CHAPTER - II

CONCEPTS AND REVIEW OF LITERATURE

2.1 Concepts of Capacity utilisation

2.2 Review of Literature
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2.1 Concepts of Capacity Utilisation

Capacity utilisation is an index of the efficiency of an industry. In order to make an industry economically viable as well as to increase its productivity and return on investment it is indispensable that the capacity of the plant and machinery should be fully utilised. It has been noticed that the installed capacity is often up-rated or down-rated, depending upon the condition of plant and machinery, manpower constraints, power consumption, number of shifts worked etc.¹

By capacity of cotton textile industry we mean the installed capacity of cotton textile normally. In the beginning cotton spinning textile unit is given a certain licensed capacity which the management may install. The installed capacity may be less than the licensed capacity operationally and practically, the concept of installed capacity is, therefore, the more relevant one. The capacity of the factory may increase over a period of time due to modernisation of the old plant.

In actual practice the full physical capacity is difficult to be used we therefore use the concept of operating rate. It is "The ratio of physical output of physical capacity. The operating rate is the key factor in evaluating the short-run business outlook especially with regard to investment in facilities for expansion. Moreover the direction of the operating rate whether up or down may have an impact on industrial prices." In other words, "the ratio of actual physical output to potential production that is the proportion of current operation to output of full capacity".

The choice of a capacity size is usually the result of capital budgeting decisions, which are reached after studying the expected impact of those capital outlays on operations over a number of years. Although it can be defined and measured in a particular situation, capacity is an illusive concept".

¹ http://cag.nic.in/reports/commercial/1999-book1/chap5.htm
2.1.1 Meaning of Capacity

Capacity, being the ability to produce work in a given time, must be measured in the unit of work. The capacity of a production unit (e.g., machine, factory, spindles) is its ability to produce or do that which the customer requires. In production and operation management, three types of capacity are often referred to:

a. **Potential capacity**: The capacity that can be made available to influence the planning of senior management (e.g. in helping them to make decisions about overall business growth, investment etc). This is essentially a long-term decision that does not influence day-to-day production management.

b. **Immediate capacity**: The amount of production capacity that can be made available in the short-term. This is the maximum potential capacity-assuming that it is used productively.

c. **Effective capacity**: An important concept. Not all productive capacity is actually used or usable. It is important for production managers to understand what capacity is actually achievable.²

The success of any firm does not lie in its installed capacity but in its actual utilisation. Otherwise, the capital invested therein remains dead or idle to the extent of non utilisation. Utilisation of capacity offers a realistic and fair view of unit’s performance. The researcher has made an attempt to find out the position of capacity utilisation in the process-wise units, and the factors responsible for such a phenomenon.

As the present study relates to the problem of capacity utilisation, we feel it necessary to elaborate the various concepts and theoretical background relevant for this study.

a. A firm working in the perfect competitive market attains its capacity output at the minimum of the average cost curve. Klein³ defined capacity of the output level associated with full competitive equilibrium. In the following diagram the economist’s concept of capacity is depicted.


In the diagram OQ is the capacity output. At the capacity level of output or equilibrium point marginal cost, average cost, price and marginal revenue all are equal. It results in zero excess profit at the capacity level of output. (Here MC = AC = P = MR = AR).

b. The output which may be produced at minimum average cost is defined as capacity by Hickman. He considers prevailing factor prices, organisation of production and plant size as given. The factors affecting capacity output at any given time are size of capital stock, state of technology and factor prices.

c. Frank de Leeuws, defined capacity output in the terms of marginal cost. According to his opinion capacity output is that level of output at which short run marginal costs are “X” percent above minimum short run average total cost. It means capacity output represents as point at which cost of an additional unit of output is above the most efficient unit cost. The value of “X” would be the same for all firms and would be selected on the empirical basis. The empirical relationship between capacity utilisation and other variables for alternative “X”s and high level of X may serve the initial purpose.

This version has advantage of the exceptions about the relationship of capacity utilisation to investment, prices and other variables. It also has the advantage of choice of

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selection of what should not be. However, there is a problem of determining the most efficient unit cost and rarely can it be used in practice.

d. Technical concept of capacity: Under this approach an uninterrupted flow of inputs like labours, raw materials and the normal organisation of production have been implicitly assumed. The capacity output is the production how associated with the input of fully utilised manpower, capital and other relevant factors of production.

If \( X = \text{output}, N = \text{labour}, K = \text{existing capital services} \), then \( X = Y(n, k) \), assuming only those two factors of production are used in the process of production. The actual output will depend on the labours and capital services \( (d) \) actually used.

