E-TRAINING ON COMPILATION OF SUT IN AFRICA

ACS/ESNA
2017

Session 3: Steps for compilation of SUTs
Outline of presentation

1. Outline of Steps to compile SUTs
2. Establishing five tables (unbalanced)
   - Table 1: Supply table at basic prices (domestic production table and import table);
   - Table 2: Valuation tables (taxes less subsidies on products, margins);
   - Table 3: Intermediate consumption at purchasers prices;
   - Table 4: Final uses at purchasers’ prices;
   - Table 5: Value added at basic prices by industry and its components
Outline of Steps to compile SUTs (1/3)

• **Step 1:** Finalise the groups of industries and products to be included in the SUTs. The criteria for grouping the industries and products should be that
  – They are relevant and important to the economy;
  – They exhaustively cover the entire spectrum of productive activities and products according to ISIC and CPC classes, respectively

• **Step 2:** Identify and finalise the data sources and methods which will be used to estimate
  – gross value of output, intermediate consumption, value added components in a cross-classification of sectors and industries with product break-down;
  – foreign trade; taxes and subsidies on products; final consumption expenditure of households, NPISHs and government; and gross fixed capital formation, change in inventories and acquisition less disposal of valuables with product break-down.
Outline of Steps to compile SUTs (2/3)

- **Step 3:** Compile preliminary control figures for the total economy using the data sources:
  - Industry-wise gross value of output, intermediate consumption, value added components
  - Imports and exports of goods and services; taxes and subsidies on products; final consumption expenditure of households, NPISHs and government; and gross fixed capital formation, change in inventories and acquisition less disposal of valuables

- **Step 4:** Compile product level break-down of control figures using the data sources to fill up the cells of SUTs.
  - The resultant supply and use tables will be unbalanced and show discrepancies between supplies and uses at individual product level

- **Step 5:** Review the control figures, product level break-downs by revisiting data sources and apply balancing methods to achieve product balances for each individual product group, in order to finally produce a balanced set of supply and use tables
  - Compile GDP estimates from three approaches, goods and services account, production account and generation of income account
Outline of Steps to compile SUTs (3/3)

Further steps required if the NSO decides also to compile SUTs at constant (or previous year) prices and to transform the SUTs to input output tables

• **Step 6:** Compile valuation matrices of trade margins, freight transport costs, taxes and subsidies on products, and imports in the structure of use table
  
  – Deduct these matrices from the use table at purchasers’ prices (at cell level), to produce the use table at basic prices. Supply table at basic prices is already available before its transformation to purchasers’ prices

<table>
<thead>
<tr>
<th>Supply table at basic prices</th>
<th>Use table at basic prices</th>
</tr>
</thead>
<tbody>
<tr>
<td>Domestic production + imports</td>
<td>Use table at purchasers’ prices (IC + final consumption + GCF + exports) – trade margins – freight transport costs – taxes on products + subsidies on products</td>
</tr>
</tbody>
</table>

• **Step 7:** Identify and compile price indices (or volume indicators) at cell level in the supply and use tables at basic prices
  
  – Apply double deflation for value added and deflation for final uses, and balance the two tables to produce SUTs at constant (or previous year) prices
Establishing five tables of SUTs
Table 1 (part): Domestic production at basic prices
Table 3: Intermediate consumption at purchasers’ prices
Table 5: Gross value added and its components (1/4)

• Production is an activity carried out under the responsibility, control and management of an institutional unit that uses inputs of labour, capital, and goods and services to produce outputs of goods and services

• The main data sources for the three tables are the
  – Administrative data (for example, agriculture, mining, electricity, transportation, government services, accounts of companies, etc.)
  – Establishment surveys or censuses on mining, manufacturing and services
  – Population census (for dwellings)
  – Other surveys (household budget surveys for estimating output of some products from expenditures, labour force surveys for informal sector, paid domestic services, etc.) and adhoc sources (such as research studies done on underground or illegal activities)

• The data available at the establishment level facilitates (in a cross-classification of sectors and industries) in the compilation of
  – Table 1: Output of goods and services at basic prices
  – Table 3: Intermediate consumption at purchasers’ prices
  – Table 5: Gross value added at basic prices and its components
Tables 1, 3 and 5.... (2/4)

