
UNIT 16 METHODOLOGY OF NATIONAL INCOME STATISTICS

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16.0 OBJECTIVES

After going through this Unit, you shall be able to:

- list the three sectors of the economy;

- describe how national income estimates are computed in various sectors of the economy;
- discuss the consumption of fixed capital and net factor income flows from abroad.

16.1 INTRODUCTION

National income may be defined as the sum total of factor incomes accruing to the residents of a country during a year. Alternatively it can also be defined as the value of final products produced within the economic territory of the country reduced by the amount of net on direct, taxes and consumption of fixed capital and increased by net factor income received from abroad. For the purpose of estimation of national income the economy is divided into a number of sector. GDP of a country is equal to the sum of gross value added from all sectors of economy. GDP can be estimated by any one of the following three methods:

- i) production approach,
- ii) income approach, and
- iii) expenditure approach

In this unit, we primarily discuss the case of India and use it as illustration to highlight the methods followed in preparing national income statistics.

Central Statistical Organization (CSO) prepares the annual estimates of National Income for India and publishes them in National Accounts Statistics. This publication also gives the estimates of consumption expenditure, saving, capital formation and capital stock. Also given in the publication are the accounts of the public sector and the consolidated accounts of the nation. For estimation of GDP the CSO divides the whole economy into Nine broad sectors.

Different approaches are followed for different sectors of the economy. For first three sectors production approach is followed. In this approach, the gross value added is obtained by subtracting the sum total of the values of intermediate consumption inputs consumed by the sector from the total value of output of all the items contained in the sector. Strictly speaking, the estimates of value of output of all the items contained in the sector. Strictly speaking, the estimates of value of output and value of intermediate consumption should be prepared separately for each item and Gross Value Added (GVA) for all items under the sector. This, however, is not feasible because of data limitations.

For the construction sector a combination of expenditure and commodity flow approach is followed. In this approach, final expenditure on products is estimated. In the income approach factor incomes originating in the sector are estimated. For the organised segments of these sectors, current data on factor payments are available from the budget documents/annual reports of enterprises. But for the unorganised segments, GVA is estimated as a product of value added per worker multiplied by the corresponding work force. The estimates of the work force are prepared, for detailed industrial classification for the base year separately for rural and urban areas.

For getting Net Value Added (NVA) for a sector the consumption of fixed capital is subtracted from the GVA for the sector. The estimates are worked out at current as well as at constant (1993-94) prices. The estimates at constant

prices are worked out from the current prices either by using the base year prices for valuing the inputs as well as the outputs or by deflating the GVA at current prices by using price index numbers.

For some sector/sub-sectors the estimates are first prepared at constant prices and then converted into current prices by making use of price index numbers. The method of estimating sector-wise value added is explained below:

Industrial Classification of Indian Economy

- 1) Agriculture, Forestry and Fishing
 - 1.1 Agriculture
 - 1.2 Forestry and Logging
 - 1.3 Fishing
- 2) Mining and Quarrying
- 3) Manufacturing
 - 3.1 Registered
 - 3.2 Unregistered
- 4) Electricity, Gas and Water Supply
- 5) Construction
- 6) Trade, Hotels and Restaurants
 - 6.1 Trade
 - 6.2 Hotels and Restaurants
- 7) Transport, Storage and Communications
 - 7.1 Railways
 - 7.2 Transport by other means
 - 7.3 Storage
 - 7.4 Communications
- 8) Financing, Insurance, Real Estate and Business Services
 - 8.1 Banking and Insurance
 - 8.2 Real Estate, Ownership of Dwellings and Business Services
- 9) Community, Social and Personnel Services
 - 9.1 Public Administration and Defence
 - 9.2 Other Services

16.2 AGRICULTURE, FORESTRY AND LOGGING AND FISHING

16.2.1 Agriculture

Let us begin with the agricultural sector, and leave the discussion of forestry and logging, and fishing in the subsequent sub-sections. The agriculture sector

comprises of (i) agriculture proper, (ii) livestock and livestock products and (iii) operations of government irrigation system.

The contribution of (i) and (ii) to the GDP is estimated in terms of GVA using the production approach. The estimation of GVA involves evaluation of the products and by-products and ancillary activities produced during a year at the prices received by the producers and deducting from this the value of intermediate goods and services consumed in the process of production.

Separate estimates of value of output from the agriculture proper and livestock production are prepared while the estimates of GVA are worked out for the sector as a whole because the cost of feed of animals cannot be realistically divided between agriculture and livestock.

In respect of operations of the government irrigation system, income approach is used where the gross factor income generated as a result of providing irrigation services is estimated. The operation of irrigation system by the agriculturists is not separately taken into account as its output gets reflected in the value of output of the crops and the expenditure on its operation in the overall input costs.

The major inputs for agriculture sector are:

- i) seed
- ii) organic and inorganic manure
- iii) livestock feed
- iv) irrigation charges
- v) market charges
- vi) electricity
- vii) pesticides and insecticides
- viii) diesel oil
- ix) current repair and maintenance of the fixed assets and other operational costs.

The NVA from this and other sectors is obtained by subtracting consumption of fixed capital from GVA. The estimates thus prepared are at current prices. To get the estimates at constant prices the valuation of outputs and inputs is done at the prices of 1993-94. In case of inputs where only value estimates are available, the constant price estimates are arrived at by deflating the current price estimates using the index numbers of prices. The estimates of irrigation charges at constant prices are obtained by projecting the base year estimates by the growth in area under government irrigation.

16.2.2 Forestry, Logging and Fishing

The estimation of GVA from the forestry and logging and fishery sectors is carried out by the production approach. For each sector, first the estimates of the value of output are obtained. The estimates of GVA are obtained by subtracting the value of intermediate consumption values of outputs of the sector.

