Chapter II

CONCEPTUAL AND THEORETICAL FRAMEWORK

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**INTRODUCTION**

In India, the political economy of SMEs is quite pronounced. The historical reason is that the small industry movement and public policy in the country emerged as an inalienable part of the freedom movement. This influence of politics on economic policy was amply clear during the subsequent Nehru era when the small industry policy was very much a part of the “socialistic pattern of society” envisaged. The liberalization era was major departure from this tradition.

The liberalization policy kick started in 1919, involved some major changes. The ‘socialistic pattern of society’ gave place to an era of market-driven policies. Employment generation became a subsidiary goal in relation to growth. The political economy dimension of small industry development was significantly replaced by simple economics, which focused on ‘competitiveness’ as the golden rule.

In India, small industry refers to the manufacturing activity. Recently, it has also come to include, to a limited extent, servicing activities such as repair and maintenance shops and few community services. It does not include wholesale and retail trading as is done in Japan or the U.K.
CONCEPTUAL CLARIFICATION OF SME IN DIFFERENT COUNTRIES

<table>
<thead>
<tr>
<th>Country</th>
<th>Terminology</th>
<th>Scope</th>
</tr>
</thead>
<tbody>
<tr>
<td>Japan</td>
<td>Small Enterprise</td>
<td>Manufacturing, Mining, Services, Trading</td>
</tr>
<tr>
<td>India</td>
<td>Small Scale Industry (SSI)</td>
<td>Manufacturing, Repair and maintenance</td>
</tr>
<tr>
<td>Korea</td>
<td>Small Enterprise</td>
<td>Manufacturing, Mining, construction, Commerce,</td>
</tr>
<tr>
<td>USA/Canada</td>
<td>Small Business</td>
<td>Manufacturing, Commerce, construction, Mining, Transport</td>
</tr>
<tr>
<td>Indonesia</td>
<td>Small Industry</td>
<td>Manufacturing, services</td>
</tr>
</tbody>
</table>

(Source Dr. Vasanth Desai:SSI)

As is clear from the above table, the scope of the small industry in India is rather narrow as compared to other countries.

In the Indian set up, the industry universe can be divided into various segments - factory sector (large-scale-units-non SSI’s) factory sector (Small scale units) and the village and small industries sector (VSI). As mentioned earlier, SSI units are defined on the basis of investment in plant and machinery with upper ceilings and no minimum investment is prescribed at the lower end. The VSI sector covers a wide range of industries that differ from one another in terms of the nature of products manufactured, techniques used, scale of production, location and marketing.

The VSI sector has further been divided into two broader sectors, namely:

- Modern Small scale industries
Traditional industries

Modern SSI are mostly those units that use power driven machinery and possess better production techniques as compared to traditional sector units. These units are generally located in close proximity to large industrial centers or urban areas.

Further, SSI units under Small Industries Development Organisation (SIDO) comprise the residual industrial units that are not covered by any assistance programme of the sector-specific statutory bodies, namely, handicraft, handloom, sericulture and coir. However, some units under the Khadi and Village Industries Commission (KVIC) are registered with the State Directorate of Industries as SIDO units.

**SEGMENT OF SSI:**

- Small scale industrial undertakings
- Export oriented SSI units
- Ancillary industrial undertakings
- Tiny enterprises
- Small-scale services and Business enterprises
- Power looms

The definition of small enterprises varies from one country to another. In most of the countries of the world, the criterion for defining a small enterprise is related to the size of employment. In USA, small business is one, which has employment of less than 500 people. In UK it is 20 skilled workers, in Germany less than 300 workers, in Sweden and
Italy less than 50 and 500 people respectively. In some countries, say Japan and South Korea both employment and investment are taken into account.

The definition of the small industry is an important aspect of the government policy as it identifies the target groups. The first official criterion for small-scale industry dates back to the second five-year plan when it was in terms of gross investment in land, building, plant and machinery and the strength of the labour force. Subsequently, on the recommendation of the Federation of Association of Small Industries of India (FASII), an apex level organization of the small-scale industry was set up under the aegis of the Ford Foundation team, where in only the investment in fixed assets in plant and machinery, whether held in ownership terms or by lease or by hire purchase, instead of fixing the limit on overall investment, was considered for granting the status of a SSI unit. From time to time, there have been many changes in the ceiling limit of investment in plant and machinery. In the beginning, for an SSI, the investment level was Rs.5 lakhs and employment limit less than 50 persons when using power and less than 100 persons without using power.

**Different segments of SSI’s have been defined as under:**

**Ancillary Industrial Undertaking:** An industrial undertaking engaged in the manufacture of parts, components, subassemblies or rendering of
services is termed as ancillary undertaking. The ancillary undertaking has
to supply or render not less than 50 percent of its production or services,
as the case may be, to one or more other industrial undertakings. The
investment in plant and machinery whether held in ownership terms or on
lease or on hire purchase, should not exceed Rs.30 million.

**Tiny enterprise:** A unit is treated as tiny enterprise where investment in
plant and machinery does not exceed Rs.25 million, irrespective of the
location of the unit of Small-scale (industry related) services and
Business Enterprises (SSSBE), Enterprises rendering industry related
service/business with investment up to Rs.0.5 million in fixed assets,
excluding land and building are called SSSBE.
### SMES in Other Countries of the World - A Global View