- First step in compiling these three tables is to establish preliminary control figures of domestic production, intermediate consumption and gross value added components for the total economy. This step is similar to the regular annual GDP estimation procedures.
  - The compilation is undertaken by analyzing all the data sources identified and finalised for compiling SUTs.
  - The following table needs to be compiled for each of the 5 institutional sectors. Final table showing grand total for the total economy is obtained by summing up the 5 tables.
  - The final table gives control figures for Tables 1, 3 and 5 of SUTs. These control figures are the marginal totals shown in the last rows under the columns of industries in SUTs.

<table>
<thead>
<tr>
<th>Industries included in SUT ↓</th>
<th>Gross value of output at basic prices</th>
<th>Intermediate consumption at purchasers’ prices</th>
<th>Gross value added at basic prices</th>
<th>Compensation of employees</th>
<th>Other taxes less subsidies on production</th>
<th>Consumption of fixed capital</th>
<th>Net operating surplus/mixed income</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The next step (which can also be carried out simultaneously while analyzing the source data for establishing control figures) is to compile product break-down of control figures for production and intermediate consumption for each of the columns of industries. No further detailed information is needed for Table 5, once the control figures are established for industries.

- For government units, data source is the government accounts
  - Only partial product level details of expenditures may be available in budgets.
  - For more detailed data at product level, major government departments may be requested to provide expenditures details with product break-down

- For non-government units (corporations and household enterprises),
  - Corporations: Partial data at product level may be available in their accounts
  - Carefully designed business surveys may provide detailed product level information (UNIDO developed model questionnaires with the purpose of meeting the requirements of national accounts as well as the SUTs)
  - Household/informal sector surveys may only provide limited information to estimate output, intermediate consumption and value added; and data at product level may not be available
  - Input output surveys, research studies and consultation with subject specialists and industry experts could be other sources to estimate ratios on output and intermediate consumption profile.
• Input-output surveys
  – In the focused input-output surveys, a few establishments under each economic activity are selected (frame from the business register or annual enterprise surveys or economic censuses) and a questionnaire is sent to them to provide detailed information on product profile of output, intermediate consumption, inventories and value added components.
  – The ratios built up from the results of these surveys can be applied on the control figures discussed earlier
• Dealing with mis-classified and unidentified products reported in the source data
  – It is often observed that units report a part of product level information under ‘others’, fuels, office expenses, miscellaneous, etc. There may also be cases of mis-classification at the coding stage. For allocating them to the SUTs products
    • One option is to use ratios built up from input-output surveys, if available
    • Another option is to allocate the values of these items to a set of product codes outside the SUT product codes, to be adjusted at the time of balancing. For example, if SUTs include 50 products, ‘others’, fuels, office expenses, miscellaneous can be allocated product codes of 51, 52, 53, 54 respectively. At the time of balancing, the values under 51 to 54 will be allocated among the 50 products.
Table 1 (part): Import of goods and services
Table 4 (part): Export of goods and services (1/3)

- Trade statistics on imports and exports of **goods** are based on customs records. These follow HS classification (6-digit). Other agencies compiling trade statistics may follow either HS or SITC classification (5-digit).
- Data on imports and exports of **services** is available from the BoP, mostly from central bank.
- BoP shows imports and exports of goods in a single row, but shows services against:
  - a. Manufacturing services on physical inputs owned by others;
  - b. Maintenance and repair services n.i.e.;
  - c. Transport;
  - d. Travel;
  - e. Construction;
  - f. Insurance and pension services;
  - g. Financial services;
  - h. Charges for the use of intellectual property n.i.e.;
  - i. Telecommunications, computer and information services;
  - j. Other business services;
  - k. Personal, cultural and recreational services; and
  - l. Government goods and services n.i.e.
Tables 1 and 4..... (2/3)