Then, \( X = f(n, d) \)

Under the technical concept of capacity only technical relations (production function) are stressed and costs are not considered.\(^6\)

e. Creamer (1961),\(^7\) defined capacity of a sector as “Given a particular conglomerate of capital (in physical sense) in a sector, certain range of output rates for the product would be carried on, with the existing facilities, there being no tendency to add capital due to output variations alone, at some rate of output, however, there will be a tendency to buy more capital goods. It is this rate of output which is to be called the capacity of a sector”. This concept of capacity for a sector combines both engineers’ and the economists’ approach to capacity. Here capacity is an economic limit to the rate of output with the existing facilities of a sector. It is the rate of output after which capital additions would tend to be made. The economic limit may coincide with the technical limit. It means output could not be increased in the sector with existing facilities regardless of the costs involved.

f. Winston (1977),\(^8\) defined the concept of capacity of economy level as “The maximum sustainable level of output (per year) that can be getting when an economy’s available resources are fully and efficiently used in the given tastes and technology. While

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aggregating micro units to get capacity at the economy level, the mutual compatibility of
industries should be considered. In this light Klein (1960) defined capacity of economy
level as “that level of output of the economy which cannot be further increased without
additional investment in the industry of which capacity utilisation is 100 percent”.

g. Shrinivasamurthy (1979),9 defined installed capacity as the maximum output that a
plant is capable of producing and is established on the basis of the number of operable
shifts appropriate to the industry concerned. He assumed availability of all the required
inputs.

h. Different versions of installed capacity:

1. Gupta and Thavaraj (1975),10 defined rated capacity as the maximum production
which a given plant can produce under prevailing conditions in the country.

2. With the aging of the plant, the rated capacity may not be attainable considering the
aging of the plant; the maximum possible output is called as the “Attainable
capacity”.

3. The bottlenecks in production like non availability of inputs, even the output with the
attainable capacity cannot be produce. In such condition the maximum output that
can be produced is called as “available capacity”.

4. Licensed capacity means ‘the capacity for which firm has obtained a license from the
licensing authority’.

5. Designed capacity is the capacity of plant in which the technical factor is considered
at the time of installation.

i. Different types of concepts of capacity:

1. The estimated maximum level of production from a plant on a sustained basis
allowing for all necessary shut down and holidays.11

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2. Alternatively capacity means "the potential output of a business with existing plant, workers and equipments. A firm or a factory actually producing at this level is said to be working at full capacity".12

3. Capacity means, the largest output that a firm or industry can produce while operating on its customary schedule and using existing plants and equipment.13

4. The maximum output that a firm can produce with a given amount of factors of production.14

However, it is also admitted that the concept of capacity is not a static one. It is mentioned that the capacity of a factory is an ambiguous concept. It is not like the capacity of a milk bottle which will hold one quart of milk and no more under any circumstances. To be more precise, capacity is a rate of output quantity of output in a given time and it is the highest quantity of output that is possible during that time. Yet capacity is at the same time a dynamic concept which is subject to be changed and managed.15

2.2 Review of Literature

In this chapter, an attempt is made to review some of the existing literature on cotton textile industry and other industry conducted in India.

Some of the earlier studies on various aspects of capacity utilisation in textile industry have been reviewed. Review of such past literature provides a base to the structure of the present study more comprehensive way.

1) The Economic Division of Planning Commission (1955).16 This study is the pioneering work in the capacity utilisation studies in the Indian economy. It covers eight years period from 1946 to 1956 relating to 53 products. The products were classified as consumer goods, durable consumer goods and producer's goods. The Study gives utilisation rates varying from 1 percent to 104 percent. This might be the result of

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unplanned investment prior to 1946. The study highlighted the need of creating balanced capacity. This study used installed capacity approach with the Monthly Statistics on Production (MSP) as its major data source.

2) Prof. Samuel Paul (1955)\(^{17}\), offers explanations for the under utilisation of industrial capacity in Indian economy which could be sought into phenomena such as imperfect competitive market structure, size of the firm, substitute products, imports substitution, raw material allocation, major additions of capacity in the preceding year, strikes, power shortage and transport bottlenecks.

3) Baldwin George B. (1965)\(^{18}\) carried out a study regarding the performance of private and public cotton mills in Karnataka. The researcher has tried to elaborate the importance of some factors like products, employment, technological change, capital equipment and labour management relation in the cotton mills.

