

CONCEPTS AND DEFINITIONS

A. Productivity indicators

1. Real output

Real output is defined as value added at constant basic prices. Value added is the value of any industry's final output less its purchases of intermediate products, raw materials and services. Value added is also equal to the amount available for distribution to the factors of production in the form of wages and salaries, profits, allowance for depreciation, interest and dividends.

Output index shows the rate of change in production as compared to a chosen base period.

$$\text{Output index} = \frac{\text{Value added (constant price) in year } n}{\text{Value added in base year}} \times 100$$

2. Employment/Labour input

Employment/Labour input is most appropriately measured by hours worked and its price by average compensation per hour. However, due to lack of data, the total number of persons engaged, defined as employers, own account workers, contributing family workers and employees in any type of economic activity is used. Prior to 2000, employment for year n was calculated as the average of employment at June of year (n) and June of year (n+1). As from 2000, average employment for a given year is available and thus the data has been used for the computation of labour input.

The labour input index shows the rate of change in employment.

$$\text{Labour input index} = \frac{\text{Average number of persons engaged in year } n}{\text{Average number of persons engaged in base year}} \times 100$$

3. Capital input

In the absence of data on services provided by capital, an estimate of stock of fixed capital is used. Capital refers to the net stock of investment in reproducible fixed assets. Reproducible fixed assets are investments in residential and non-residential building (excluding land), infrastructural work, machinery and equipment.

The standard **Perpetual Inventory Method (PIM)** has been used for the estimation of the net Capital Stock. Further details on the PIM approach are given in the section on estimates of capital stock.

Capital input index shows the rate of change in capital. This estimate uses net capital stock at constant prices.

$$\text{Capital input index} = \frac{\text{Stock of fixed capital in year } n}{\text{Stock of fixed capital in base year}} \times 100$$

4. Multifactor input

The multifactor input is a weighted combination of inputs, namely labour and capital. Part of compensation of employee in value added is used to weigh labour and the remaining is used to weigh capital.

5. Labour productivity

Labour productivity is conventionally measured as the ratio of real output to labour input. Although this measure relates output to the number of employees, it does not measure the specific contribution of labour as a single factor of production. Rather, it reflects the joint effects of many influences, including new technology, capital investment, capacity utilisation, energy use, and managerial skills, as well as the efforts of the workforce.

Labour productivity index shows the rate of change in output per person engaged.

$$\text{Labour Productivity Index} = \frac{\text{Output index}}{\text{Labour input index}} \times 100$$

6. Capital productivity

Capital productivity is the ratio of real output to stock of fixed capital used in the production process. This index should be interpreted with care since partial measures can be very misleading if taken alone, as they include amongst other factors, the effects of the substitution of one resource for another, such as capital for labour.

The capital productivity index shows the rate of change in output per unit of capital.

$$\text{Capital Productivity Index} = \frac{\text{Output index}}{\text{Capital input index}} \times 100$$

7. Multifactor/Total Factor productivity

The limitation of partial productivity measures such as labour and capital, is that they attribute to one factor of production changes in efficiency that are attributable to other factors. Multifactor productivity (MFP) reflects many influences including qualitative factors such as better management and improved quality of inputs through training and technology. MFP index shows the rate of change in “productive efficiency” and is obtained as the ratio of output to multifactor input that is a weighted combination of labour and capital inputs.

$$\text{MFP index} = \frac{\text{Output index}}{\text{Multifactor input index}} \times 100$$

$$A(t) = \frac{Q(t)}{\{WL(t) \times L(t)\} + \{WK(t) \times K(t)\}} \times 100 \text{ where}$$

A(t) = Multifactor productivity index in time t

Q(t) = Output index in time t

WL(t) = Labour's input share in time t (ratio of compensation of employees to value added)

L(t) = Labour input index in time t

$$WK(t) = 1 - WL(t)$$

K(t) = Capital input index in time t

8. Capital-labour ratio

The Capital-labour ratio gives the proportion of stock of fixed capital to labour inputs. If the ratio increases, capital deepening takes place whilst, when it declines capital widening occurs.