For both these sectors the estimates at constant prices are obtained by valuing the major items of production at 1993-94 prices, while for minor products the increase in prices is assumed to be the same as that of related major products. The ratio of inputs to output is assumed same for current price and constant price estimates.

16.3 MINING AND QUARRYING

The estimates of GVA in this sector are prepared by following production approach i.e., calculating the value of output of each mineral at state level and deducting the value of intermediate consumption from the value of the output. This implies that GVA is obtained first for each mineral and then added for all minerals to get the GVA for the sector as a whole.

The method of getting estimates at constant prices is the same as that for agriculture.

Check Your Progress 1

- 1) How is national income originating in agricultural sector/estimated?

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- 2) Briefly describe the method of estimating gross value added in mining and quarrying.

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16.4 MANUFACTURING

Manufacturing industries is divided into two parts:

- i) Registered (organised) and
- ii) Unregistered (unorganised)

All factories employing 10 or more workers if using power or 20 or more workers if not using power come under registered manufacturing industries. The remaining manufacturing units are unregistered units.

Registered Manufacturing

For registered manufacturing sector the estimates of GVA are worked out for 20 industry groups, following the production approach. The value of output in this case comprises of :

- i) ex-factory value of all products and by-products including semi-finished goods manufactured,
- ii) receipts for industrial and non-industrial services rendered to other,
- iii) value of fixed assets produced by the factory for its own use, and
- iv) net balance of goods sold in the same condition as purchases.

Likewise, intermediate consumption mainly comprise of purchase value of all items of:

- i) raw materials, components, chemicals, packing materials and stores actually used for the production process,
- ii) fuels, lubricants, electricity, water, etc. consumed,
- iii) cost of non-industrial services received from other concerns,
- iv) cost of materials consumed for repair and maintenance of fixed assets including cost of work done by others to the fixed assets,
- v) cost of contract and commission work done by others on materials supplied by the factories, and
- vi) cost of office supplies etc.

The estimates of GVA at constant prices are obtained by deflating the industry-wise estimates of GVA at current prices with the relevant wholesale price indices. This is not the ideal method to arrive at the estimates at constant prices. Ideally the constant price estimates should be obtained by reevaluating the inputs and outputs at the constant prices.

Unregistered Manufacturing

The industry-wise estimates of GVA for unregistered manufacturing are obtained as a product of work force and the corresponding GVA per worker. These estimates are first worked out for the benchmark (base) year and then carried forward to subsequent years on the basis of indicators representing physical volume of activity for each industry. The current price estimates are obtained from the constant price estimates by multiplying these with the corresponding indices of wholesale prices.

16.5 CONSTRUCTION

The estimates of GVA are derived from the corresponding estimates of value of output separately for pucca construction and labour intensive kutcha construction.

In the case of pucca construction, the estimates of value of output are prepared by commodity flow approach. This approach envisages estimation of production of commodities (cement, steel, bricks, timber, fixtures, etc.) used in construction. The commodities available for construction are evaluate at prices paid by the builders at the site of construction.

The estimates of output of labour intensive kutcha construction undertaken with the help of freely available materials like leaves, reeds, mud, etc. are prepared by expenditure approach using data from sample surveys, budget

documents of central/state governments and local authorities and annual reports of public and private sector enterprises.

For pucca construction having estimated the value of material inputs by commodity flow approach, the GVA is taken to be 47.5% of the value of material inputs in the base year. For other years it is adjusted for the relative movement in the index of wages of construction workers as compared to the composite index of prices of construction materials to account for year to year changes.

In case of kutchra construction the output is separately estimated for construction undertaken by the public sector, household sector (separately for rural and urban areas) and private corporate sector. The GVA is taken as 75% of the value of output on a uniform basis.

The sum of the GVA from pucca and that from kutchra construction gives the total GVA from construction.

The current price estimates of GVA by types are converted to constant price estimates by using appropriate deflators for different types of construction work, specially prepared by the CSO for this purpose.

16.6 ELECTRICITY, GAS AND WATER SUPPLY

GVA is estimated as the sum of gross factor incomes in the case of electricity and water supply sub-sectors and as value of output less intermediate consumption in the case of gas sub-sector. The estimates of GVA at constant prices are obtained by using different methods for the three sub-sectors. For electricity the estimates of GVA for the base year are moved forward to other years with the help of data on quantum of energy sold. For gas the quantum of output is evaluated at the base year price and it is assumed that input-output relationship assumed during base year will remain the same for other years also. For water the estimates are obtained separately for public and rural and urban segments of the private sectors. In the case of public sector the estimates at constant prices are obtained by deflating the current price estimates by the consumer price index numbers for industrial workers. For the private sector the estimates are first prepared at constant prices by income approach and then converted into estimates at current prices.

Check Your Progress 2

- 1) Distinguish between registered manufacturing units and unregistered ones.

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- 2) How is gross value added estimated in the construction sector?

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16.7 TRADE, HOTELS AND RESTAURANTS

Wholesale and retail trade deal with distribution activities of goods produced in other sectors of the economy like agriculture, mining, manufacturing, etc. The gross output of services rendered in the distribution of commodities is measured as gross trade margins of the trading establishments. From the gross trade margins the intermediate cost incurred is deducted for arriving at the GVA. Due to nature of available data, the estimates from trade, hotels and restaurants are being prepared by adopting the income approach.

The estimates of GVA for trade as well as hotels and restaurants are prepared, separately for the organised segment comprising Public Sector and Private Corporate Sector (including cooperatives) enterprises, and the rest of the enterprises constituting unorganised segment. For the organised segment the estimates at the current prices are based on the current data whereas for the unorganised segment, the base year estimates are carried forward with the indicators of specially constructed Gross Trading Income (GTI). The index of GTI is based on the value of marketable surplus in commodity producing sectors in agriculture, mining, manufacturing, etc. This index is used for trade as well as hotels and restaurants. The base year estimates, for the unorganised sector, are prepared separately for rural and urban areas for trade as well as hotels and restaurants. These are obtained as a product of the number of workers and GVA per worker during the year.