<table>
<thead>
<tr>
<th>Country</th>
<th>Category of Industry</th>
<th>Criteria/Country’s Official Definition</th>
<th>Measure</th>
</tr>
</thead>
<tbody>
<tr>
<td>USA</td>
<td>Very small enterprise</td>
<td>&lt;20 employees</td>
<td>Employment</td>
</tr>
<tr>
<td></td>
<td>Small Enterprise</td>
<td>20-99 employees</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Medium</td>
<td>100-499 employees</td>
<td></td>
</tr>
<tr>
<td>Canada</td>
<td>Enterprise</td>
<td>Independent firms having &lt;200 employees</td>
<td>Employment</td>
</tr>
<tr>
<td>Mexico</td>
<td>Manufacturing</td>
<td>&lt;15 employees and gross income/sales&lt;US $175,000</td>
<td>Employment</td>
</tr>
<tr>
<td></td>
<td>Micro</td>
<td>15-99 employees and gross income/sales&lt;US $175,000</td>
<td>Employment</td>
</tr>
<tr>
<td></td>
<td>Small</td>
<td>100-249 employees and gross income/sales&lt;US $3,500,000</td>
<td>Employment</td>
</tr>
<tr>
<td></td>
<td>Medium</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Belgium</td>
<td>SME</td>
<td>Annual staff average of 50 employees, annual turnover (VAT excluded) ECU-4.2 million, balance sheet total of EUC 2.1 million</td>
<td>Employment</td>
</tr>
<tr>
<td>Denmark</td>
<td>Manufacturing</td>
<td>&lt;500 employees. Production units with more than 5 employees</td>
<td>Employment</td>
</tr>
<tr>
<td>France, Germany &amp; Greece</td>
<td>SME</td>
<td>10-499 employees</td>
<td>Employment</td>
</tr>
<tr>
<td></td>
<td>SME</td>
<td>&lt;500 employees</td>
<td>Employment</td>
</tr>
<tr>
<td></td>
<td>Small Enterprises</td>
<td>&lt;50 employees</td>
<td>Employment</td>
</tr>
<tr>
<td></td>
<td>Type</td>
<td>Employees</td>
<td>Employment</td>
</tr>
<tr>
<td>-------------</td>
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</tr>
<tr>
<td>Ireland</td>
<td>SME</td>
<td>&lt;500</td>
<td>Employment</td>
</tr>
<tr>
<td>Italy &amp;</td>
<td>Small Enterprises</td>
<td>&lt;200</td>
<td>Employment</td>
</tr>
<tr>
<td>Netherlands</td>
<td>Small Enterprises</td>
<td>&lt;10</td>
<td>Employment</td>
</tr>
<tr>
<td></td>
<td>Medium Enterprises</td>
<td>10-100</td>
<td>Employment</td>
</tr>
<tr>
<td>Portugal</td>
<td>SME</td>
<td>&lt;500</td>
<td>Employment</td>
</tr>
<tr>
<td></td>
<td></td>
<td>&lt;Esc 2400 million in sales (value for 1993), is not controlled, More than 50 percent of any company (nor does it hold more than 50 percent of any other company)</td>
<td></td>
</tr>
<tr>
<td>Spain</td>
<td>Small Enterprises</td>
<td>&lt;200</td>
<td>Employment</td>
</tr>
<tr>
<td></td>
<td>Medium Enterprises</td>
<td>&lt;500</td>
<td>Employment</td>
</tr>
<tr>
<td>Sweden</td>
<td>SME</td>
<td>Autonomous firms with &lt;200 employees</td>
<td>Employment</td>
</tr>
<tr>
<td>Switzerland</td>
<td>SME</td>
<td>No fixed definition</td>
<td></td>
</tr>
<tr>
<td>United Kingdom</td>
<td>SME</td>
<td>No fixed definition</td>
<td></td>
</tr>
<tr>
<td>China</td>
<td>SME</td>
<td>Depends on product group usually &lt; 100 employees: investment ceiling 30 million Yuan (US $8 million)</td>
<td>Employment &amp; Investment</td>
</tr>
<tr>
<td>Country</td>
<td>Type</td>
<td>Employees</td>
<td>Capitalization</td>
</tr>
<tr>
<td>-----------</td>
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<td>-----------</td>
<td>----------------</td>
</tr>
<tr>
<td>Indonesia</td>
<td>SME</td>
<td>&lt;100</td>
<td></td>
</tr>
<tr>
<td>Japan</td>
<td></td>
<td>&lt;300</td>
<td>&lt;100 Million Yen</td>
</tr>
<tr>
<td></td>
<td></td>
<td>&lt;50</td>
<td>&lt;30 million yen</td>
</tr>
<tr>
<td></td>
<td></td>
<td>&lt;50</td>
<td>&lt;10 million yen</td>
</tr>
<tr>
<td>Korea</td>
<td>Manufacturing, Wholesale Trade, Retail Trade and Services</td>
<td>&lt;300</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>&lt;20</td>
<td></td>
</tr>
<tr>
<td>Malaysia</td>
<td>SMIs</td>
<td>&lt;75 full time workers or with a shareholder fund of &lt;RM 2.5 million (US $1 million)</td>
<td>Manufacturing establishments employing between 5 and 500 employees or with a shareholder fund up to RM 500,000.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Singapore</td>
<td>Manufacturing, Services</td>
<td>&lt;S $ 12 million fixed assets</td>
<td>&lt;100 employees</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Country</td>
<td>Category</td>
<td>Criteria</td>
<td>Employment or Sales turnover</td>
</tr>
<tr>
<td>-----------</td>
<td>----------------</td>
<td>--------------------------------------------------------------------------</td>
<td>-----------------------------</td>
</tr>
<tr>
<td>Taiwan</td>
<td>SMEs</td>
<td>In manufacturing, mining and construction-invested capital is &lt;NT $ 40 million or regular employees to be &lt;200</td>
<td>Employment or Invested capital</td>
</tr>
<tr>
<td></td>
<td>SSEs</td>
<td>In manufacturing and construction sales turnover &lt;NT $% 120 million or regular 20</td>
<td>Employment or sales turnover</td>
</tr>
<tr>
<td>Thailand</td>
<td>Labour intensive sectors</td>
<td>&lt;200 employees</td>
<td>Employment</td>
</tr>
<tr>
<td></td>
<td>Capital Intensive sectors</td>
<td>&lt;100 employees</td>
<td>Employment</td>
</tr>
<tr>
<td>Vietnam</td>
<td>SME</td>
<td>No fixed definition generally &lt;200 employees</td>
<td>Employment</td>
</tr>
<tr>
<td>Brunei</td>
<td>SME</td>
<td>0-100 employees</td>
<td>Employment</td>
</tr>
<tr>
<td>Hong Kong</td>
<td>SME</td>
<td>Manufacturing enterprises with fewer than 100 employees and non-manufacturing enterprises with fewer than 50 employees</td>
<td>Employment</td>
</tr>
<tr>
<td>Australia</td>
<td>Manufacturing Services</td>
<td>Small enterprises&lt;100 employees</td>
<td>Employment or Employment</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Medium enterprises&lt;200 employees</td>
<td>Employment or Employment</td>
</tr>
</tbody>
</table>
**DEFINITION**

The operational definition for policy purposes includes all those undertakings having an investment in fixed assets - in plant and machinery - whether held on ownership terms or by lease or by hire purchase, not exceeding Rs.60 lakhs. Both ancillary units and tiny units also come under the umbrella of small-scale industries. A tiny unit is one whose investment in fixed assets including plant and machinery does not exceed Rs.5 lakhs. An ancillary undertaking is one whose investment in plant and machinery does not exceed Rs.75 lakhs and is engaged in:

a. the manufacture of parts, components, sub assembly tooling or intermediate or

b. the rendering of services of supplying 1/3 of their total service or productions as the case may be to other units for production of other articles.

Another definition of small-scale industries relates to National Income Accounting. Accordingly, a small industry is presently defined as ‘a unit engaged in manufacturing, servicing, repairing, processing and preservation of goods having investment in plant and machinery at an original cost not exceeding Rs.60 lakhs’. On the other hand, an ancillary undertaking is defined as ‘a unit having investment in fixed assets in plant and machinery not exceeding Rs.75 lakhs and engaged in the manufacture of parts, components, subassemblies tooling or intermediates
or the rendering of services and supplying or proposing to supply or render 50 percent of their production of other articles, provided that no such undertaking shall be subsidiary of or owned or controlled by any other undertaking.

**SSI Investment Restriction**

The government of India has issued a notification, scaling down the investment limit in the fixed assets with plant and the machinery for small scale ancillary industrial undertaking, whether held on ownership terms or on leased or on hire purchase, to Rs.1 crore. The investment limit for tiny units will continue to be Rs.25 lakh.

