CHAPTER IV

METHODOLOGY

4.1 Importance of Engineering Industry
4.2 Why Large Scale Industries
4.3 Selection of Geographic Area
4.4 Product Range
4.5 Relevance of the Study
4.6 Selection of Companies
4.7 Data Collection
4.1 Importance of Engineering Industry

4.1.1 After independence our country has accepted concept of planning at national level in development efforts. All the investments are governed by the five year plans, which in turn decide gross output, value added and employment in the respective sectors of economy.

According to National Industrial Classification, following are the subsections of engineering industry:

1. Metal Products
2. Electrical Machinery
3. Other Machinery
4. Transport equipment

It can be seen in the table that engineering industry has substantial contribution to the national economy, e.g. Investment is 15.1%, Employment is 17%, and Gross output is 17.8%, for the year 1977-78, of the factory sector as defined by the Government of India.

4.1.2 'Factory' is defined as a unit engaged in the manufacture of goods or service employing ten or more workers with the help of power or employing 20 or more workers without using power.
### TABLE NO. 4.1: A Table showing share of Engineering Industries in Factory Sector (1977-78)

<table>
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<th></th>
<th>Percentage Share</th>
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<td>Value Added</td>
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<td>Total Share</td>
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(Source: Statistical Outline of India 1982 Tata Services Ltd., Economics and Statistics Department.)
4.1.3 Indices for -
- Net Value Added
- Employment
- Net Value Added per Employee

in the Indian Manufacturing Sector over the period of 1951-52 to 1975-76 at 1970-71 prices is given in table numbers 4.2, 4.3 and 4.4 respectively.

Also given is Rate of -
- Growth of output
- Growth of employment
- Growth of output per employee

for Indian Manufacturing Sector in table numbers 4.5, 4.6 and 4.7 respectively.

Manufacturing Sector of Indian Economy has grown over the period. Table number 4.8 identifies and quantifies sources of output growth during 1951-75 under following heads:

- Employment Effect
- Productivity Effect
- Effects of changes of structural composition and

- Employment interaction effect

Table number 4.9 gives share of individual Industry groups on Employment and Output.
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<tr>
<th>Year</th>
<th>Metal Products except machinery &amp; transport equipment</th>
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<td>64.79</td>
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Table No. 4.2: Indices of Net Value Added in the Indian Manufacturing Sector (At 1970-71 Prices)

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Table No. 4.3: Indices of Employment in the Indian Manufacturing Sector  
(Base 1970-71 = 100)

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<th>Year</th>
<th>Metal Products except machinery &amp; transport equipment</th>
<th>Machinery except Electrical Machinery</th>
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Table No. 4.3 : Indices of Employment in the Indian Manufacturing Sector
(Base 1970-71 = 100)

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<th>Year</th>
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Table No. 4.5 : Rate of Growth of Output in the Indian Manufacturing Sector  
(Percents per annum)

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<td>4) Transport Equipment</td>
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Table No. 4.6 : Rate of Growth of Employment in the Indian Manufacturing Sector

(Percent per annum)

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<td>10.23</td>
<td>0.87</td>
<td>3.31</td>
<td>12.15</td>
</tr>
<tr>
<td>3 Electrical Machinery</td>
<td>1.25</td>
<td>16.68</td>
<td>15.18</td>
<td>5.66</td>
<td>3.69</td>
<td>27.22</td>
</tr>
<tr>
<td>4 Transport Equipment</td>
<td>3.67</td>
<td>4.20</td>
<td>4.41</td>
<td>1.86</td>
<td>2.73</td>
<td>2.58</td>
</tr>
<tr>
<td>5 Miscellaneous Industries</td>
<td>17.18</td>
<td>(-)3.29</td>
<td>5.69</td>
<td>1.09</td>
<td>2.67</td>
<td>(-)0.53</td>
</tr>
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Table No. 4.7: Rate of Growth of Output per Employee in the Indian Manufacturing Sector (Percent per annum)