The estimates at constant prices are prepared separately for the organised and unorganised components. The estimates for organised trade have been obtained on the basis of quantum indices of purchases and sales of the public authorities and companies in the organised sector. In the case of hotels and restaurants the quantum index of sales of private corporate sector only are used to carry forward the base year estimates as the corresponding index for public sector is not available. For the unorganised parts of trade and hotels and restaurants the 1993-94 estimates are carried forward by making use of index of GTI at constant prices.

16.8 TRANSPORT, STORAGE AND COMMUNICATIONS

The output of transport (railways, mechanised and non-mechanised road transport, water transport, air transport and services incidental to transport), storage and communication sector cover the value of the services which these sectors deliver to domestic producers, households and the rest of the world. The estimates of GVA are prepared following the income approach (i.e. number of workers multiplied by GVA per worker). As the sum of compensation of employees and operating surplus (GVA by income approach) is equal to gross output less intermediate consumption, the production approach has been applied in the case of railways as well as communication.

For sub-sectors under this group, the GVA for each sub-sector has been worked out separately for public and private sectors. For the Public Sector GVA for each year is worked out on the basis of analysis of annual reports of different enterprises. While for private sector the estimates are prepared for the base year and carried forward to other years by making use of some relevant physical indicators and price index numbers.

For constant price estimates only physical indicators are used (e.g. the physical indicator for mechanised goods transport is growth in the number of trucks). For public sector also the estimates at constant prices are prepared for different sub-sectors generally by carrying forward the base year estimates by relevant indicators measuring the volume of activity.

16.9 BANKING AND INSURANCE

This sector is divided into the following sub- sectors:

- i) Commercial banks
- ii) Banking department of the RBI
- iii) Public non-banking financial companies
- iv) Organised non-banking financial companies engaged in trading in shares, investment holdings, loan finance and the like activities
- v) Unorganised non-banking financial undertakings such as professional money lenders and pawn brokers
- vi) Post office saving banks including operations concerning cumulative time deposits and national saving certificates
- vii) Cooperative credit societies
- viii) Life and non-life (general) insurance activities.

The GVA from this sector is estimates by income method using readily available source materials for each of the sub-sectors (except No.v). Regarding unorganised non-banking financial undertaking, in the absence of any available source material GVA is assumed to one third of GVA in the organised part of the sub-sector (NO. iv).

Estimates at constant prices are prepared for each of the sub-sectors by moving forward the base year estimates with the indicators measuring volume of activity in each sub-sector.

16.10 REAL ESTATE, OWNERSHIP OF DWELLINGS AND BUSINESS SERVICES

16.10.1 Coverage

The economic activities covered in this sector are

- i) ownership of dwellings (occupied residential houses),
- ii) real estate services (activities of all types of dealers such as operators, developers and agents connected with real estate), and
- iii) business services

16.10.2 Ownership of Dwellings

Ownership of dwellings includes the imputed value of owner occupied dwellings. (services rendered by non-residential buildings are considered to

be a subsidiary activity of the industries, which occupy the buildings and therefore, are not included in this sector).

The methodology for ownership of dwellings consists of estimating the gross rental of residential buildings (including owner occupied) and deducting there from the cost of repairs and maintenance to obtain the GVA.

Gross rental is estimated state-wise separately for rural and urban areas for the base year. The estimates for other years, at constant prices, are obtained by using the growth rate in the estimated number of dwellings in rural and urban areas separately. Current price estimates are obtained by multiplying the constant price estimates with the increase in rent. GVA is obtained by deducting the expenditure on current repairs and maintenance from the gross rentals (both the current and constant prices).

16.10.3 Real Estate

The GVA from real estate is estimated separately for organised and unorganised establishments, the former consisting of public and private limited companies and the rest in the unorganised sectors. For organised units the current yearly data are available for a number of companies from their annual reports. For companies for which reports are not available the estimates obtained on the basis of available reports is adjusted for full coverage by the ratio of paid-up capital of all the real estate companies to the paid-up capital of the companies for which the reports are available. The per head earnings in the unorganised real estate services has been assumed to one-third of that in the organised parts. The estimates of GVA at constant prices are obtained by moving forward the base year estimates of GVA with the growth rate in the estimated number of urban dwellings.

16.10.4 Business Services

For business services the GVA is obtained as the sum total of earnings of all workers (employers, own-account workers and employees) engaged in the activity, the profit and dividends generated in joint stock companies. Since the estimates of earnings of all workers include the total income of self-employed, employers and employees, only profits and dividends from the joint stock companies need be added for the measurement of total value added. The GVA per worker and also the number of workers for the base year are estimated separately for rural and urban areas. Estimates are first prepared at constant prices for some base year. Estimates for other years prepared by carrying forward the base year estimates by using the composite indicator based on number of chartered accountants, architect and the index of industrial production of machinery including electrical. The current price estimates are obtained from the constant price estimates by using consumer price index numbers for non-manual employees for urban areas and index of wage rate of rural skilled workers for rural areas.

16.11 PUBLIC ADMINISTRATION AND DEFENCE

Public administration and defence covers services rendered by the administrative departments of the general government (Ranging from Central Government to Local Bodies). The expenditure on services produced by the

administrative departments are mainly financed by the government themselves and they are consequently considered to be the final consumers of these services except for a minor part sold to the other sectors. Most of the buildings occupied by administrative departments and defence organisations are owned by the government. Data on amount of rent paid for hired premises are not separately available as the same are included under the miscellaneous expenses. Interest paid on borrowings from public by the government being included under interest on national debt. This does not form a part of factor payment. The cost of inputs, comprising purchasing of commodities and services, compensation of employees and CFC which is also equal to the value of output produced for own use and a minor part sold to household sector thus does not include the element of operating surplus. The contribution GDP, therefore, comprises compensation of employees and CFC only. Constant prices estimates are obtained by deflating the current price estimates by consumer price index numbers for industrial workers.