**Evolution of Definition of Small-scale and Ancillary industries:**

<table>
<thead>
<tr>
<th>Date</th>
<th>Defining Authority</th>
<th>Main Features</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Capital Investment in Plant and Machinery</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Number of persons, Employed</td>
</tr>
<tr>
<td>6-4-1948</td>
<td>Industrial Policy Resolution</td>
<td>All industries in handloom, handicrafts, coir, silk and khadi and village industries are grouped into the small-scale sector</td>
</tr>
<tr>
<td>6-1-1955</td>
<td>Small-scale industries Board</td>
<td>Rs.5 lakhs</td>
</tr>
<tr>
<td></td>
<td></td>
<td>50(if using power) or 100(Without the use of power) Per shift</td>
</tr>
<tr>
<td>Date</td>
<td>Body</td>
<td>Amount</td>
</tr>
<tr>
<td>--------------</td>
<td>----------------------------------------------------------------------</td>
<td>--------------</td>
</tr>
<tr>
<td>September 1957</td>
<td>Small-Scale industries Board</td>
<td>Rs.5 lakhs</td>
</tr>
<tr>
<td>4-1-1960</td>
<td>Small-scale Industries Board</td>
<td>Rs.5 lakhs</td>
</tr>
<tr>
<td>8-7-1966</td>
<td>Ministry of industries, Government of India Small-scale Industries Board</td>
<td>Rs.7.5 lakhs</td>
</tr>
<tr>
<td>November 1974</td>
<td>Industries Policy Resolution, Government of India</td>
<td>Rs.10 lakhs</td>
</tr>
<tr>
<td>July 1980</td>
<td>Industries Policy Resolution, Government of India</td>
<td>Rs.20 lakhs</td>
</tr>
<tr>
<td>March 1985</td>
<td>Industries Policy Resolution, Government of India</td>
<td>Rs.35 lakhs</td>
</tr>
<tr>
<td>August 1991</td>
<td>SSI Policy Statement</td>
<td>Rs.60 lakhs</td>
</tr>
<tr>
<td></td>
<td>(Rs.75 lakhs for export-oriented units)</td>
<td></td>
</tr>
</tbody>
</table>

**Ancillary Industries**

<table>
<thead>
<tr>
<th>Date</th>
<th>Body</th>
<th>Amount</th>
<th>Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>January 1955</td>
<td>Small-scale industries Board</td>
<td>Rs.10 Lakhs</td>
<td>Nine types of industries manufacturing components were reserved for ancillary industries</td>
</tr>
<tr>
<td>Date</td>
<td>Small-scale industries Board</td>
<td>Amount</td>
<td>Description</td>
</tr>
<tr>
<td>------------</td>
<td>------------------------------</td>
<td>---------</td>
<td>--------------------------------------------------</td>
</tr>
<tr>
<td>8-7-1996</td>
<td>Rs.10 Lakhs</td>
<td></td>
<td>Included units producing parts, components, subassemblies and tooling</td>
</tr>
<tr>
<td>November 1970</td>
<td>Rs.15 Lakhs</td>
<td></td>
<td>Add: rendering of services to large industries but not a subsidiary</td>
</tr>
<tr>
<td>July 1980</td>
<td>Rs.25 lakhs</td>
<td></td>
<td>List of Industries covered 26 items</td>
</tr>
<tr>
<td>March 1985</td>
<td>Rs.45 lakhs</td>
<td></td>
<td>List of Industries covered 26 items</td>
</tr>
<tr>
<td>April 1991</td>
<td>Rs.60 lakhs</td>
<td></td>
<td>List of Industries covered 26 items</td>
</tr>
<tr>
<td>August 1991</td>
<td>Rs.75 lakhs</td>
<td></td>
<td>List of Industries covered 26 items</td>
</tr>
</tbody>
</table>

**Tiny Sector**

<table>
<thead>
<tr>
<th>Date</th>
<th>Industrial Policy Resolution</th>
<th>Amount</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>December 1977</td>
<td>Rs.1 lakh</td>
<td></td>
<td>Industries situated in towns and villages with a population less than 50,000</td>
</tr>
<tr>
<td>July 1980</td>
<td>Rs.2 lakhs</td>
<td></td>
<td>To cover cottage industries in rural and semi-urban areas</td>
</tr>
<tr>
<td>March 1988</td>
<td>Rs.2.5 lakhs</td>
<td></td>
<td>To cover cottage industries in rural and semi-urban areas</td>
</tr>
<tr>
<td>August 1991</td>
<td>Rs.5 lakhs</td>
<td></td>
<td>All Places</td>
</tr>
</tbody>
</table>
Full utilisation of production facilities

Full utilisation is an integral part of production management. It has gained more importance in recent times owing to increased cost of production. Full utilisation refers to the two important aspects of production inputs namely, machines and labour. In addition, raw material management and administration also contribute to production. Broadly, full utilisation of capacity, labour, management and finance will result in higher output.

Full utilisation means capacity utilisation of machines and productivity of labour. Full utilisation of these two key elements of production results in higher production at low cost.

The objectives of full utilization

- Contributes towards higher production in a given period of time.
- Results in higher production per unit of labour.
- Reduces the cost of each unit of product.
- Lowers marginal cost.
- Increases productivity at lower manufacturing cost.
- Results in increased profits.

Scope of full utilisation

The scope of full utilisation of production depends upon the type of factory, the type of product manufactured, the relative importance of full
utilisation to the enterprises, the demand for the product both domestically and in the international market, the health of machinery, the number of employees involved, type of workers and the organizational structure of the enterprise.

Capacity utilisation refers to the maximum output attainable per shift by the unit in the manufacture of a product with the machinery installed and average employment provided. In other words if the machine works continuously for eight hours, it produces a quantum of product which is its capacity turnover. The capacity utilisation varies from machine to machine and it also relates to the age and upkeep of the machine. Further, it is also related to the type of technology used in the production of a product.

**PRODUCTIVITY**

Productivity of labour is generally measured in terms of output per man hour or output per unit of labour time. The great interest in productivity is due to the fact that productivity of labour affects, to a considerable extent, the cost of production and prices of commodities and labour productivity is intimately related to wage rates and level of income and standard of living of workers. Increasing productivity in its broad sense implies more efficient use of all the factors of production than before and reducing to a greater extent than before, the degree or extent of wastage of various factors of production or inputs. Obviously, the
objective is to increase productivity to the maximum possible extent. This implies making the best use of all the factors and cutting down wastes to the maximum possible extent. Production is complex proposition. Production is related with the degree of utilization of available minimal facilities. Utilisation of production facilities will also ensure small-scale industries to widen the spectrum of business environment.

**Major Causes for Underutilization**

- Power cuts or load shedding.
- Shortage of few critical raw materials.
- Lack of demand for domestic products due to liberal import policy followed by the union Government recently.
- Labour unrest.
- Mechanical breakdowns and obsolete machinery.
- Technological constraints.

**Capacity Utilisation**

It is a concept in Economics which refers to the extent to which an enterprise or a nation actually uses its installed productive capacity. Thus, it refers to the relationship between actual output produced and potential output that could be produced with installed equipment, if capacity was fully used.
If market demand grows, capacity utilization will rise. If demand weakens, capacity utilization will slacken. Economists and bankers watch capacity utilization indicators for signs of inflation pressures. It is believed when utilization rises above somewhere between 82 percent and 85 percent, price inflation will increase. Excess capacity means that insufficient demand exists to warrant expansion of output. All else constant, the lower capacity utilization falls (relative to the trend capacity utilization rate,) the better the bond market likes it. Strong capacity utilization (above the trend rate) reports leads to bonds being sold off, as investors expect higher interest rates (which decreases bond prices) to offset the higher expected rate of inflation.

Much statistical and anecdotal evidence shows many industries in the developed capitalist economies suffer from chronic excess capacity. Critics of market capitalism therefore argue that the system is not as efficient as it may seem, since at least 1/5 or more output could be produced and sold, if buying power was better distributed. However, a level of utilization somewhat below the maximum prevails, regardless of economic conditions.