• Establishing control figures of imports and exports
  – The control figures should be those reported in the BoP, as SNA and BoP are conceptually aligned. If any adjustments are carried out for illegal or border trade in national accounts, the BoP data should be adjusted in the first place.
  – For the control figures of exports of goods and services to be used in SUT, values provided in the BoP can be used as such, as both use f.o.b. valuation. Most likely, the BoP includes non-residents’ purchases in the economy under travel item. If not, this item should be estimated and added to the exports values shown in BoP
  – For import of goods, the SUT requirement is that they should be valued on c.i.f. basis. The BoP shows total import of goods on f.o.b. basis, but may also show separately the values of c.i.f./f.o.b. adjustment. Therefore, it is possible to compile total value of goods imported on c.i.f. basis.
  – For import of services, the values shown in BoP should be adjusted for the difference in import of goods on c.i.f. and f.o.b. against imports of insurance and freight transport services
Tables 1 and 4.....(product break-down) (3/3)

• **Goods**
  – Source of data for product break-down of imports and exports of *goods* is the merchandise trade statistics
  – Data available according to HS/SITC needs to be converted to CPC. A simpler method is to use SUT product codes directly on the source data, as these codes are fewer in number as compared to the CPC.
  – The difference between the control figures for imports and exports of *goods* as available from the BoP and the merchandise trade data, should be adjusted at the time of balancing the SUTs.

• **Services**
  – Broad product level break-down of services is available in the BoP.
    • C.i.f/f.o.b. adjustment may have to be made against the rows of insurance and freight transport services of imports.
    • Travel item in BoP most likely includes purchases of residents abroad and non-residents purchases in the economy. If not, adjustments have to be made in imports and exports data
      – This item includes many products. If product level data can be estimated using tourism satellite accounts, imports and exports of products may be adjusted accordingly
Table 2: Trade margins columns (1/2)

- Trade margins include
  - Output of traders (which is derived as the difference between the sale and purchase value of traded goods)
  - Secondary output of other industries (several industries (other than trade), sell some products in the same condition as they are purchased. The margin from such sales is trade product of these industries)

- Data required for supply table is trade margins by products for the total economy

- Usually, the enterprise surveys and business accounts provide data on total trade margins only

- Very few countries are able to collect information on trade margins by products through surveys

- Therefore, data on trade margins by products is mostly estimated through indirect methods.
The indirect method involves four steps:

1. Estimating total output of trade (in the supply table), which is equivalent to the sum of:
   - output of principal product of trading industry and
   - output of trade product of other industries;
2. Estimating (or assuming) trade margin ratios for each product;
3. Estimating trade margins for each product (only goods) by applying the trade margin ratios on the product’s output at basic prices; and
4. Finally, adjusting the trade margins for each product to the control figure, which is the total output of trade product.

These trade margin ratios for different products can be estimated on the basis of small surveys of wholesalers and retailers.

It is advisable to estimate trade margins by products separately for wholesale and retail trade, as trade margin ratios are different for the same product in the hands of wholesalers and retailers, especially for the agricultural and perishable goods.
Table 2: Columns of freight transport costs

- The requirement of data is transport costs with product break-down for the total economy.
- As in the case of trade, the transport costs can also be estimated through indirect methods, in the absence of direct product-wise information on transport costs from the enterprise surveys.
- The procedure is exactly the same as mentioned under trade margins.
- It is also advisable to estimate transport costs by products, separately for each means of transport, namely, railways, road, air, and water, if feasible.
Table 2: Avoid double-counting of trade and freight transport

- The gross output of trade and transport need to be included as part of domestic gross output. They are shown in the output matrix like that of any other industry.
- However, these same gross outputs of trade and freight transport products are needed to be allocated to products valued at basic prices to bring them up to purchasers’ prices.
- At purchasers’ prices, there are no trade and freight transport margins on products as their values are subsumed in the values of goods.
- The next table shows how we avoid counting gross output of trade and freight transport twice.
<table>
<thead>
<tr>
<th>Products (CPC)</th>
<th>Domestic production by industries (ISIC)</th>
<th>Imports</th>
<th>c.i.f. f.o.b. adjust.</th>
<th>Total</th>
<th>Taxes less subsidies on products</th>
<th>Trade and transport margins</th>
<th>Value added type taxes</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manufact.</td>
<td>100</td>
<td>10</td>
<td>110</td>
<td>10</td>
<td>58</td>
<td>5</td>
<td>183</td>
<td></td>
</tr>
<tr>
<td>Trade Transp.</td>
<td>18</td>
<td>40</td>
<td></td>
<td></td>
<td></td>
<td>-18</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
<td>18</td>
<td>40</td>
<td>10</td>
<td>Zero</td>
<td>168</td>
<td>0</td>
<td>183</td>
</tr>
</tbody>
</table>
Table 2: Columns of taxes and subsidies on products

• Data on taxes and subsidies on products are available from the government budget documents or tax authorities.