16.12 OTHER SERVICES

Other services sector includes the following type of services:

- i) educational services
- ii) research and scientific services,
- iii) medical and health services including veterinary services,
- iv) sanitary services,
- v) religious and other community services,
- vi) legal services,
- vii) recreation and entertainment services including TV and Radio broadcasting,
- viii) personal services (domestic, laundry, dyeing and dry cleaning, barber and beauty shops and others, and
- ix) services n.e.s.

The methodology generally followed for estimation of value added from different categories of services is to use the total number of persons engaged and value added/earnings per person. To the extent necessary the profits and dividends earned by the organised/corporate enterprises engaged in these activities are added to account for the factor income generated in the forms other than labour income. The estimates of GVA are prepared separately for the various categories mentioned above. Some details are given below.

16.12.1 Educational Services

The estimates are prepared separately for recognised and unrecognised institutions. For recognised institutions GVA is taken to be the sum of total wages and salaries of teachers and other staff employed in the institutions and the secondary income arising from educational services and consumption of fixed capital. For unrecognised institutions the income is assumed to be a constant percentage of the income of recognised institutions.

16.12.2 Research and Scientific Services

GVA is obtained by using the number of workers under this sub-sector and the GVA per worker. GVA for workers is assumed to be the same as in public administration and defence.

16.12.3 Medical, Health and Sanitary Services

For this sub-sector the GVA is estimated separately for public and private sectors. For public sector, GVA is taken to be equivalent to the budget expenditure on salaries and wages of doctors and other medical staff and consumption of fixed capital. For private sector the estimates are obtained as product of estimated work force and the corresponding GVA per worker. The estimates are separately prepared for rural and urban areas. The annual estimates of total working force are obtained by using the base year figure estimated from population census and the current growth rate in the number of medical personnel available. The work force in the private sector is obtained by subtracting public sector estimates of working force from the total working force. The private sector working force, thus obtained, is divided into rural and urban areas in the ratio of rural and urban working force in the total working force under medical and health services in the base year. GVA per worker by rural and urban areas is based on the follow-up surveys of the Economic Censuses.

16.12.4 Religious and Community Services

The general approach in all these services is to estimate the annual working force in each category using population Census data and to measure the change in the number of persons engaged and GVA/gross earnings per worker. In a number of cases physical indicators have been used to move the base year working force to other years. GVA per worker is estimated broadly following the approach for the medical and health services.

For some of the sub-groups the base year estimates of value added are moved by physical indicators to arrive at the annual estimates at constant prices and then converted to the estimates at current prices by making use of price indices. For other sub-groups the estimates at current prices are deflated by price indices to derive the estimates at constant prices.

16.13 NET FACTOR INCOME FROM ABROAD

The sum of the GVA's from all the sectors gives the GDP at factor cost or the sum of the corresponding NVAs gives NDP at factor cost. To get an estimate of NNP at factor cost or national income, net factor income from abroad has to be added. The net factor income from abroad consists of

- i) net compensation of employees, and
- ii) net income from property and entrepreneurship.

Here net means receipts by residents minus disbursement to non-residents. The data on net factor income from abroad are obtained from the balance of payments records compiled by the RBI. The current prices estimates are deflated

by the index of Unit Value of imports to arrive at the estimates at constant prices.

16.14 CONSUMPTION OF FIXED CAPITAL

CFC may be defined as that part of gross domestic product which is required to place fixed capital used-up in the process of production during the period of account. CSO has prepared estimates of consumption of fixed capital for 18 sectors of the economy by using the average life of different types of assets.

Check Your Progress 3

- 1) Describe how gross value added is estimated for banking and insurance sector?

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- 2) How is gross value added estimated in the medical, health and sanitary services subsector?

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16.15 LET US SUM UP

This unit gives the methodology adopted by the CSO for estimation of gross (net) national product. CSO has been issuing the annual estimates of national product (national income) since 1956. The economy is divided into 9 broad sectors. The estimates of sector-wise gross value added are prepared by following different approaches for different sectors. Even for different sub-sectors under a sector, different methods are used. For example, commodity flow approach is used for estimating value added for pucca construction while expenditure approach is used in case of labour intensive kutcha construction.

16.16 KEY WORDS

- Gross Value Added** : The total or aggregate of all value added by all the production units of the economy.
- Gross Trading Incomes** : Method to compute gross value added in the trade hotels and restaurants sector, based on the marketable surplus.

16.17 SOME USEFUL BOOKS

CSO (1989), *National Accounts Statistics: Sources and Methods*, New Delhi.

Bhatia D.P. (1996), *National Accounting: Concepts and Estimates*: Khanna Publishers, New Delhi.

Agarwala S.K., *National Income Accounting* , Bookland Publishing Co., New Delhi

16.18 ANSWERS OR HINTS TO CHECK YOUR PROGRESS EXERCISES

Check Your Progress 1

- 1) See subsection 16.2.1
- 2) See section 16.3

Check Your Progress 2

- 1) See section 16.4
- 2) See section 16.5

Check Your Progress 3

- 1) See section 16.9
- 2) See subsection 16.12.3

UNIT 17 DATA SOURCES FOR ESTIMATION OF NATIONAL INCOME AND RELATED AGGREGATES IN INDIA

Structure

- 17.0 Objectives
- 17.1 Introduction
- 17.2 Primary Sector
 - 17.2.1 Agriculture and Allied Activities
 - 17.2.2 Forestry
 - 17.2.3 Fishing
- 17.3 Secondary Sector
 - 17.3.1 Manufacturing
 - 17.3.2 Construction
- 17.4 Tertiary Sector
 - 17.4.1 Electricity, Gas and Water Supply
 - 17.4.2 Trade, Hotels and Restaurants
 - 17.4.3 Transport, Storage and Communications
 - 17.4.4 Banks, Insurance and Real Estate and Ownership of Dwellings
 - 17.4.5 Other Services
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- 17.5 Let Us Sum Up
- 17.6 Abbreviations Used
- 17.7 Some Useful Books
- 17.8 Answer or Hints to Check Your Progress Exercises

17.0 OBJECTIVES

After going through this unit, you would be able to:

- differentiate between primary, secondary and tertiary sectors of the economy;
- describe the sources of data for each subsector in the economy for preparing national income accounts; and
- discuss the procedures used by Central Statistical Organisation to the data to prepare national income for India.

