CHAPTER IV

SOURCE OF DATA AND MEASUREMENT OF VARIABLES

The Census of Indian Manufacturers (CIM) conducted from 1946 to 1958 was confined to only 29 out of 63 groups of industries. The census covered all registered (under the Factories Act, 1948) factories employing 20 or more workers and using power. Annual Survey of Industries (ASI) is conducted since 1959 under the Authority of Collection of Statistical Act 1953 in accordance with the provision of the collection of statistics (central) Rules 1959 framed there under. Coverage of ASI extends to the entire “Factory Sector” comprising all units (called factories) registered under sections (i) and (ii) of the Factories Act 1948. Establishments under the control of the Defense Ministry, oil storage and distribution units, restaurants, cafes and technical training institutions not producing anything for sale or exchange are kept outside the purview of the ASI. The ASI census covers all registered firms employing 50 or more workers with the aid of power or 100 or more workers without the aid of power.

From 1973-74 onwards National Industrial Classification (NIC) is being adopted instead of ASI classification. In the NIC, the manufacturing sector is divided into 24- two digit major groups which are further divided into 180 -three digits groups. Data on vacuum pan Paper industries are published under code NIC-280. The reference period is accounting year of the factories closing accounts on any day during the 1st April and 31st March.
The basic data source for this study is the Annual Survey of Industries (ASI). This study covers the period from 1979-80 to 1997-98. ASI have published data on gross fixed capital, working capital, number of employees, man days worked, input used, outputs, wages, salaries and money value added, etc., for the Paper industry at the national level.

ASI provides data on total employees. This is computed by taking total attendance of persons in all the shifts on all the working days and dividing it by the number of days worked. Break-up of 'total employees' is available into 'workers' and 'persons other than workers'. The latter category of employees includes supervisors, technicians, managers, clerks and other similar type of employees. ASI also provides information on man-hours worked. This is calculated by multiplying the number of workers employed in each shift by 8 hours and aggregate the products for all shifts on all the working days in the year.

Payment to employees is given under three heads:

i) Payment to workers

ii) Payment to other than workers and

iii) Money value of benefits.

The money value of benefits includes net cost of the concessions in respect of supplies made or services rendered such as housing, food grains, medical, educational
ASI separately provides information on materials consumed. Materials consumed represents the total delivered value of raw materials, chemicals, packing materials and stores which actually entered into the production process.

ASI provides information on gross value of inputs. It is the sum of gross value of materials and fuels, electricity, light and lubricant, etc., consumed, work done by other concerns, products reported for sales last year but used for further manufacture, incidental expenditure on purchase of materials, etc., non-industrial services purchased, depreciation and purchase value of goods sold in the same condition as purchased. Non-industrial services include audit fee, accounts and bank charges, legal expenses, insurance charges, local rates, factory licenses, etc., Depreciation is calculated at the rates allowed by Income Tax Authorities for assessing taxable income.

Gross value of output is arrived at by adding the value of products and by-products manufactured for sale, work done for customers and sale value of goods sold in the same condition as purchased and is adjusted for the difference in stock of semi-finished goods at the beginning and at the end of the survey year. Ex-factory value (exclusive of taxes, duties, etc., on sale and inclusion of subsidies etc., if any) of output is net of transportation charges from factory and selling agents commission.
Value added by manufacture represents that part of the value of the products which is created in the factory and is computed by deducting from the gross ex-factory value of output, the gross value of input.

**Output:**

For the measurement of productivity output is measured in three ways. 1) Real gross value of output 2) Real value added and 3) Physical quantity of production. The real gross value of output is arrived at by dividing the gross value of output by index of whole sale price of paper\(^1\). Alternatively real value added is used as output. Gross value added is arrived by subtracting gross value of input excluding depreciation from the gross value of output. Even though net value added figures are more relevant for studying production characteristics it is decided to work with gross figures because of highly arbitrary nature of the depreciation charges in the Indian Industries\(^2\).

Value added is arrived at by subtracting gross value of input including depreciation from the gross value of output. The real value added is arrived at by dividing the value added by the wholesale price index of paper. Physical quantity of output is also used for the measurement of partial factor productivity indices. For the measurement of total factor productivity and production function output is measured in real value added.
INPUTS

I Labour Input: -

Regarding the measurement of labour input four alternatives are available: 'employees', 'Workers', 'man-hours' and 'total emoluments'. In the present study 'employees' and 'man-hours' is used for the measurement of partial factor productivities. For the measurement of total factor productivity and production function employees is used as a measure of labour input. It has been argued that employees other than workers are as much important for getting the work done as the workers who operate the machines and therefore their services should be taken into account in the measurement of labour input. Data on man-hours are considered to be unsatisfactory on two grounds. Multiplying the number of workers in a shift arrives at one is that man-hour series covers only workers and the other is that man-hour by eight and not the actual duration of the shift.

II Material input: -

Material input is measured in terms of value at constant base year price. It is equated to the residual after subtracting fuel etc., consumed and depreciation from the gross value of input. The values of raw materials at current prices are converted into constant base year price (1979-80=100) by deflating them by paper price index for the deflators the source is the various issues of reserve banks of India bulletin.
III Capital input:-

Value of gross fixed capital stock at constant prices has been taken as the measure of capital input. The book value of gross capital stock (Fixed capital depreciation) reported in ASI 1979-80 as the base year capital stock. Method of estimation of capital input of Paper Industry is as follows:

To estimate the growth of gross fixed capital in the subsequent period, annual additions are calculated by subtracting previous year fixed capital from current year fixed capital. These additions are deflated by the wholesale price index of machinery and transport equipment. The series of gross capital stock has been obtained by adding to the base year value of gross fixed assets, the annual deflated additions in subsequent years. Evidently, net capital stock (Net of cumulated depreciation allowance) is a better measure of its basic capacity to contribute to production and revenue than gross stock.

For the reasons mentioned earlier, the amount of depreciated allowed for in each year does not form an economically meaningful category. In fact, George Rosen observe that in under-developed countries, a machine is probably more often used at approximately constant levels of output for a period far beyond the accountancy lift of the machine measured by normal depreciation. Until it is eventually, discarded or sold for scrap. Under these circumstances, gross rather than depreciated value of the stock would be more closely related to the capital services consumed by the industry.
The partial and total factor productivity ratios without correcting the capital figures for capacity utilization are carried out. For the estimation of production function, the capital figures used are adjusted for capacity utilization.
FOOT NOTES

1. A separate wholesale price index of paper for the period 1979-80 to 1997-98 is worked out by taking 1979-80 as the base year.

2. Sinha and Sawhney (1970), Mukherjee (1975) etc., have also used real value added as output.

3. The unadjusted base year capital figure for variations in prices at which in different components were acquired results in an under estimate of the base year figure of capital stock and therefore, leads to an over estimation of increase in capital stock in the subsequent years.

4. The procedure for the estimation of growth of gross fixed capital is similar to Banerjee (1975).


6. Working capital is excluded from the measure of capital as its relation to the growth of output is less influenced by technical factors than the relationship of fixed capital and output. Working capital used in a factory is determined by other than the techniques of production i.e., supply of production.

7. Whenever we use capital in production function, it must be adjusted for capacity utilization because what belongs in a production function is capital in use and not capital in place. Estimation of production function without correcting capital for capacity utilization did not yield satisfactory results.