**Measurement of Capacity Utilisation**

In economic statistics, capacity utilization is normally surveyed for goods-producing industries at plant level. The results are presented as an average percentage rate by industry and economy-wide, where 100%
denotes full capacity. This rate is also sometimes called the “operating rate”. If the operating rate is high, this is called “overcapacity”, while if the operating rate is low; a situation of “excess capacity” or “surplus capacity” exists. The observed rates are often turned into indexes.

There has been some debate among economists about the validity of statistical measures of capacity utilization, because much depends on the survey questions asked, and on the valuation principles used to measure output. Also, the efficiency of production may change over time, due to new technologies.

For example, Michael Perelman has argued that the US Federal Reserve Board measure is just not very revealing. Prior to the early 1980s, he argues, American business carried a great deal of extra capacity. Running close to 80 percent indicated at the time approaching capacity restraints. Since then, firms have scrapped much of their most inefficient capacity. As a result, an 80 percent capacity utilization now would be equivalent to a historical level of 70 or 75 percent.

**Engineering and Economic Measures**

One of the most used definitions of the “capacity utilization rate” is the ratio of actual output to the potential output. But potential output can be defined in at least two different ways.

One is the “engineering” or “technical” definition, according to which potential output represents the maximum amount of output that can be produced in the short-run with the existent stock of capital. Thus, a
standard definition of capacity utilization is the average of the ratio between the actual output of firms to the maximum that could be produced per unit of time, with existing plant and equipment. Obviously, “output” could be measured in physical units or in market values, but normally it is measured in market values.

However, as output increases and well before the absolute physical limit of production is reached, most firms might well experience an increase in the average cost of production (even if there is no change in the level of plant and equipment used). For example, higher average costs can arise, because of the need to operate extra shifts, undertake additional plant maintenance, and so on.

An alternative approach, sometimes called the “economic” utilization rate, is therefore to measure the ratio of actual output to the level of output beyond which the average cost of production begins to rise. In this case, surveyed firms are asked by how much it would be practicable for them to rise production from existing plant and equipment, without raising unit costs. Typically, this measure, will yield a rate around 10 percentage points higher than the “engineering” measure, but time series show the same movement over time. (Ref. Wikipedia, the free encyclopedia)
**Output gap measure**

As a derivative indicator, the “output gap” (%OG) percentage can be measured as actual output (AO) less potential output (PO) divided by potential output x 100

\[
\% \text{ OG} = \left(\frac{AO}{PO} - 1\right) \times 100
\]

**FRB and ISM utilization indexes**

In the survey of plant capacity used by the US Federal Reserve Board for the FRB capacity utilization index, firms are asked about “the maximum level of production that this establishment could reasonably expect to attain under normal and realistic operating conditions, fully utilizing the machinery and equipment in place.”

By contrast, the Institute of Supply Management (ISM) index asks respondents to measure their current output relative to “normal capacity”, and this yields a utilization rate, which is between 4 and 10 percentage points higher than the FRB measure. Again, the time series show more or less the same historical movement. (Ref.Wikipedia, the free encyclopedia)

**Capacity Utilisation : Degree of Difference**

The average economy-wide capacity utilization rate in the US since 1967 was about 81.6% according to the Federal Reserve measure. The figure for Europe is not much different; for Japan only slightly higher.
The average utilization rate of installed productive capacity in industry, in some major areas of the world, was estimated in 2003/2004 to be as follows:

- United States 82% (Federal Reserve measure)
- Japan 83-86% (Bank of Japan)
- European Union 82% (Bank of Spain estimate)
- Australia 81P% (National Bank estimate)
- Brazil 60-80% (Various sources)
- India 70% (Hindu business line)
- China perhaps 60% (various sources)
- Turkey 72.5% (July 2001; Statistics Bureau)
- Canada 87% (Statistics Canada)

(Ref. Wikipedia, the free encyclopedia)

**Technology Support for Small-Scale Industry**

Technology support is a component; most of the literature has a broader focus on management, organisation, sales, employment, income and general quality issues. Few publications contain technical details about upgrading of products, process and organisation, the support needed to bring about such improvements and the effectiveness of delivery mechanisms. Technological competence is an important determinant of small manufacturing ability to hold their own in a context of liberalization and increasing integration of manufacturing global
networks. Many of their markets, even traditional ones, are changing rapidly.

Small industries generally find it more difficult to cope than medium and large ones. Their technological capabilities are weaker and they are usually not in a position to get funding for innovation on reasonable terms through the regular financial system. Owing to resource constraints, their information search efforts and investments in training and education tend to be quite restricted. Lack of finance, skill and expertise combined with high uncertainty also lead to risk-averse behaviour, depressing investment in technological effort. In some industries, modern, efficient techniques of production suitable for a small scale of operation are also lacking. Moreover, problems associated with economies of scale affect small firms worse than large ones.

Potential benefits of institutional support to small firms are large. Early technology support programmes predominantly adopted a ‘supply push approach’. Many countries setup state run small and medium industry development organisations charged with providing services such as technical and management training, marketing assistance advice about technology choice, assistance with technology procurement and provisions of subsidized finance.
TECHNOLOGY, CAPITAL SPENDING AND CAPACITY UTILIZATION

Recent technological changes have increased the flexibility of relationships between inputs and outputs in manufacturing, which may have eroded the predictive value of the utilization rate; this considers how technology might be expected to affect utilization. It shows that recent changes could either lower average utilization by making it cheaper to hold excess capacity, or raise utilization by making further changes in capacity less costly and time-consuming.

Capacity utilization is a variable of longstanding macroeconomic interest. Many studies have found it to be a valuable indicator of inflationary pressure. For Example, Cecchetti (1995) finds that capacity utilization works as well as or better than variables in predicting inflation over the next year or two. Similarly, in models of the level of resource utilization above which inflation accelerates, the utilization rate does as well as, and sometimes better than, the unemployment rate predicting this level. This predictive value may reflect capacity utilisation’s ability to do “double-duty,” picking up the extent of slack in both labor and product markets (Corrado and Mattey 1997).

However, in recent years, the capacity utilization and unemployment rates have at times provided different signals about the degree of tightness in resource markets. Notably, in the late 1990s, the
decline in the unemployment rate below 4 percent suggested a relatively tight labour market, but the capacity utilization rate remained unexpectedly flat. Part of this divergence may be due to effects of technology on capacity utilization, as the 1990s saw both an investment boom that broadly increased manufacturing capacity and a shift in the composition of capacity toward high-tech machinery and equipment. In the 1940s and 1950s, manufacturing methods typically involved assembly-line production with large-scale, fixed units of machinery and equipment. Relationships between inputs and outputs were relatively fixed, and adjustments in capacity were both costly and slow. Modern manufacturing methods, however, build considerable flexibility into the management of capacity. Technologies like numerically controlled machines, programmable controllers, and modular assembly make it easier to adjust the level and composition of output. At the same time, the use of automated design and modular tooling lowers the cost and time needed to expand capacity. While the use of advanced technologies is far from universal, it is increasingly widespread.

Conceptually, how these advances in technology would affect capacity utilization is not clear. On one hand, flexible manufacturing makes it easier to ramp production up and down. This may encourage firms to install a broader margin of excess capacity, that is, to operate at lower average utilization, in order to be able to handle upswings in
demand. Such a strategy would be favoured by declining prices of high-tech capital, which makes excess capacity cheap. On the other hand, automated design and modular tooling make it faster and cheaper to for firms to expand capacity. This may permit them to reduce the amount of excess capacity they maintain and to operate at higher utilization on average. With these two offsetting forces at work, determining how advances in technology affect capacity utilization is ultimately an empirical question.