$$\text{Capital-labour ratio} = \frac{\text{Real fixed capital utilised in an industry}}{\text{Number of persons engaged in the industry}}$$

9. Capital-output ratio

The capital-output ratio represents the units of capital required to produce one unit of output. This ratio indicates how efficiently investment is contributing to economic growth.

$$\text{Capital-output ratio} = \frac{\text{Real fixed capital stock in a specific year}}{\text{Real GVA for the same year}}$$

10. Labour cost index

The compensation of employees is used as a proxy for labour cost as it is more readily available from national accounts data. It includes wages and salaries in cash and kind, bonus, overtime and social contribution incurred by employers.

11. Unit labour cost index (ULC)

Unit labour cost is the remuneration of labour (compensation of employees) to produce one unit of output. It is computed as the ratio of the labour cost index to an index of production. The index shows the rate of change in labour cost per unit of output.

$$\text{Unit labour cost index} = \frac{\text{Labour cost index}}{\text{Output index}} \times 100 \text{ or } \frac{\text{Average compensation index}}{\text{Labour Productivity index}} \times 100$$

For Competitiveness purposes, the exchange rate effect has to be taken into account. ULC is therefore computed both in local currency and in US dollar.

$$\text{ULC index (US \$)} = \frac{\text{ULC index (MUR)}}{\text{Exchange rate index of MUR/ US \$}}$$

12. Hourly Labour cost

Hourly Labour cost is the ratio of compensation to total hours worked, inclusive of overtime. Compensation of employees comprises wages & salaries in cash and in kind, bonus, overtime and social contribution incurred by employers. The source of data is the Survey of Employment, Earnings and Hours of work.

B. ECONOMIC PRODUCTIVITY MEASURES ACCORDING TO THE RAMSAY PRODUCTIVITY MODELS (RAPMODS)

Economic Productivity is conceptualized as follows:

It is the units of monetary value achieved as “Output” or “Value Added” by a conversion system such as manufacturing, mining, processing, service, government and the like, covering all economic systems, for unit monetary value of input of any specific resource or a set of resources or aggregate of all input resources consumed by the conversion system.

The Economic Productivity Measures outlined in the RAPMODS System are based on both System Output (Gross Output) and System Value Added (Value Added).

1. Total / Overall Productivity Measure (TPM / OPM)

Total / Overall Productivity Measure (TPM / OPM) measures the output (Gross Output / Value Added) achieved per unit value of Total System Input (TSI) or all input resources.

All Input Resources = Intermediate Consumption + Compensation of Employees +
Other Taxes

$$\text{Total Productivity Measure} = \frac{\text{Gross Output}}{\text{All Input Resources}}$$

$$\text{Overall Productivity Measure} = \frac{\text{Value Added}}{\text{All Input Resources}}$$

2. Factor Productivity Measure (FPM)

Factor Productivity Measure is the output achieved per unit of currency spent on a specific item of factor input. The Factor Productivity Measure of Compensation of Employees is defined as the output (Gross Output or Value Added) produced per unit value spent as Compensation of Employees.

$$\text{Factor Productivity Measure of Compensation of Employees (FPM}_{\text{Comp. based on GO}}) = \frac{\text{Gross Output}}{\text{Compensation of employees}}$$

$$\text{Factor Productivity Measure of Compensation of Employees (FPM}_{\text{Comp. based on VA}}) = \frac{\text{Value Added}}{\text{Compensation of employees}}$$

3. Productivity of Intermediate Consumption (Z_1 / Z_2)

Productivity of Intermediate Consumption measures the Output (Gross Output or Value Added) achieved per unit value spent as Intermediate Consumption.

$$\text{Productivity of Intermediate Consumption (Z}_1) = \frac{\text{Gross Output}}{\text{Intermediate Consumption}}$$

$$\text{Productivity of Intermediate Consumption (Z}_2) = \frac{\text{Value Added}}{\text{Intermediate Consumption}}$$

4. Exchange rate

The exchange rate quoted at a certain time is the nominal exchange rate. Although many international transactions take place in US dollars, it is often necessary to get an indication of the average movement of the local currency against that of its major trading partners. This is desirable as the exchange rate may appreciate against some and depreciate against others.