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</tr>
</thead>
<tbody>
<tr>
<td>1 Metal Products except Machinery and transport equipment</td>
<td>13.28</td>
<td>(-)2.07</td>
<td>(-)5.94</td>
<td>0.48</td>
<td>(-)0.32</td>
<td>0.15</td>
</tr>
<tr>
<td>2 Machinery except electrical machinery</td>
<td>16.77</td>
<td>6.01</td>
<td>11.72</td>
<td>1.78</td>
<td>2.80</td>
<td>21.41</td>
</tr>
<tr>
<td>3 Electrical Machinery</td>
<td>12.89</td>
<td>(-)0.96</td>
<td>0.61</td>
<td>6.43</td>
<td>0.41</td>
<td>7.05</td>
</tr>
<tr>
<td>4 Transport Equipment</td>
<td>8.45</td>
<td>3.78</td>
<td>4.43</td>
<td>(-)5.87</td>
<td>(-)3.47</td>
<td>2.72</td>
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<tr>
<td>5 Miscellaneous Industries</td>
<td>(-)4.98</td>
<td>14.12</td>
<td>3.96</td>
<td>5.26</td>
<td>(-)3.61</td>
<td>15.04</td>
</tr>
</tbody>
</table>
Table No. 4.8 : Sources of Output Growth in Manufacturing Sectors during 1951-75  
(Percentages)

<table>
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</thead>
<tbody>
<tr>
<td>1) Employment Effect</td>
<td>38.33</td>
<td>40.99</td>
<td>57.99</td>
<td>27.31</td>
<td>33.60</td>
<td>35.62</td>
</tr>
<tr>
<td>2) Productivity Effect</td>
<td>59.24</td>
<td>49.65</td>
<td>30.26</td>
<td>120.52</td>
<td>16.42</td>
<td>56.69</td>
</tr>
<tr>
<td>3) Effects of changes in Structural Composition Employment</td>
<td>3.30</td>
<td>7.96</td>
<td>10.34</td>
<td>4.45</td>
<td>(-) 3.82</td>
<td>2.86</td>
</tr>
<tr>
<td>4) Interaction Effect</td>
<td>(-) 0.87</td>
<td>1.40</td>
<td>1.42</td>
<td>(-) 52.58</td>
<td>6.20</td>
<td>4.83</td>
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<tr>
<td>1) Metal Products except machinery and transport</td>
<td>2.24</td>
<td>2.27</td>
<td>2.41</td>
<td>3.57</td>
<td>3.59</td>
<td>4.22</td>
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<tr>
<td>equipment</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>2) Machinery except Electrical Machinery</td>
<td>3.86</td>
<td>1.10</td>
<td>4.14</td>
<td>1.39</td>
<td>5.72</td>
<td>3.16</td>
</tr>
<tr>
<td>3) Electrical Machinery</td>
<td>1.15</td>
<td>1.16</td>
<td>1.30</td>
<td>1.93</td>
<td>2.31</td>
<td>2.72</td>
</tr>
<tr>
<td>5) Miscellaneous Industries</td>
<td>2.56</td>
<td>3.12</td>
<td>4.33</td>
<td>3.30</td>
<td>3.46</td>
<td>3.78</td>
</tr>
</tbody>
</table>

Source: The principal source of output data is the National Accounts Tables compiled by Central Statistical Organisation (CSO) which in turn are based on the Census of Manufacturing Industries (CMI) during years prior to 1959 and Annual Survey of Industries (ASI) during the years from 1959.
4.1.A Coverage of Engineering Industries:

Engineering industry is covered under National Industrial Classification, which is given in point 4.1.1.

4.1.A.1 The products covered under each of the above sub sections are given in details in the following text.