• Sometimes, product-wise tax data (excise duties, sales tax or VAT) may not be available.
  – In such cases, countries first need to estimate product taxes for each product on the basis of average tax rates (output at basic prices multiplied by average tax rate) and then adjust these to the control figure of total product taxes on pro-rata basis.
  – This may be done for each type of tax on product (excise, VAT, sales tax, import duties, etc.), as tax rates are different for different types of taxes on the same product.
  – Industry surveys may also provide information on taxes and subsidies paid/received by the producers, but the summation of these may not tally with the government records.
Table 4: Consumption expenditure of NPISHs

- NPISHs are legal or social entities created for the purpose of producing services (and sometimes goods) on a non-market basis
  - mainly financed by donations or regular subscriptions
  - not a source of income, profit or other financial gain for the units that establish, control or finance them.
  - can have surpluses but cannot be appropriated by those which establish them.
- **Final consumption expenditures of NPISHs** equals the gross output of producers of NPISHs services less sales of non-capital goods and services plus social transfers in kind.
  - The final expenditures of NPISHs are classified according to classification of the purposes of non-profit institutions (COPNI) (housing, health, recreation and culture, education, social protection, religion, political parties, labour and professional organizations) : These need to be converted to a product classification for use table.

- Data sources:
  - tax authorities collect accounts of NPISHs, though exempt from taxation..
  - economic censuses, enterprise surveys, annual accounts, labour force surveys.
  - BoP on current transfers made to NPISHs
Table 4: GFCE (1/4)

GFCE equals government output, less value of government sales of non-capital goods and services, plus social benefits in kind.

- Output of government services is measured on the cost basis
- Other government expenditures such as subsidies to industries, interest payments, costs of capital goods procurement, transfers, etc. do not form part of output
- Sales include receipts from fees and charges that are not economically significant and, to a minor extent, receipts from sales of market output

GFCE includes

- Expenditure on individual services and collective services produced by government itself that are supplied free or at prices not economically significant
  - Individual final consumption expenditures consist services, mainly of (a) Health, (b) Recreation, culture and religion, (c) Education, (d) Social security and welfare, and (e) Housing, refuse collection and sewerage.
  - Main characteristic of individual consumption expenditure is that, it must be possible to observe and record the acquisition of the good or service by an individual household or member and also the time at which it took place
Table 4: GFCE (2/4)

• Collective final consumption expenditures include only services with the following characteristics:
  – (a) Collective services can be delivered simultaneously to every member of the community or of particular sections of the community;
  – (b) The use of such services is usually passive and does not require the explicit agreement or active participation of all the individuals concerned;
  – (c) The provision of a collective service to one individual does not reduce the amount available to others in the same community or section of the community. There is no rivalry in acquisition.

• Current expenditures defined as collective fall under the broad headings of general public services, defense, public order and safety, economic affairs and environment protection but they also include certain expenditures under housing, health, recreation and culture, education and social protection that are considered to benefit the community at large.
Table 4: GFCE (3/4)

- Social benefits in kind include expenditure on consumption goods and services purchased by government from market producers and supplied directly to households without further processing
  - This is not government output, but is part of GFCE
  - These goods and services are valued at purchasers’ prices

- The government consumption expenditures are recorded according to the classification COFOG

- Sources of data are the accounts of government units at all levels and/or the budget documents.
Table 4: Column of GFCE in use table (4/4)

• For the GFCE column, it is necessary that government expenditures are classified under different functions (or purposes) of the government according to COFOG, in as much detail as possible

• The GFCE data can further be classified as individual consumption and collective consumption

• The detailed data on government expenditures compiled according to COFOG can easily be translated to ISIC/CPC using the concordance tables available between the purposes (COFOG) and the industries (ISIC) and products (CPC).

