast		3,706.20	-	199.34	1.29	529.10	214.91	570.60	50.91	36.27	133.61	200.52	2,421.78	100.21	108.93	31.91	99.5
80	Arid North		946.58	249.40	-	768.22	116.66	815.64	270.79	307.62	262.02	1,567.74	42.43	835.38	1,814.48	-	36.63	142.0
81	Arid South		215.15	-	175.23	-	491.09	167.22	236.87	49.42	3,737.73	894.78	18.52	447.19	2,085.20	1,635.91	6.27	16.4
82	High Rainfall (commercial product		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
83	Semi-Arid North (commercial proc		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
84	Semi-Arid South (commercial proc		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
85	Food crops		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
86	Cotton (production)		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
87	Sugarcane (production)		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
88	Coffee (production)		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
89	Tea (production)		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
90	Tobacco (production)		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
91	Others crops (production)		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
92	Livestock (production)		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
93	Dairy (production)		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
94	Fishing (production)		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
95	Forestry (production)		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Source: DataM, provided by the European Commission – Joint Research Centre. Dashboard: SAM - Kenya - 2014, accessed on 21/03/2018.

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