4) Mathur P.N., Valavade S. P. and Kirloskar M.P. (1967)\(^{19}\) tried to estimate the optimum capacity in respect of multi product process industries. The optimum capacity was estimated by using Linear Programming on the basis of it optimum production pattern was also estimated. For computing utilisation rates various objective functions like maximisation of production, value added or contribution of overhead costs were considered. They found that 40 to 45 percent of the capacity was being utilised. Apart from considerable amount of unutilised capacity there existed an unbalanced structure of capital equipment. These imbalances in capital equipment the capacity of the units under study were in a position to use only fifty percent. As regards capital imbalance they attributed it to the purchase policy of the management. The uncertainties regarding import policy had promoted the management to buy the machinery as and when it is available. Moreover, the firm did not seek to maximise the utilisation of its machineries as it cannot be replaced.

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In this model while measuring the capacity in machine hours the time lost due to fatigue, rest etc., was not included as such time varies from factory to factory. Moreover the efficiency of the worker was also assumed to be unity which means the actual time required for the performance of job is equal to the standard time required. Despite the limitations of the model the figures of imbalance in the capital equipment are too large to be ignored.

5) Raghunath K. Koti (1968)\(^{20}\), in his study capacity utilisation and factors affecting it in certain Indian industries used survey method and estimated the capacity utilisation for the year 1968. It covered 475 factories and 517 products. The author estimated the economy wide capacity utilisation which was only 50 percent. He pointed out that the lack of demand and shortage of raw materials and components were the major factor responsible for the under utilisation of capacity. As this study was conducted during a recession year it becomes non representative and the figure of underutilisation of capacity might be overestimated.

6) The Installed Capacity Approach by RBI (1969)\(^{21}\) in the study made by RBI, 163 products were covered for the period from 1963 to 1967. These products were grouped into 3 categories: a) chemical, b) metal and engineering and c) others. It was found that the actual output was greater than the capacity output. But in this study for each year overall index of capacity utilisation for the manufacturing sector as a whole was not given. The study used the data given in the reports of Ministry of Petroleum and Chemicals, Annual plans, Indian textile bulletins etc.

7) Hanson J. L. (1971)\(^{22}\) has defined capacity as follows “with reference to a firm or industry it means that maximum output it is capable of producing at a given time with its existing stock of factor of production. A firm or industry can increase its capacity up to a point by introducing more a modern forms of capital or by varying the proportion in which the factors of production are combined.”


\(^{22}\) Hanson J.L., Dictionary of Economics and Commerce. 1971
8) **Samuel Paul (1974)** examined 42 groups of industries of which date is available in monthly statistics of production and annual survey of Industries. He modified the installed capacity approach in his study as the industries in single shift group and double shift group were working more than the reported shifts. He assumed that the industries work for 2.5 shifts per day instead of 2 shifts and in 2 shifts instead of 1 shift. Then utilisation rate was measured as the ratio of actual output to the recomputed installed capacity. He found that the average utilisation rate was about 53 percent for the entire period. For explaining the factors affecting capacity utilisation he used regression analysis. He considered variables like size of the firm, market structure, import substitution, import content of the production and pressure of demand for explaining the variations in capacity utilisation. But fit was found very poor when the products were classified into capital and intermediate goods and consumer goods and the equations were fitted separately, the fit showed improvement by explaining nearly 72 percent variance.

9) **Mitre P. K. (1981)** conducted a study of handloom industry and he concluded that: at present, in India. “The overall capacity utilisation in our textile industry has not been more than 60 percent. The estimated capacity utilisation in mills was 85 percent, in handloom 35 percent and in power looms it was 65 percent.”

10) **The IDBI (1981)** The IDBI estimated the capacity utilisation of 30 industries. These industries were classified as basic industries, capital and intermediate industries and consumer goods industries. Although, the IDBI assisted units account for very small part in the industry’s total output, they have a weightage of 50.80 percent in the general index of industrial production. The IDBI series on capacity utilisation from 1970 onwards shows the declining trend from 1970 to 1975 and from 1975 to 1981 it shows increasing trend. Over the period the capacity utilisation was 70 percent.

11) **Modi K. N. (1982)**, carried out a study under the title modernisation without tears in which he has evaluated causes for dissatisfactory performance of the textile industry in

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export market. He has considered the necessity of modernisation with some other measures in revitalising the industry. In his opinion, producing quality goods of international standards increasing productivity and reducing cost are necessary steps to find a place in the export market.

12) The Economic Intelligence Service (1982)\(^{27}\) The Centre for Monitoring Indian Economy (CMIE) conducted capacity utilisation study of 226 products. It used installed capacity approach for estimating product wise utilisation rates. This study used the data available from MSP, ASI, company reports and bulletins. It was observed that the overall the decade from 1970 to 1980 the capacity utilisation rate declined from 85.2 percent to 76.8 percent.

13) Gupta L. C. (1983)\(^{28}\) Conducted a study of sick units for the Planning Commission of India and pointed out major reasons for the sickness of industrial units, such as licensing of capacity unrelated to demand, price distribution controls and infrastructural constraints. The study in its report also referred as to how the management is a responsible for sickness in industries.