Recent research on resource utilization emphasizes the level of capital and labour used in production, relative to their total stocks, rather than the level of output relative to its potential. This emphasis is clearly important for understanding factor productivities and how they may change over time. However, as Corrado and Mattey (1997) and Gordon (1998) have explained, the broader notion of capacity utilization remains an important alternative indicator of conditions in resource markets, gauging the extent to which firms could meet an increase in demand without additional capital investment.

Existing theoretical and empirical work has tended to view capacity utilization and capital investment decisions made in the short-run and capital investment decisions as independent, with utilization decisions made in the long run. In practice, it is unclear that these decisions are so independent. In response to all but the most transitory
demand or cost shocks, firms may change their utilization of existing capacity, change the level of capacity using existing technology or change capacity and technology at the same time. Especially in an era when new vintages of capital equipment offer opportunities for significant efficiency gains, these interrelations between capacity, capital investment and technological change may be particularly important.

To begin to think about relationships between technology and capacity utilization, it is helpful to sketch out a simple conceptual framework. The discussion that follows is largely intuitive. Suppose that firms have a certain amount of capacity in place initially. They receive information about demand at the outset of the current period; this information may also modify their expectations of future demand. Firms may then either: (a) change output without changing capacity, (b) change output and change capacity using existing technology; or (c) change output and change capacity using new technology. Which strategy is chosen depends on expected profitability.

One can suggest several ways in which recent technological changes may have affected the relative returns to these strategies. First, automated design and modular tooling have reduced fixed costs of expanding capacity and have shortened lags till new capacity can be brought on line. This may generally raise the relative attractiveness of capacity adjustments over changes in utilization. Second, declining prices
of capital goods also improve the profitability of capacity expansion over changes in utilization by making additions to capacity cheaper. Third, prices of capital goods embodying new technology have fallen disproportionately. This would particularly favour capacity changes with a shift in technique. And finally, new technologies provide opportunities to lower unit costs significantly, again favouring capacity changes with a shift technique.

The high level of investment in high-tech machinery and equipment is consistent with an increase in the relative attractiveness of expanding capacity and changing technology, in a response to strong demand. Even so, the implications of this shift for capacity utilization are less clear. As mentioned, new technologies may make it easier to ramp production up and down. Combined with falling prices of high-tech equipment, this may encourage firms to install a broader margin of excess capacity—operating at lower average utilization—to be able to handle upswings in demand. But because automated design and modular units make capacity expansion faster and cheaper, firms may prefer to operate at higher average utilization, expecting to boost capacity should demand turn out to be strong. With these two offsetting forces at work, determining how advances in technology affect capacity utilisation is ultimately an empirical question. Yet as the above analysis indicates, detecting effects of technology may not be straightforward, partly
because capital spending, utilisation and technology are related complex ways and partly because effects of technology on utilisation may be different in the short-run than they are in the long run. (Martha Starr, 2004)

The term capacity has been used indiscriminately in the theoretical as well as in the empirical literature with varying connotations. In most of the writings, it has been accepted as a self-explanatory term, therefore, not worthy of any clear-cut definition. A brief review of the available concept of capacity implicit or explicit in various theoretical and empirical writings suggests that the concept of capacity differ from each other on the basis of varying importance attached to the centrality of fixed capital stock. The concept that specifies utilisation of capacity with special reference to fixed capital stock measures the utilised inputs of capital relative to the available input of capital. These concepts are termed as the concepts of capital utilisation. On the other hand, the concepts that specify capacity output, measure the rate of utilisation in terms of realized output relative to the potential output.

Depending upon the relative importance attached to the fixed capital stock, there are three different concepts of capacity. These concepts are –

a) engineering concepts

b) operational or managerial concept

c) economic concepts
The engineering concepts use the flows of potential output per unit of time from a fixed capital stock as capacity output. In this category, there are two concepts:

a) concept of installed capacity and

b) concept of rated capacity

By installed capacity engineers mean the potential output, which can be realized from items of equipment under optimum conditions or lab conditions while rated capacity denotes the potential output, which can be realized under actual plant conditions. In case of a single product firm it is simply the maximum attainable output subject to the performance of the slowest segment of the plant. For, multi product firm, the estimation of capacity becomes little more complicated. In the case of such firms, it is estimated on the basis of major equipment units of plants assuming that other minor equipment will be operating at a constant rate.

Klein (1960) has broadened the engineering concept of capacity by arguing that capacity is not purely a proxy for capital stock. In his definition of technical capacity, capacity output is defined as the production flows associated with inputs of fully utilised manpower, capital and other relevant factors of production. In his definition also, the centrality of capital inputs is maintained but its productive capacity is adjusted with the fully utilized inputs of other factors. Distinction between short-run and long run capacity rests on the proposition that in
the short run, capacity can be measured with the help of the utilisation rates of fixed factors i.e. fixed capital stock. But in the long run, where all the factors of production including fixed capital are variable, it is essential to estimate capacity with the help of all the factors of production.

The methods, which use the engineering concepts of capacity, ignore the differences in the objectives of the firm, which may require different amount of optimum output, quality of management, quality and quantity of inputs other than the input capital. The operational concepts of capacity also consider the influence management capabilities, establishment pattern, plant layout broadly defined as actual plant conditions. Therefore, operational or managerial concept of capacity is defined as the level of output at which the management would become dissatisfied with existing stock of its fixed plant and equipment (Hickman 1964). This point is the level of output, which corresponds to the point of minimum average cost. Hickman defines capacity as the volume of physical output produced with given plant under normal organizational set up of production with uninterrupted availability of variable input.

According to the operational concepts, capacity output is largely related to the fixed stock of capital, but is significantly influenced by the availability of variable inputs. Therefore, capacity becomes an instrumental variable in the hands of management, because management
can alter the rate of utilisation of capacity. Some part of capacity is always intentionally kept idle extant. Hence, fixed capital stock cannot be accepted as a proxy for capacity. In the work of Marris (1964), the distinction between ex-ante (planned underutilization) and ex-post utilisation appeared for the first time in its most logical form.

The most satisfactory concept of economic capacity has emerged in the theory of firm. The full capacity output is defined here as the level of output associated with the long run equilibrium of the firm under perfect-competition. In a perfect market, a firm is said to be in equilibrium in the long run when the marginal cost is equal to marginal revenue and average cost is equal to average revenue. This point emerges when there is no incentive for the entry of new firms in the industry. The advantages of this concept are that it relates capacity with optimum utilisation of resources in the welfare theoretic sense. This concept was evolved to show why under imperfect market conditions there will exist excess capacity (Chamberlin)-1933). In the short run, the capacity output is related to the cost of variable inputs and in the long run all the factors of production are variable.