17.1 INTRODUCTION

The first official estimates of national income at constant prices prepared by the Central Statistical Organisation (CSO) with base year 1948-49. These

estimates at constant prices along-with the corresponding estimates at current were published in 1956 in the publication Estimates of National Income. Since then CSO annually been publishing ther estimates of national income (product) and related aggregat6es. Over the years there has been gradual improvement in the availability of basic data and in the methodology of preparing the estimates. The base year for preparing the estimates was first changed to 1960-61 and then to 1970-71. The base year for the current series is 1980-81. The sources of data used by the CSO for preparing the estimates for the 1980-81 series, of gross value added (GVA) and net value added (NVA) for different sectors of the economy are given in this unit . A number of different sources are used to get the estimates of the values of output and the values of different inputs for each of these sectors. For some sectors such as agriculture and mining, production approach is used to obtain the value added. For other sectors like transport, trade, etc., income approach is followed. For organised segments of these sectors current data on factor payments are available from the budget documents annual reports of enterprises. For the inorganised segment of these sectors, GVA is estimates as a product of per worker value added and the corresponding work force. The estimates of work force are based on the 1981 population census data. The estimates of value added per worker are based on the follow up surveys of the economic census. The sources of data used for estimating value added for different sectors of the economy are analysed below.

17.2 PRIMARY SECTOR

17.2.1 Agriculture and Allied Activities

For purposes of evaluation of output 74 crops/crop groups including by-products are considered. These are divided into 4 broad categories viz., (i) 45 items of principal crops, (ii) 10 items of minor crops, (iii) 11 items of miscellaneous and unspecified crop groups, and (iv) 8 items of other products and by products. The list of crops under each of these groups is given in the appendix at the end.

The estimates of physical output of principal crops at state level are regularly obtained from Area and Production of principal Crops in Indian published by the Ministry of Agriculture, Directorate of Economics and Statistics (DES). The estimates are prepared at state levels by the state agencies and are consolidated and published by the DES. The estimates are based on coverage of area and yield through scientifically conducted crop cutting experiments by the respective state governments and are fairly reliable.

The estimates output (and also area) of cashnut, indigo and papaya are also published in the above publication of DES but with a time large of one year. The estimate for the current year are, therefore, obtained by projecting previous year's estimates on the basis is of past trends and are revised subsequently when more data become available. The estimates of area are fairly reliable but the yield rates are based on traditional methods. For other minor crops the estimates of output are not published. These are prepared by the CSO on the basis of area estimates ad-hoc estimates of yield rates available from various state agricultural departments. Some of the states have initiated a scheme for 'Crops Estimation Surveys on Fruits and Vegetables and Minor Crops'. This scheme is likely to improve the production statistics of these crops. There are publishers later sources for plantation crops like tea, coffee and rubber, the production figures are obtained from the respective boards.

For unspecified crops like other oilseeds, other cereals, 'other fruits and vegetables' etc. only area figures are available. The values of output of these crops are, therefore, directly estimates on the basis of area and value of output of related major crops/crops groups.

In the process of cultivation of crops and their processing by indigenous methods, several by-products are also products. However, for the estimation of GVA only those by products which are readily identifiable and have some definite economic value are considered. The value estimates of these by-products are based on the results of cost of cultivation studies (CCS) conducted by the DES. CCS scheme was initiated by the DES in 1970-71 for the purpose of obtaining estimates of cost of cultivation of principal crops. The scheme envisaged collection of representative data on inputs and outputs in physical and monetary terms and estimating there-from the cost of cultivation per hectare and cost of production per quintal of the principal crops. The value per unit area of the byproducts available from the CCS have been directly utilized for arriving at the value of output of these products.

Results of Indian Live Stock Census (ILS) conducted one every five years) provide age-wise and sex-wise population at district level for different categories of animals. The estimates for inter-census and post Census years are arrived at on the basis of compound growth rate observed for each category between two consecutive Censuses. The estimates of the output of milk, eggs and wool are obtained through scientifically planned sample surveys, conducted by the State Animal Husbandry Departments (SAHD). Estimates of production of meat of different categories of animals are prepared using the data obtained from SAHD and are based on yield rates and the number of animals slaughtered. The estimates of other meat products and by products are based on the number of slaughtered and fallen animals and the corresponding yield rates. These rate are based on very old reports of the DMI and are not very reliable.

The estimates of the value of inputs are prepared using various sources like NSSO, IASRI, DES SAHD, Central Electricity Authority (CEA), Fertilizer Association of India, All India Debt and Investment Survey (AIDIS), etc.

The estimates of seed and diesel oil are based on the results of the CCS. The results of such studies may be representative for All India but using the same at State level may not be justified. In the case of chemical fertilizers it is assumed that whatever is distributed is consumed. The estimated of state-wise dispatched of fertilizers are published by FAI. The concentrated used in the livestock feed are estimated form the NSSO survey results for the year 1975-76. Data on electricity consumed for agricultural purposes are obtained from CEA. For pesticides and insecticides the estimated of consumption are obtained from pesticed Association of India (PAI). Data on irrigation charges are provided by the State Irrigation Departments. Live Stock feed estimated are very roughly estimated on the basis of availability of different items under this head and are based on a number of studies/surveys carried by the NSSO, IASRI, SAHD etc. AIDS forms the main source of data for preparing estimates of repairs and maintenance charges. These surveys are, however, conducted once every 10 years and the preparation of annual estimated is naturally handicapped due to the non-availability of satisfactory annual indicators.