14) The USA’s International Trade Commission Report (1986)\(^{29}\), conducted a detailed study on Textile in India. The commission presented a detailed profile of Indian textile mills structure, installed capacity production, employment and wages, plants and equipment, investment, expansion and Government policy from 1976 to 1983. The study concludes that expansion in the organised sector was not significant because of Government policies, which aimed at protecting handloom and power loom sectors providing much needed employment in rural areas.

15) Dave Nalini V. (1987)\(^{30}\), conducted a comprehensive study on industrial sickness and key areas of management in textile industry. She presents in textile industry examining strengths and weakness of management practices in selected units in Gujarat. Besides making some suggestions to change in Government Policy towards

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\(^{27}\) Economic Intelligence Service., Production and capacity utilisation in 600 industries 1970 to 86 CMIE Bombay, 1982 (various issues).


textile industry, she has offered some suggestions for improving the quality of management in the textile units, as she considers, quality of management is an important determinant of health of an enterprise.

16) Srivatsava S. K., Neogi, V. and Vishnoi H. K. (1990)\(^{31}\), have made an attempt to analyse the major environmental changes responsible for textile crisis in India which have caused many of the mills in getting sick or closed. They felt the necessity of total restructuring of the textile industry to face competition. They have suggested that the management should follow a totally well targeted consumer oriented approach. Their survey reveals that textile mills with high profitability also have high productivity of machine and labours.

17) Bishwanath Goldar and V.S. Ranganathan (1991)\(^{32}\). The capacity utilisation, one disquieting feature of Indian industry has been, and is, the existence of substantial unutilised production capacities in many branches of the industrial economy. For a capital scarce economy, as India is, such under utilisation of capacity is a waste of a scarce resource, which is obviously a matter of serious concern. Needless to say that with better utilisation of capacity output, employment, income generation, etc., should have been higher than what it is at present. Also, this would have lowered the cost of production of industrial products and thus helped in relaxing the demand side constraints on industrial expansion.

18) Paul (1991)\(^{33}\) investigated into the causes of under utilisation, estimated a multiple regression equation (explaining inter-industry differences in capacity utilisation) using cross sectional data for 39 industrial groups for the year 1965. He employed two sets of explanatory variables in the multiple regression equation. The first set reflected industry characteristics and the second the influence of government policies. Market structure, pressure of demand and the size of firm (capital intensity) constituted the first set, while, import substitution (ratio of imports to supply), effective rate of protection and import content of production constituted the second set. He found a statistically significant


relationship between capacity utilisation and all the six explanatory variables. A positive relationship was found between demand pressure and capacity utilisation and a negative relationship between effective rate of protection and capacity utilisation.

19) Sonjib Pohit and Raghavendran Satish (1995). In this study the capacity utilisation index attempts to capture the efficiency aspect of the manufacturing enterprise. It provides insight into the performance of manufacturing enterprise and also aids in identifying factors which influence industrial growth. For this reason, the problem of capacity and its utilisation have received considerable theoretical attention from western economist. In India, during the formulation of the second five year plan, Vakil (1955) focussed attention on this problem.

While, these studies have attempted to analyse capacity utilisation by various approaches, it is important and desirable to consider alternative measure and evaluate them before forming a judgment about the extent of capacity utilisation. Only, one study Sastry (1980) has so far made an attempt to analyse comparative empirical evaluation for cotton mill industry in India.

20) Sharma B. D. (1998) in his study highlighted the capacity utilisation of agro industries. He stated that in the sphere of capacity utilisation, co-operative sugar factories stand out with distinction when compared with those in other sectors. Their capacity utilisation in 1989-90 was 93.4 percent against 78 percent of others. He emphasised the way of co-operative agro-industrial units have succeeded in providing benefits at large.

21) Dhananjaya R. S., Narmad G., and Savithri (2007), studied the total factor productivity in the Indian textile industries and explained how textile industries with better Total Factor Productivity (TFP) rates exert positive influence on the industrial structure and pave way for achieving diversified manufacturing activity in a nation. They estimated the Divisia-Index of TFP in their study for 19 selected units. They have

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highlighted that higher rates of technical efficiency in the process of manufacturing would strengthen their international commodity competitiveness.

Despite its significance, the issue of capacity under utilisation in Indian industries has not received much attention of the researchers. There have been only a few empirical studies on this aspect and most of them are now out dated. The studies have been concerned mainly with the measurement of excess capacity and with the variations in the rates of capacity utilisation across industries and over time. Relatively much less attention has been paid to the causes of under utilisation.