**Operational or Managerial Measures of Capacity Utilisation**

To overcome the weaknesses of engineering methods, attempts were made to make the measures of utilisation of capacity more operational. This concept of capacity output resulted in the birth of
various surveys conducted in U.K, U.S.A and also in India. In England, two surveys have been conducted on the regular basis. The National Institute of Economic and Social Research has been continuously conducting surveys since 1958 to estimate the rates of utilisation. In their survey, the rate of utilisation is derived from the statements by firms themselves about the potential increases in the output, which can be met with the help of existing capital equipment. This is estimated from the reply to the question being asked to the firms “how much they can produce if the demand were there and if they were to employ more labor”. In the second survey conducted by the Confederation of British Industries (CBI) on quarterly basis; the extent of utilisation is known from the question. “Is your present level of output is below capacity?” The answer is given by the firm is either ‘Yes’ or ‘No’. Therefore, the survey does not provide exact magnitude of underutilization of capacity (Glyn-1968)

In the USA, the McGraw Hill surveys are conducted on the similar lines. The survey consists of asking to the firms regarding capacity in terms of physical volume, rate at which companies were actually operating at the end of the year and also regarding the rate at which firms would prefer to operate. The reports supplied by the individual companies are aggregated by making use of employment weights (McGraw Hill survey-1961). Based on the similar methodologies, surveys were
conducted in India by the Gokhale Institute and National Council of Applied Economic Research. But all these surveys collected information regarding capacity and capacity utilisation through questionnaires filled by the management of the firm and therefore inevitably rely on subjective judgment of the managements regarding ‘normal’ and ‘maximum’ capital usage.

**Economists’ Measure of Capacity Utilisation**

Economists have evolved econometric techniques based on the economic theories of cost and production, known as cost and production functions, to estimate the extent of utilisation of capacity. According to one variant, capacity output corresponds to the minimum point on the firm’s long run average cost (Cassel-1937). The second variant defines the capacity output at a point where short-run average cost curve is tangent to the long run average cost curve (Klien-1960, Hickman-1964). The development in the theory provides a suitable framework for the estimation of economic measures of capacity. Scholars have used a short-run or variable cost function assuming that capital is fixed in the short-run for estimating economic measures of capacity utilisation. (Hesse-1986, Nelson-1989 and Padma Suresh-1991)

The measure of capacity utilisation has a longstanding tradition in empirical economic analysis. The capacity utilisation measures are generally employed in order to understand investment behaviour,
productivity movements, inventory behaviour, and also to measure the strength of aggregate demand (Berndt and Hesse, 1986). Unfortunately, these measures are beset with many complex problems and their calculation and derivation is in large part ad hoc, rather than based on an explicit theoretical foundation.

The economic theory of cost and production defines capacity output as the output at which the short and long run average total cost curves are tangent to one another, and capacity utilisation as the ration of actual to capacity output. Under conditions of long-run constant returns to scale, capacity output corresponds to that output at the minimum point of the short-run average total cost curve.

Johansen (1968) defines capacity output as “the maximum amount that can be produced per unit of time with existing plant and equipment, provided that the availability of variable factors of production is not restricted”. Since capacity output is inherently a short run notion, it is necessary that the modeling framework incorporate short run constraints facing the firm (Berndt and Hesse, 1986)

Klein (1960) states that capacity and associated utilisation rates give a combined measure of under use of all input resources. A purpose of such statistics is to extend the measures of underutilisation of resources beyond such conventional statistics as the number of unemployed persons. In a function designed to show actual operations of the economy,
the input variables are measured by amounts actually used in the production process. For instance, in the case of labour inputs, an employment variable reflects the number of man-hours actually used during the period of production. This information tells more about economic efficiency than the plain statistics of number of employed persons.

The capacity utilisation measures are prominent variables in several modern business cycle theories, especially those based on a version of the acceleration principle (The Economist, 1997). The business cycle is the more or less regular pattern of expansion (recovery) and contraction (recession) in economic activity around the path of trend growth. During an expansion or recovery the employment of factors of production increases (indicating higher utilisation of existing capacity), which in turn, increases incomes, creates more demand, resulting in further utilisation of existing capacities and so the prices continue (the multiplier). Before long, producers come up against capacity constraints. If they are confidant that demand will remain buoyant (expectations), they invest more in new plant and machinery (creation of more capacity) which generates even more demand (the accelerator).

The upward momentum cannot continue indefinitely. Eventually, output hits a ceiling owing to bottlenecks and supply constraints. Demand for investment funds may push up interest rates to the point where new
investment is no more profitable. This will reduce the investment demand. Despite the steady consumer demand, a fall in investment demand pulls back the level of total output. With investment demand falling, the producers of capital goods start to cut back on labour. The higher unemployment reduces consumer demand. The multiplier, expectations and accelerator principles work in reverse and the economic contraction gathers momentum.

The output will not fall indefinitely. It will stop at some minimum level because employees retain jobs and spending power where they work in secure jobs with government or in industries supplying essentials. The welfare payments, past savings and new borrowings enable other consumers to buy essentials. The slack demand for investment funds may pull back interest rates making new or replacement investment more attractive. And with consumer demand steady, it is the investment demand (capacity creation) that begins to lift the economy again. Though there is no general consensus about what causes fluctuations in capacity utilisation rates, major influences include fixed investment and inventory cycles, external shocks and macro-economic policies of the government.

**CAPACITY PLANNING**

**Determination of Plant Capacity**: Production system designs are the first level planning for the inputs, conversion activities and outputs of production operation. Design decisions are very important because they
are often associated with significant investment of funds. The initial outlay and operating expenses are established based on design decisions and these in turn affect productivity of the concern and affect the fixed cost and variable cost.

**Design Capacity**: Preliminary estimate of capacity is done based on long range forecast extending 5 to 10 years into the future.

The design capacity of a system is the rate of output of goods or services under full scale operating conditions.

Capacity planning is to be carried out keeping in mind future growth and expansion plans, market trends, sales forecasting etc. It is a simple task to plan the capacity in case of stable demand. But in practice the demand will be seldom stable. The fluctuation of demand creates problems regarding the procurement of resources to meet the customer demand. Capacity decisions are strategic in nature.

Capacity is the rate of productive capability of a facility. Capacity is usually expressed as volume of output per period of time.

Production managers’ departments are more concerned about the capacity for the following reasons:

- Sufficient capacity is required to meet the customers demand in time
- Capacity affects the cost efficiency
- Capacity affects the scheduling system
• Capacity creation requires an investment

It is easy and simple to measure the capacity of the unit manufacturing homogenous tangible products which can be counted. But it is difficult to express capacities when the company manufactures multiple products and some of the products requiring common facilitates and other specialized facilities. In this situation measuring capacity is more complicated. In such situations, the capacity is not expressed as output per period of time but usually expressed as man-hours, machine hours or some times in terms of applicable resources.

**Systems Capacity:** In practice, it may not be possible to achieve production to the extent of design capacity mainly because of mismatch between required resources and available resources.

The maximum output of a specific product or product mix that the system of workers and equipments is capable of producing as an integrated whole is called system capacity. This may be less than that of the design capacity.

The actual output may be even less than the systems capacity since it is affected by short range factors such as actual demand, equipment breakdowns and personal absenteeism or productivity.

Systems efficiency = Actual output ÷ Systems capacity

**Capacity Planning Strategies:** Capacity is a measure of the ability to produce goods or services or it may be called as the rate of output.
Capacity planning is the task of determining the long term and short term capacity needs of an organization and then determining how these needs will be satisfied.

**Long Term Capacity Strategies:** Long term capacity requirements are more difficult to determine because of the future demand and technology are uncertain. Forecasting for five or ten years in to the future is more risky and difficult. Even sometimes today’s products may not be existing in the future. Long range capacity requirements are dependent on marketing plans, product development and life cycle of product.

Strategies would include—

- Develop new product lines.
- Expand existing facilities.
- Construct or phase out production plants.

**Short Term Capacity Strategies:** In short term planning horizon, capacity decisions are taken by considering the fluctuations in demand caused by seasonal and economic factors. The purpose of short term capacity planning is to respond to variations in demand during the short term planning horizon.