A) Metal Products:

1. Typewriters
2. Sewing machine
3. Steel furniture
4. Wires and Wire Ropes
5. Welding electrodes
6. Lifts
7. Reduction gears
8. Enamel wares
9. Containers and drums
10. Wire nails
11. Building hardware
12. Bolts, nuts and rivets
13. Hurricane Lanterns
14. Ball and roller bearings
15. Oil barrels
16. Water tanks and buckets
17. L.P.G. cylinders
18. Locks
B) Industrial Machinery:

1. Cranes
2. Machine tools
3. Diesel engines
4. Pumps
5. Compressors and Refrigerators
6. Boilers - industrial and power
7. Furnaces
8. Chemical Machinery
9. Metallurgical machinery
10. Coal and mining machinery
11. Textile machinery
12. Cement machinery
13. Sugar machinery
14. Paper and Pulp machinery
15. Dairy machinery
16. Conveyors
17. Weighing machinery
18. Fork Lift trucks
19. Oil drilling machinery
20. Steel plant machinery
21. Agricultural implements
22. Crawler tractors
23. Dumpers and scrappers
24. Truck shovel
25. Road Rollers
26. Agricultural Tractors
27. Rice milling machinery
28. Ice Plants
29. Rubber machinery
30. Printing machinery

C) Electrical Machinery and Equipments:

1. Turbo Generators
2. Electric Motors
3. Electric transformers
4. Power Capacitors
5. Control Gears
6. Electric Conductors
7. Electric Fans
8. Refrigerators
9. Air Conditioners
10. Power Cables
11. Air Coolers
12. Bottle Coolers
13. Dry Cells
14. Storage Batteries
15. G. L. S. Lamps
16. Fluroescent Tubes
17. Consumer Electronics
18. Industrial Electronics
19. Computer Systems
20. Components (Electric)

D) Transport Equipments:
1. Diesel Locomotives
2. Electric Locomotives
3. Wagons
4. Passenger Coaches
5. Commercial Vehicles including three wheelers
6. Auto ancillaries and parts
7. Two wheelers - scooters, mopeds and motor cycles
8. Bicycle - parts & accessories
9. Ships, boats and crafts
10. Bus body building
11. Cars, Jeeps etc.

4.2 Why Large Scale Industries?

4.2.1 Majority of industrial output comes from large scale industries which can be seen from the table presented below:
Table No. 4.10: A table showing share of small scale and large scale industries in total output for the year 1977-78 (figures in crores of Rs.)

<table>
<thead>
<tr>
<th>Gross output</th>
<th>Small Scale</th>
<th>Large Scale</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gross output</td>
<td>9586</td>
<td>29276</td>
<td>38860</td>
</tr>
</tbody>
</table>

| Percentage   | 24.66       | 75.34       | 100   |

Source: Statistical outline of India 1982
Tata Services Ltd., Economics & Statistics Department.

4.2.2. Data Generation:

Large scale industries are required to generate the data regarding production capacity installed and production capacity utilized for submitting annual returns to Central Government - Director General Technical Development Financial Institutions giving term loans to the large industries demand above mentioned data for control purposes. Large scale industries themselves need the detailed information such as production, productivity for assessing capacity utilization for expansion programmes, production planning and control, materials management, giving delivery indications to customers, manpower planning incentive payments etc. Large scale industries do have very well developed data generation and data processing information systems for the use of various internal departments as well as
outside agencies and statutory bodies.

4.2.3 Data Availability:

Small scale units are usually proprietary or partnership concerns and not willing to part with the information required for this kind of research study. Secondly, as resources of small units are limited, they may not have necessary expertise for generating information of productivity and related areas. Small scale industries are usually owner managed. Owner manager has close supervision and control of day to day affairs of the enterprise. Hence he does not need elaborate information for control.

4.2.4 For the purpose of present study, large scale industries are defined as follows:

1. Industry having capital of Rs. fifty lakhs or more;

or

2. Industry having sales turnover of Rs. fifty lakhs or more.
4.3 Selection of Geographic Area:

4.3.1 It was felt that the industrial zone should represent the national industrial scene for the purpose of the research study. Pune's industrial growth barely spans 25 odd years. City had earlier no local traditions of large scale trade, commerce or industry. It has been typical middle class community. None of its leading entrepreneurs today have textile background which was the chief ingredient in the success formula of many a prominent business houses in other parts of India.