17.2.2 Forestry

CSO has been collecting data on output of forest products and prices, thereof, prevailing in the assembling centres, directly from the state forest department on a financial year basis for building up the estimates of the value of output of forestry sector. Though the statistics on major forest products (fuel-wood and industrial wood) are to some extent complete, statistics on minor forest products are generally not satisfactory and only value figures are available. From 1991-92 onwards data on production and prices on industrial wood and minor forest products and data on process of fuel wood are received from principal Chief Conservators of forests/state DESs:

A serious limitation of these outturn data is that they represent only the authorised exploited forest resources and substantial quantity of output goes unrecorded. Unrecorded outturn of industrial wood is assumed to be 10% of recorded output. For fuel-wood the unrecorded part used to be taken as 10 times that of the recorded one. Since 1991 issue of NAS the method has been changed on the basis of the recommendations of the working group. The estimates of production are now based on the consumption estimated available from the quinquennial surveys on consumption expenditure conducted by the NSSO.

For minor products reliable data on production and prices are not available for all the states and the estimated for many states are obtained by inflating the royalty by the state authorities. Comprehensive studies are required to be undertaken for estimating the proportion of unrecorded removals and other required ratios. The data availability regarding minor forest products needs to be improved.

Material inputs in the forestry sector include expenditure on transportation, water, electricity fuel, normal repair and maintenance of fixed capital, etc. No reliable data are available regarding inputs consumed. Based on ad-hoc studies, 10% of the value of output is assumed for the total material inputs consumed.

The scope of present day forestry has gone beyond traditional forest areas. Programmes of social forestry, farm forestry, agro-forestry, etc., are being implemented on a massive scale with public participation. Several international agencies are funding this programme in addition to large investments by Government of India. Though a substantial portion of money is going into private hands and a lot of income is being generated, there is no proper recording of the output of timber, fuel-wood, etc. From these privately owned forests.

17.2.3 Fishing

The data on production and prices of fish are supplied by the state Fishers Departments (SFD)s. For estimation of value of output of all major minerals, except petroleum and natural gas, is the Financial Year Aggregate of Mineral production published by the Indian Bureau of Mines (IBM). IBM has also been supplying the data on estimates of mining expenses as percentage of value of production for each major mineral (except coal). However, IBM has not been able to provide the data after 1984-85 and the ratios of 1984-85 are assumed to hold good for subsequent years. Regarding coal the value of inputs is obtained from the office of Coal Controller, Calcutta.

Regarding petroleum and natural gas, the data on production, prices and inputs are obtained by the CSO from oil and Natural Gas Commission and Oil India Ltd.

Data on the output of minor minerals are obtained by the CSO from the State Geological Departments and are in terms of value only. The reliability of data in respect of these minerals cannot to be considered to be of the same order as that of the major minerals. The estimates of inputs are again of ad-hoc nature.

17.3 SECONDARY SECTOR

17.3.1 Manufacturing

Registered Units

The estimates of GVA are directly available from Annual Survey of Industries (ASI) published by the CSO. The survey divides all the registered factories into two parts – (i) factories employing 100 or more workers (Census sector) and (ii) remaining factories (sample sector). A complete enumeration is done of all factories in category (i) and a sample is taken in case of category (ii).

The estimates as published in the ASI are not adjusted for non-responding factories in this sector. The industry-wise estimates of output and GVA published in the ASI are adjusted upwardly by making use of the supplementary information available regarding employment in the non-reporting factories. The estimates of GVA obtained from ASI include bank charges paid by the manufacturing establishments. The value of such services forms a part of the income originating in the banking and insurance sector, and as such, is deducted from the GVA of the registered manufacturing sector. In the absence of adequate details, adjustments for imputed bank charges are made only at an aggregate level, ASI also gives the industry-wise NVA, which is used for getting the NVA from the registered manufacturing industries.

The estimates of GVA at 1980-81 prices are obtained by deflating industry-wise estimates of GVA at current prices at 2 digit level of National Industrial Classification (NIC) with the relevant wholesale prices indices for the year for which ASI data are available. For recent years for which ASI data are not available (due to time lag in the availability of ASI of data) the industry-wise estimates of the latest year based on ASI data are moved forward by using relevant indices of industrial production. For these years the constant prices estimates are converted to current price estimates by using relevant indices of wholesale prices. These estimates are revised as soon as ASI data become available.

Unorganised Manufacturing

The industry-wise estimates of GVA are obtained as a products of work-force and corresponding GVA per worker. These estimates are first worked out for the bench mark (base) year and then carried forward to subsequent years on the basis of indicators representing physical volume of activity. The estimates of workforce for 1980-81 are based on the details provided in the 1981 population Census. The estimates of industry-wise gross value added per worker except for beverages and tobacco and textiles, are based on the Reports of surveys of unorganised manufacturing industries conducted for the year 1984-85.

In the past, no reliable data were available in respect of unorganised sectors of non-agricultural sectors of the economy. In order to remove the gap in the data, the CSO launched an Economic census and Survey Scheme in 1976. So far four country-wide economic Censuses, first in 1977, second in 1980, third in 1990 and the fourth in 1996 and four series of follow-up surveys covering sectors on non-factory manufacturing, trade, hotels, and restaurants, transport, storage and warehousing and services sectors have been undertaken. The economic Census provides a frame for conducting follow up sample surveys to collect detailed information on an enterprise/establishment basis. The establishments are divided into three groups, namely, (i) Directly establishments (DE) employing six or more persons and (ii) the rest called non-directory establishments (NDE) employing at least one hired worker) and (iii) own-account enterprises (QAE). The surveys for the first group of establishments were conducted by the CSO, while the second and third groups of establishments were surveyed by the NSSO.