5. Export ratios

5.1 Openness

The openness of the economy is given by the ratio of total trade “exports of goods & services + imports of goods & services” to GVA.

$$\text{Openness} = \frac{\text{Exports of goods \& services} + \text{Imports of goods \& services}}{\text{Domestic production (GVA)}} \times 100$$

5.2 Net export ratio

$$\text{Net export ratio} = \frac{\text{Exports of goods \& services} - \text{Imports of goods \& services}}{\text{Domestic production (GVA)}} \times 100$$

If the net export ratio declines it could mean

- (i) deterioration in the terms of trade
- (ii) structural shift in production from less import intensive to higher import intensive industries i.e. capital intensive technology.
- (iii) export markets are being eroded
- (iv) export incentives have been reduced.

5.3 Net export to export ratios

$$\text{Net export to export ratio} = \frac{\text{Exports of goods \& services} - \text{Imports of goods \& services}}{\text{Exports of goods \& services}} \times 100$$

If the net export to export ratio declines it could mean

- (i) deterioration in the terms of trade
- (ii) structural shift in production from less import intensive to higher import intensive industries i.e. capital intensive technology.
- (iii) higher value added to relatively lower value added activities
- (iv) higher import intensity of exports.

5.4 Export growth, market growth and market penetration (evolution of market share)

If the share of a country's (Mauritius) export growth of a product or service (say T-shirts) in the market in which it is sold, equals the growth of the imports of the buying country, it can be said that the exporting country (Mauritius) is maintaining its share of the market growth. If the growth is higher, the exporting country (Mauritius) is penetrating the importing country's market. On the other hand, if the growth is lower, the exporting country is losing its market share.

C. Estimates of capital stock

1. The Perpetual Inventory Method (PIM)

The Perpetual Inventory Method (PIM) has been used to produce estimates of the value of the stock of capital assets used in the production process. Capital assets refer to tangible reproducible fixed assets which include building (excluding land), infrastructural work, machinery and equipment. The PIM requires current price estimates of Gross Domestic Fixed Capital Formation and price indices over many years, and assumptions about the expected lifetime of the respective assets as shown at paragraph 3.

The PIM produces annual estimates of gross and net capital stock at constant and current prices by accumulating past flows of expenditure on Gross Fixed Capital Formation (GFCF).

2. Consumption of fixed capital

Consumption of fixed capital is a cost of production. It may be defined in general terms as the decline, during the course of the accounting period, in the current value of the stock of fixed assets owned and used by a producer as a result of physical deterioration, normal obsolescence or normal accidental damage.

Gross capital stock is the accumulation of past investment flows less retirements before deduction of any allowances for consumption of fixed capital.

Net capital stock is gross capital stock less accumulated capital consumption on items forming the gross capital stock.

Annual estimates of consumption of fixed capital have been derived using the **Straight Line Method**. The straight line method is recommended in the System of National Accounts (SNA). The straight line depreciation function assumes a linear decline in efficiency, that is, it exhibits the same loss every year until the service life ends when efficiency declines to zero.

3. Assumption used for mean asset life by type

Type of asset	Mean asset life
A .Construction Work	
	Age
Residential building	30 years
Non residential building	40 years
Other construction work	60 years
B. Transport equipment according to type / sector	
Motor car	8 years
Other transport equipment by sector	
Agriculture	15 years
Manufacturing	8 years
Air / Sea Transport	20 years
Other sectors	12 years
C. Other machinery and equipment by sector	
Agriculture	15 years
Manufacturing	8 years
Financial services	5 years
Public utilities	20 years
Other sectors	12 years

Flow Chart of the PIM process (Perpetual Inventory Method)