• Some developing countries show GFCE only under three broad product groups of education and health (individual); and Public administration and defence; compulsory social security (collective)
Table 4: HFCE (1/3)

- Household final consumption expenditures include:
  - All purchases of consumer non-durable and durable goods except dwellings and valuables;
  - Imputed purchases of consumer durables by financial leasing;
  - Imputed gross rental for owner-occupied housing services;
  - Own-account production and consumption of goods
  - Bartered consumer goods and services (net);
  - Domestic services provided by domestic servants;
  - Goods and services in kind provided by enterprises as wages;
  - Imputed financial intermediary (banking, insurance, etc.) service charges;
  - fees paid to government and NPISHs, fees for all kinds of licences and permits
  - Purchases by residents abroad;
  - (Minus) Purchases by non-residents at home.
Table 4: HFCE (2/3)

- HFCE is recorded at purchasers’ prices paid by households including any transport charges and taxes on products that are payable at the time of purchase.
- Individual consumption expenditure of households includes a number of imputed expenditures.
  - Goods consumed out of own production is valued at purchasers’ prices, although it is same as basic prices, since there are no trade and transport margins and taxes.
  - Income in kind is valued at purchasers’ prices if the employer purchased the products that are provided to employees. It is valued at producers’ prices if the products are produced by the enterprise itself.
- Data sources for estimating HFCE are the household income-expenditure surveys, retail trade surveys and other administrative data.
- Commodity flow approaches are widely used to estimate the HFCE.
Table 4: Column of HFCE in the use table (3/3)

- The main data source is the household expenditure survey or the household income and expenditure survey (HIES)
  - Supplemented with administrative data (e.g. alcohol sales, utilities sales to households, etc.) and commodity flow methods
- Household surveys to under estimate household expenditures, especially for services. Therefore, even if a country has good HIES, commodity flow methods become necessary for validation and consistency of data.
- Product level break-down of household expenditures, at very detailed level is generally available in the surveys, which can be used to fill the cells in the column of HFCE in the use table.
- The HFCE estimates based on HIES and commodity flow method, at product level should be reconciled carefully at the time of manual balancing
Adjustment items for HFCE

Adjustment for purchases of residents abroad
• Direct purchases by residents abroad are treated as both imports and HFCE
  – These values are shown in the adjustment rows
    • under imports in supply table
    • under HFCE in use table
  – ESA recommends (i) distributing these expenditures to different products, not in a single adjustment row and (ii) allocating part of these expenditures to intermediate consumption in the case of business travels.

Adjustment for purchases of non-residents in the domestic market
• Direct purchases in the domestic market by non-residents are shown under exports and also as a negative entry under HFCE in the use table, in a separate row at the end of the product rows

These adjustment rows are not required if the HFCE is based on household expenditure survey (since it does not cover non-residents) and if balance of payments include data on such purchases by residents/non-residents
Table 4: Actual final consumption

- The use table also has a provision to record actual final consumption of households, NPISHs and general government
  - Of these, conventionally, the NPISHs do not have actual final consumption, as their expenditures are of the nature of individual final consumption and, therefore, become part of household actual final consumption.
  - The actual final consumption of general government is its collective consumption expenditure. The individual consumption expenditure of general government becomes part of actual final consumption of households.
  - Thus, the actual final consumption of households includes:
    - Household final consumption expenditures;
    - Final consumption expenditures of NPISHs; and
    - Individual final consumption expenditures of general government
Table 4: Gross fixed capital formation (1/4)

- **Gross capital formation**: comprises gross fixed capital formation, changes in inventories and acquisition less disposal of valuables

- **Gross fixed capital formation (GFCF)** includes
  - all expenditure by producers on acquisitions less disposals of produced fixed assets to be used in the production process, such as
    - vehicles, machinery, equipment, buildings and other construction works, cultivated biological resources, weapons systems;
    - intangible assets of computer software, mineral exploration, and literary, artistic and entertainment originals;
    - certain additions or major improvements to non-produced tangible assets (land and sub-soil assets)
    - major renovations to existing assets,
    - own account GFCF
    - capital transfers in kind and
    - fixed assets acquired through barter
Table 4: Gross fixed capital formation (2/4)