The first survey of non-factory manufacturing units was carried out for 1978-79 and was based on the frame provided by the 1977 Economic Census. The second survey, based on 1980 Census, was carried out for 1984-85, while the third for the year 1989-90 was based on the updated 1980 Census. The fourth survey for 1994-95, based on 1990 Census, has been done but the results are not yet available.

The results of the surveys for 1978-79 were not used as these were considered to be at variance with the industry-wise estimates already being used. Therefore, the industry wise GVA per worker for 1980-81 were based on the same source as used for the 1970-71 series. From the year 1984-85 onwards the GVA per worker estimates of GVA for beverages and tobacco are based on the current data available from the Directorate of Tobacco Development and for Textiles the data on production in the decentralized sector are available from Textiles in India by Textile Commissioner for cotton and man-made fabrics and for woolen, pure silk and hosiery from the report of the consumption panel project, All India Annual Survey of Textile Committee.

The estimates for subsequent years (up to 1983-84) were obtained first at constant prices by carrying forward 1980-81 estimates by appropriate physical indicators. The current price estimates are obtained from constant price estimates by making use of wholesale price index numbers. For 1984-85 the estimates were worked out afresh and are used as bench mark estimates for carrying forward the estimates to get these for subsequent years. The periodical surveys provide detailed data on inputs and outputs once in 5 years only and the problem of preparing the estimates for intervening years remain. There has been no satisfactory data to build up annual indicators necessary for carrying forward the bench mark year estimates.

17.3.2 Construction

The estimates of the value added are derived from the corresponding estimate of value of output separately for pucca and labour intensive kutcha construction. The estimates of the value of output for pucca construction have been derived by using commodity flow approach and for kutcha construction by using expenditure approach. For getting the estimates of output by commodity flow approach, CSO requires the estimates of production of commodities used in

construction and adjusting them for inputs in other industries, changes in sectors and net imports so as to get the estimates of their net availability for construction purposes. Also required is the ratio of value added to value of output. A number diverse sources have been used for estimating the flow of input materials going into construction. Some of the important sources are ASI, Cement production and Despatches brought out by Cement Controller, etc.

For kutcha construction for public sector the expenditures are available from the annual budget documents. For such construction by the private corporate sector also the annual reports are used. In the case of household sector AIDS 1981-82 conducted by the Reserve Bank of India, is used for preparing the estimates.

Although a number of diverse sources (not feasible to list all the sources) have been used for preparing the estimates, yet the estimates are not satisfactory. Because of wide diversity in the types of construction, the proportions of GVA to total value of construction of different types are likely to vary. Even the estimates of the value of output are not satisfactory. It is desirable that the different type of construction are classified into homogeneous groups and the proportion of value added for each group and also the value of output of each groups is worked out on a more satisfactory basis.

Check Your Progress 1

- 1) Describe how data is collected for agricultural and allied activities for national income accounting?

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- 2) What is the method of data collection for unorganised manufacturing for preparing national income accounts.

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17.4 TERTIARY SECTOR

17.4.1 Electricity, Gas and Water Supply

The major source of data utilised are: (i) budget documents of the Central , state and union territories in case of departmental commercial undertakings, (ii) annual reports in the case of non-departmental commercial undertakings

and (iii) a sample of annual reports of private companies and data on electricity sold/generated available in the annual publication 'General Review of the Public Electricity Supply – All India Statistics' by Central Electricity Authority. For Gas, the major sources of data utilised are: (i) production data on LPG from Ministry of Petroleum and input-output coefficients from Bharat Petroleum Corporation Ltd. (ii) annual accounts of two coal gas companies, and (iii) annual reports of khadi and village Industries Commission in case of Gobar-gas. In the absence of details of input structure, the value of output of gobar gas is treated as equivalent to GVA. For water supply, the main sources of data are: (i) budget estimates of Central and State governments, (ii) municipal data on compensation of employees, (iii) population census for estimating work force and (iv) Directorate General of Employment and Training for Data on public sector employment in water supply activities. In case of public sector budget documents are used for preparing the estimates. For private sector, the estimates are based on the work force in the private sector and the income per worker. The work force estimates for the private sector are obtained by subtracting the work force estimates of the public sector as obtained from the DGET from the total force estimates based on the population census. Income per worker is based on the data from different municipalities/corporations. For other years the estimates are carried forward by making use of the data regarding employment given by the municipalities/corporations.

17.4.2 Trade, Hotels and Restaurants

The major sources of data used are: (i) the work force estimates based on the population census data, (ii) The follow-up surveys of the Economic Censuses conducted in 1979-80 and 1983-84 for getting the estimates of GVA per worker, (iii) annual reports of public sector enterprises dealing in trade, hotels and restaurants, and (iv) analysis of companies in private corporate sector and corporate societies.

The estimates of public sector are based on current data and can be considered as reliable. In the case of private corporate sector, the estimates are based on data from RBI sample studies and finances of medium and large public limited companies. Such data become available after considerable time lag and in the absence of current data, the estimates are built up on the basis of growth in the paid up capital of such companies.

For the Unorganised part of the activity only the bench-mark estimates are based on the survey data. In this case the survey years are not conterminous with the bench-mark year and this results in errors in estimates. For other years the estimates are built-up with the specially constructed indicator of Gross Trading Income (GTI) in the commodity producing sectors. The GTI is based on the value of marketable surplus in commodity producing sectors in agriculture, live stock fishing, forestry, mining and manufacturing. The same indicators are used for trade as well as hotels and restaurants. These indicators are not reliable. The estimates for this sector, therefore, have large scope for improvement.