Factors influencing effective capacity utilisation include-

- Forecasts of demand
- Plant and labour efficiency
• Subcontracting
• Multiple shift operation
• Management policies

It is very difficult to forecast demand, as always there is an uncertainty associated with the demand. The forecasted demand will be either higher or lower than the actual demand. So, always there is a risk involved in creating capacity based on projected demand. This gives rise to either over capacity or under capacity.

The over capacity is preferred when

a) Fixed cost of the capacity is not very high.

b) Subcontracting is not possible because of secrecy of design and /or quality requirement.

c) The time required to add capacity is long.

d) The industry cannot afford to miss the delivery and cannot afford to lose the customer.

e) There is an economic capacity size below which it is not economical to operate the plant.

The under capacity is preferred when

a) The time to build capacity is short.

b) Shortage of products does not affect the industry.

c) The technology changes fast i.e. the rate of obsolescence of plant and equipment is high.
d) The cost of creating the capacity is prohibitively high.

**Determinants of Managerial Decisions on Capacity Utilisation**

The studies that have emerged at the micro-level deal with ex-ante (planned underutilization) rates of utilisation capacity. Ex-ante rates of capacity utilisation depends on factors that are endogenous to decision-making process at the level of management of a firm. Therefore, to identify the management’s decision regarding planned underutilisation of capacity utilisation, the micro level studies are more relevant.

**Labour costs and Utilisation of Capacity**: Changes in the rate of utilisation capacity might be accompanied by either increased overtime or shift-work or by varying proportions of both the sources of supply of labour force. The increase in the rate of utilisation, whether by overtime or shift work, is likely to augment labour costs. Increase in the rate of utilisation increases the labour cost.

**Prime Costs and Incentive to Utilise**

The other components of costs that affect the incentive to utilise are the costs of fuel and material costs. The intensity of the influence of fuel and materials on incentive to utilise depends on the initial ratio of prime costs to total costs. In certain industries, continuous or semi-continuous operations result in the economies of fuel and materials. In such an industry fuel and materials play significant part of total costs and continuous utilisation results in economies.
Depreciation and Incentive to Utilise

Depreciation also influences the incentive to utilise. If depreciation consists only wear and tear of user cost, then its impact on incentive to utilise will be like fuel and material. When obsolescence is fast, equipment becomes valueless long before the end of its physical life. Therefore, in an industry where technical change is fast, i.e. rate of obsolescence is higher, the impact of wear and tear will be insignificant. And other things being equal, it will strengthen the case for increased utilisation. Moreover, if in an industry, the rate of obsolescence of equipment is rapid, then a firm has to charge prices for its products such that it earns reasonable profit within the economic life of the equipment. Therefore, compared to the industries with lower rates of obsolescence, the ratio of gross profit to wages and utilisation rates will have to be higher in such industry.

Economies of Scale and Utilization of Capacity

Economies of scale also play an important role in affecting the rate of utilization of capital. It has been observed that there exists a positive correlation between economies of scale and rate of utilization. The acceptance of positive correlation depends upon the fact that equipment lumpiness (that is large daily output of a plant) will allow for division of factors over time and the sequence of operation in plant that makes the management and scale of equipment used sensitive to scale of operation.
The positive correlation between scale economies and rate of utilization was empirically observed for Pakistan. (Winston 1971). In this study economies of scale have been measured with the help of average size of firm. Average size of firm helps in capturing the impact of management scale-economies and less strictly technological plant scale-economies. A positive correlation between utilisation and economies of scale can exist if (a) we assume that high utilization rates are sign of efficiency, then efficient firm will grow large than inefficient firms; (b) if one assumes that larger firms can exert greater political power, then larger firms would operate at higher rates of utilization, where as, a study on Kenya did not observe any correlation (Baily 1972).

In comparison to the above-expected correlation between economies of scale and utilization, it has been argued that continuous economies of scale create a bias against multiple shift operation. This is because high utilisation will reduce the cost of capital and small capital stock would be required in a plant with multiple-shift operation and hence will eliminate the economies of scale. Therefore, the correlation between scale and utilization depends on the coefficient of scale parameter, which can be positive, negative, non-existent (Betsncourt and Clague 1975).

Most of the micro approaches that have tried to identify the determinants of excess-capacity, analyzed the problem with the neo-classical theory of profit maximizing firm. The behaviour implicit in
these theories is that of a passive firm, that operates within the constraints imposed by the given environment. Here environment is defined in terms of short-run and long-run costs and revenue conditions, analysed in terms of average and marginal costs and revenue curves. Hence, the passive firm, depending upon the kind of constraints it is facing, tries to maximize profit responding either through demand or cost variables.

On the other hand, an active firm tries to overcome these constraints with the help of different strategies like merger, collusion, take-over, product diversification, advertising and research and development (Hay and Morris 1979). Therefore, if we accept the new theory of active firm, both demand and supply sides are subject to active manipulation through its strategic decisions.

**Excess Capacity as Entry Deterrence**

Some scholars view that the underutilization of capacity in modern firms is deliberately created as a part of their strategy to prevent entry of new firms. In economics the study of strategic role of underutilization of capacity as an entry barrier began with the work of Pashigian 1960, Needam 1971 and Warden 1971. The empirical validity of this view is available in the famous decision on Anti-trust case against Aluminum Company of America (ALCOA) given by Judge Learned Hand in 1945.

To establish the role of excess-capacity as a entry barrier, scholars expanded the basic model of limit pricing of quantity setting oligopoly to
include an additional decision variable ‘capacity’ to mark the upper limit on output that rival believes will be fully utilized in the event of entry. Once capacity is installed, it imposes capacity constraint. A single existing firm, the only supplier with market, is able to install capacity before the new entrants think that in the event of entry, the existing firm will fully utilize its capacity. Under these circumstances existing firms deter entry by installing capacity that is only meant for creating entry barriers.

Eaton and Lipsey 1979 have studied the role of excess capacity when demand is also expanding. They demonstrate that if the growth of the market is foreseen, it will always pay existing firms to pre-empt the market by establishing new plant and capacities before it would be appropriate for new firm to enter. In such markets, plants will be installed well in advance, before their output is required, even when current costs and receipts yield losses. Therefore, such market will always have excess capacity (Exposito and Exposito 1974). Now there exists a vast body of theoretical and empirical work, which has established that excess capacity can act as a barrier to entry. The studies show that firms may rationally invest in excess capacity with the expectation that it will be seen by potential entrants as a signal of intent threat (Salop 1979 or a credible threat Baumol and Willing 1981). These ideas have been explored in
Contrary to this established view on the role of excess capacity as entry deterrent, scholars have developed an alternative explanation. They maintain that dominant firms keep excess capacity to promote entry (Strenberg and Ungen-1988). They argue that most of the dominant firms maintain economic relationship with other smaller upstream or downstream firms. These relationships constitute a major part of total activities of the dominant firm. The smaller companies have to make investment in certain specific sunk costs to enter into economic relationship with dominant firm. Before incurring such costs small enterprises like to have some assurance that dominant firm will not reduce its demand for supplies of firms to the extent that small firms can continue to earn economic rate of return. In the absence of long run contract, dominant firms decision to invest into excess capacity may give downstream and upstream firms the assurance, which they require for undergoing sunk costs.