SNA recommends for GFCF data to be shown by following types of assets

(i) Dwellings
(ii) Other buildings and structures
(iii) Machinery and equipment
(iv) Weapons systems
(v) Cultivated biological resources
(vi) Costs of ownership transfer on non-produced assets
(vii) Intellectual property products
Table 4: Gross fixed capital formation (3/4)

• GFCF estimates are based on
  – construction surveys, building permits, enterprise surveys, accounts of corporations and NPISHs, government budget documents, foreign trade statistics and the household surveys (on own account construction).
  – commodity flow methods are widely adopted to estimate GFCF by developing countries.

• GFCF is valued at
  – purchasers’ prices and include costs of transport and installation and any fees or taxes for transfer of ownership.
  – Own-account GFCF at basic prices or at the costs of production plus estimated operating surplus.
Table 4: Gross fixed capital formation (4/4)

- Asset-wise estimates of GFCF are usually compiled and these can easily be mapped to products in the use table.
- Commodity flow methods adopted can also facilitate easy identification of products of GFCF.
- Output of construction on the supply side can be recorded as GFCF against construction product, after adjusting for minor repairs and maintenance and acquisition costs.
- Output of work-in-progress for cultivated biological resources estimated on the supply side can be allocated to agriculture or livestock products on the use side against GFCF/CII, as the case may be.
- Output of intellectual property products estimated on the supply side can be allocated to corresponding products on the use side.
- Output of industrial machinery and goods that are partly consumption and partly capital (laptops, vehicles) can be allocated to the corresponding products as in the supply table.
Table 4: Change in inventories (1/2)

- Changes in inventories are measured by value of entries into inventories less value of withdrawals and less value of any recurrent losses of goods held in inventories during the accounting period.

- Inventories are usually classified into three broad categories:
  - Finished goods include goods acquired for resale by wholesalers and retailers, all goods stored by government as strategic reserves, such as food and fuel, and finished goods that are awaiting delivery to customers.
  - Materials and fuels include raw materials and supplies which will be used up as intermediate consumption in the course of production in a future year.
  - Work-in-progress consists of:
    - goods and services on which some processing has taken place but which are not yet in a finished form suitable for delivery to customers.
    - In agriculture, work-in-progress consists of the natural growth of vineyards, orchards, plantations and timber tracts and the natural growth in livestock that are being raised for slaughter or milk.
Table 4: Change in inventories (2/2)

- Sources of data for CII are the same as those used for estimating domestic production, intermediate consumption and value added components.
- Data available from these sources is mostly *finished products, semi-finished products* and *raw materials and components*, without detailed product break-down.
- Assumptions may have to be made on the product profile of change inventories available in the source data:
  - Mostly, finished and semi-finished products can be allocated to the main product of the industry (same treatment as in the supply table, where these two items are added to the output of main product).
  - Allocation of raw materials and components can be based on industry characteristics. If the survey includes separate questions for raw materials, chemicals, fuel, packing material, etc., allocation to products becomes easier.
Table 4: Valuables

• **Valuables:**
  – Are produced goods of considerable value that are not used primarily for purposes of production or consumption but are held as stores of value over time.
  – Are expected to appreciate or at least not to decline in real value, nor to deteriorate over time under normal conditions.

• They consist of precious metals and stones, jewellery, works of art, etc.

• Acquisitions of valuables are valued at their purchase prices together with associated costs of ownership transfer. Disposals are valued at their sale prices less any associated costs of ownership transfer.

• Supply of valuables can be estimated using the commodity flow methods

• Valuables mostly belong to few product groups included in SUTs, therefore, allocation to products in the use table is based on supply
Worked examples

- Example of compiling SUT
Suggested reading material

- Handbook on SUT: Compilation, Application, and Practices Relevant to Africa (Draft), UNECA
- The 2008 SNA, European Commission, IMF, OECD, UN, World Bank, 2009;
  - Chapter 14: The supply and use tables and goods and services account
  - Chapters 3 to 5
THANK YOU