17.4.3 Transport, Storage and Communications

The estimates of value added from railways and communications are based on up-to-date and reliable information i.e. the production accounts prepared by the concerned ministries. What about civil Aviation ?

The estimates of value added from other transport and storage are separately prepared for the public and private sectors. For public sector, the estimates are based on the current data available from the respective annual reports and other official documents. For private sector, the estimates of GVA are obtained as a products of the workforce under each category and the value added per worker. The estimates of total industry-wise work force are based on 1981 population Census. For each activity the estimates of work force under private sector are obtained by subtracting the workforce under public sector from the corresponding total work force. The estimates of GVA per worker are based on periodical follow up surveys conducted in 1979-80 and 2983-84. For other years the estimates are carried forward by making use of relevant physical indicators and price indices based on various official documents.

17.4.4 Banks, Insurance and Real Estate and Ownership of Dwellings

The overall position regarding availability of data for banks and insurance is satisfactory (official documents), except in the case of unorganised non-banking financial enterprises and own-account money-lender. Certain arbitrary ratio regarding total GVA from this component has been assumed.

Only for the measurement of value added in segment of organised real estate services, current data are obtained from their annual reports. For Unorganised real estate services, the per head earning is assumed to be 1/3rd of that in the organised part. The work force is again dependent upon 1981 population Census.

The major sources of data for ownership of dwellings are: (i) the population Census of 1971, and 1991 1981 for estimating the number of dwellings, and (ii) the data on average gross rental per dwellings NSSO surveys for 1978-78 and 1983. The estimates of gross rental have been prepared separately for rural and urban areas. The surveys conducted by the NSSO give estimates for urban areas only. For rural areas the gross rental has been assumed to be same as rental for kutchha houses in urban areas. The estimates thus prepared relate to the base year. For other years, the estimates are carried forward by making use of growth in the number of dwellings and the growth in the house rent index number for non-0manual employees.

17.4.5 Other Services

The estimates for different category of services are prepared separately for public and private sectors. For public sector the current data based on annual reports are used while for private sector the GVA for different services is estimated as a product of work force and the corresponding GVA per worker based on the follow-up surveys of NSSO and CSO. For educational services, the estimates for prepared separately for recognised and unorganised institutions. For recognized institutions, current data are available for Education in India published by the Ministry of Human Resource Development. Teh GVA for unorgqnised institutions. This percentage is based on the Enterprise Survey 1983-84 by the CSO. For medical and health services, the estimates of GVA for the public sector are equivalent to the budget expenditure on wages and salaries of doctors and other medical staff plus consumption of fixed capital while for private sector these are prepared separately for rural and urban areas

by making use of GVA per worker and the number of workers in the private sector. The annual estimates of work force are obtained by using the base year estimates and the growth rate in the number of medical personnel.

17.4.6 Public Administration and Defence

The sectors of data are the budget documents of Central Governments, state governments, union territories and local authorities and other official documents and the information available in the finance accounts and other reports of the Comptroller and Auditor General of India. You will read more about public administration and Defence in Unit 18 in Block 7.

Check Your Progress 2

- 1) Mention the main sources of data for the Electricity, gas and water supply subsectors for preparation of national income accounts.

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- 2) How is data obtained for the transport, storage and communications sub-sector to prepare national income accounts?

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17.5 LET US SUM UP

CSO has been continuously publishing annual estimates of national income and related aggregates. Over the year there has been gradual improvement in the availability of data and in the methodology of preparing the estimates. This unit gives the sources of data used by the CSO for preparing estimates of value added for different sectors of the economy.

For sectors like agriculture, forestry, fishery, mining and registered manufacturing the sources for getting the value of outputs and inputs have been listed. Among the listed sources Area and production of Principal Crops in India and ASI are the major ones. For sectors where income approach is followed, i.e. where value added is equal to the products of work force and value added per worker, the major sources for unorganised parts of the sectors are the 1981 population Census for getting work force estimates for the benchmark year and the follow-up surveys of the economic Census for getting the value added per worker. For getting the estimates of value added for public sector, various annual reports and documents of the budget are analyzed and the estimates are based on the current data. For carrying forward the benchmark year estimates of the Unorganised sector to other years a number of physical indicators are used for different economic activities. The indicators used in many cases require improvements and the estimates are not reliable.

17.6 ABBREVIATIONS USED

ASI	Annual Survey of Industries
DES	Directorate of Economics and Statistics
CSO	Central Statistical Organisation
GVA	Gross Value Added
NVA	Net Value Added
CCS	Cost of Cultivation Studies
ILS	Indian Live Stock Census
DMI	Directorate of Marketing and Inspection
NSSO	National Sample Survey Organisation
IASRI	Indian Agricultural Statistics Research Institute
AIDIS	All India Debt and Investment Survey
FAI	Fertilizer Association of India
PAI	Pesticides Association of India
CEA	Central Electricity Authority
SAHD	State Animal Husbandry Departments
SFD	State Fishers Departments
IBM	Indian Bureau of Mines
DE	Directory Establishments
OAE	Own-Account Enterprises
NAS	National Accounts Statistics

17.7 SOME USEFUL BOOKS

Bhatia, D.P. (1996) *National Accounting: Concepts and Estimates*, Khann Publishers, New Delhi.

Agarwala, S.K. (1998) *National Income Accounting*, Bookland Publishing Company, New Delhi.

Roy Choudhury, Uma Dutta (1995) *National Income Accounting*, Macmillon, New Delhi.

17.8 ANSWERS OR HINTS TO CHECK YOUR PROGRESS EXERCISES

Check Your Progress 1

- 1) See subsection 17.2.1
- 2) See subsection 17.3.1

Check Your Progress 2

- 1) See subsection 17.4.1
- 2) See subsection 17.4.3