The scholars who view excess capacity as entry promoter argue that an oligopolist firm wants to obtain required quantities of material and component at a lowest possible price. To minimize these costs firm can follow either of the strategy (a) vertical integration, (b) long run contract with the suppliers and (c) reputation. Vertical integration generally results...
in large-scale operation and higher fixed costs, which might be much larger than the cost of holding excess capacity. On the other hand long run contract with the suppliers can be maintained with the commitment, which is related to the existence of excess capacity. The reputation of a firm among its suppliers also depends on potential output, which can be obtained in future without undergoing expansion.

Apparently there does not exist any contradiction between the scholars who view the existence of excess capacity as an entry barrier and those who view it as an entry promoter. The entry barriers school is talking about the entry of potential competitor where as the entry promotion school is viewing it as encouraging the entry of firms as ancillaries, subsidiaries or vendors. Therefore, one can reconcile these alternative hypotheses into a single objective of an oligopolistic firm to maximize market share following these two complementary strategies. The existence of excess capacity will deter the entry of rival firm and at the same time will help the entry of downstream small firms which will reduce the transaction costs of buying materials and components.

In theoretical literature, the growth in industrial output is primarily associated with new investment in plant and machinery. However, new investment alone does not ensure economic growth. It must also be matched by efficiency of investments. Empirical studies confirm that less than half the growth in output can be attributed to increases in factors of
production and higher productivity explains the rest. One of the critical
determinants of productivity is the rate at which installed capacity has
been utilised. An increase in the utilisation of existing capacity increases
the output without any need to undertake additional investment in capital
stock. Capacity utilisation is one of the major indicators of the efficiency
of the industrialization process as it influences the cost of production,
profitability and generation of internal resources. The subject of ‘capacity
utilisation’ assumes special significance especially in ‘capital scarce’
developing economies. It is generally expected that market oriented
reforms in developing countries will sufficiently increase competition to
eliminate or at least significantly reduce the unutilized productive
capacity.

**Macro-Economic Determinants of Utilisation of Capacity**

According to Malthus, there exists an optimum balance between
capital goods and consumer goods. Similarly, labour force is divided into
two categories- productive labour force (the labour force that produces
material objects) and unproductive labour force (the labour that provides
non transferable services). According to this classification only
productive labour can increase commodity production. As in the market
economy, labour commanded is greater than labour embodied in the
commodity; in the production sector the wages of productive labour are
not sufficient to buy total produce. Hence, some part of the total produce will remain unsold, giving rise to over-production, i.e. excess-capacity.

After World II, the period of de-colonization began. The wartime destruction of developed economies and pressing needs of development of newly independent economies facilitated the birth of economics of growth and development. Most of the growth theory provides overriding importance to the accumulation of capital, i.e. capacity creation in the process of economic growth. It, by and large, concentrates on the conditions of steady state of growth, ignoring the importance of utilisation of capacity. In the growth models under utilisation of capacity occurs as a consequence of any departure from the conditions of steady state growth.

The development economist realized the process of industrial capacity creation in the context of developing countries facing demand side constraint because of limited size of domestic market for the manufactured item. The realization regarding demand side constraint helped in the birth of the theories of balanced and unbalanced growth (Resentein, Rodan, Hirschman and Scitovsky). These theories suggested that in order to overcome the limited size domestic market, the process of industrialization should be planned in such a way that output of one industry should be input of other industry. Hence, according to their suggestion, underdeveloped economies should start their industrialization
with the introduction of those industries simultaneously that have strong technological linkages to avoid the problem of demand and underutilisation of capacity.

Some of the Economists tried to relate the prevalence of underutilisation of capacity with some of the structural characteristics of the underutilisation of capacity. The analysis regarding the existence of excess capacity in their theoretical construct is implicit in the factors that cause stagnation. According to Furtado, the underdevelopment is “a state of factor imbalance reflecting lack of adjustment between the availability of factors and technology of their use; that it is impossible to achieve full utilisation of both capital and labour.”

During 1970s and 1980s, most of the developed market economies experienced a unique economic crisis, where high rates of growth of unemployment and underutilisation of capacity were accompanied by higher rates of inflation. This crisis is now known as “stagflation”. It consists of low rates of growth combined with –

(a) much below normal productivity growth,
(b) high and rising unemployment,
(c) underutilisation of productive capacity,
(d) domestic excess capacity linked with global excess in certain key industries (Lundberg-1984)
Economists observed that this crisis was related to in-built rigidities in the economic system, which prevents the growth in supply to adjust growing demand. Therefore, they argued slow rates of productivity growth and prevalence of underutilized capacity are products of supply side constraints associated with institutional constraints imposed by the government regulations and intervention. Hence, they started blaming government intervention for the existence of excess capacity in industry. This mode of thinking has also entered in the framework of policy making in the development economies through the spread of structural adjustment programme. Therefore, economists here also attribute, for the existence of excess capacity, the supply side constraints created by government interventions and regulations which give rise to different kinds of rigidities.

Most of the academic output in economics which has appeared under different names like classical, neoclassical, Marxian economics, Keynesian, Post-Keynesian and theories of economic growth and development has stressed on the centrality of quantity and quality of capital stock and capital accumulation (i.e. productive capacity and growth in capacity) in increasing the efficiency of productive system and in the process of economic growth and development of an economy. Following the wisdom embodied in the literature of economics, policymakers gave overriding importance to capital and capital
formation. The policy makers did not realize that the success of development process also depends on how properly a system utilises its productive capacity. The better rates of capacity utilisation not only increase output, save inputs of capital, critical human resources, but also help in creating additional employment and increasing savings potential.

**Small Industries Level of Capacity**

The data collected from Indian small industries (Vasanth Desai-2006) shows that the 5,82,368 small-scale industries had created production capacity of Rs 84,919.92 crores with a fixed investment of Rs 9296 crores. In other words, production capacity was in the ratio of 1:9:135. It means an investment of one crore will enable the industry to produce goods worth of Rs 9.14 crores and per unit capacity will be Rs 14.58 lakhs for an investment of Rs 1.60 lakhs.

Category-wise 560,470 small-scale industries had created production capacity of the value of Rs 83,674.62 crores with an investment of Rs 9,077.91 crores. Whereas, 3029 ancillary industrial undertakings had created production capacity of Rs 679.72 crores with an investment of Rs 103.14 crores and 18869 small service establishment had only production capacity of the value of Rs 565.58 crores for an investment of Rs 114.95 crores. The production capacity was in the ratio of 1:9.217 for small-scale industries, 1:6.590 for ancillary industries and 1:4.920 for small service establishments.
Per unit capacity was highest at Rs22.44 lakh for ancillaries, followed by Rs 14.93 lakhs for small-scale industries and lowest Rs 3 lakhs for small service establishments.

Activity-wise, manufacturing-assembling units had the highest production capacity of the value of Rs 65,034.40 crores or 76.6 percent of the total and lowest of Rs 1.78 crores for job-work. However, per unit production varied between 1.02 lakhs and Rs 54.96 lakhs. All in all, manufacturing or assembly processing accounts for 92.56 per cent of total capacity.

The small entrepreneur will increase his production by fully utilizing his machinery and labour. Non-utilisation of these two important component results in an increase in cost per unit. If all the necessary raw materials are available, a fuller utilisation of machinery and labour will results in higher production. And every increase in production reduces the average cost per unit. This apart, the marginal cost is also considerably lower. Small entrepreneur has to plan in detail, so that no bottleneck crops up in between. In short, a full utilisation of production facilities will result in a lower cost per unit. The cost of overheads too will go down. Therefore, the aim of small-scale industries should always be to utilize the production facilities fully.