4.3.2 Though Pune does not have any tradition of organized industries, attempts were made as early as in the last quarter of 19th century to start industries in the vicinities of Pune. In 1885 a paper mill was founded, which was followed by large scale production of brass and copper-wares with the aid of machinery in 1888. In the last decade of 19th century a textile mill, and a litho press were started near Pune. Later a glass factory was started.

Apart from these private efforts, the Government set up its defence factories near Pune. Thus, in 1869, ammunition factory was started on the outskirts of Pune and during the 1st and 2nd world wars considerable expansion took place at this factory. In 1940, High Explosive Factory went into production in nearby area.
Though these large factories were started in good old days, and they have progressed during these years, the establishment of these factories did not set further process of industrialisation. Thus the picture of Pune industries in early fifties was the existence of these large scale industries and the side by side existence of a few small scale units producing a variety of consumer articles such as bidies, bricks, coarse cloth, brass and copper utensils, stationery, perfumes, soaps etc. But the prominent character of Pune as an educational and administrative centre did not materially change.

4.3.3 The change was initiated with the establishment of M/S Kirloskar Oil Engines in 1946. This factory gave an impetus to the setting up of a number of small scale units as feeders to the large scale units. Subsequently many large scale industries were started in Pune. The setting up of large scale units encouraged considerable industrial development near about these factories, in the Bombay-Pune Road corridor in Pimpri-Chinchwad area in late fifties. This growth was further accelerated mainly because of the proximity and easy accessibility of this area to Bombay and also owing to restrictions imposed by the State Government on the industrial expansions in Greater Bombay. The other factors, such as moderate climate, availability of skilled personnel, necessary infra structure facilities such as water, power, transport etc. also played a great part in attracting industries to Pune.
4.3.4 The establishment of Hadapsar Industrial Estate in 1956 by Pune Municipal Corporation and exemption of octroi duty on the raw material and machinery of the units located in this estate also attracted a few new industries to Pune. In 1960, Maharashtra Industrial Development Corporation undertook development of large industrial area of three thousand acres at Bhosari in the Pimpri-Chinchwad industrial complex. A large number of industries both, small and large scale have already been established in the area, and the development of this area, and the development of this area by M.I.D.C. has helped the process of industrialisation in Pune further. Pimpri-Chinchwad-Bhosari industrial complex is one of the larger industrial complexes in our state and also country. The result is that now there are about 3000 units both large and small scale, in and around Pune. ¹

4.3.5 From the above description, it can be seen that industrial development of Pune took place in last thirty years. Industrial development in India was also started thirty years ago, in true sense, and momentum was gathered later. Thus over the period of last thirty years industrial culture in Pune has reached a stage of maturity, through various stages. Hence, Pune industrial area can be considered as a representative of National Industrial Scene.

¹ Industrial and Commercial Directory of Pune, Mahratta Chamber of Commerce and Industries - 1978.
4.4 **Product Range**

The variety of products manufactured by large scale engineering industries along with their capital and annual sales turnover can be visualized from the list given below:

A list of Engineering Industries in Pune having capital of Rs. 50 lakhs and/or above and/or turnover of Rs. 50 lakhs and above:

1. **Advani Oerlikon Limited**  
   Capital: Rs. 661.25 lakhs  
   Production: Rs. 427.09 lakhs

**Products**: Semi-automatic and automatic submerged arc welders, automatic and automatic gas shielded welders. Modern static welding sources, modern welding transformers, arc welding generators, power and distribution transformers.

**Electric Items**:

a) Timers & flashers  
b) Process control equipment & traffic control equipment;  
c) Electronic flash guns; variable gang condensors, static drives and

---

1. *Industrial and Commercial Directory of Pune, Mahratta Chamber of Commerce and Industries - 1978.*
excitor supplies and static inverts special equipments like welding rotators, welding columns, booms, seamers, positioners, custom built welding outfits, high voltage rectifiers for electrostatic precipetator application etc.

2. Agarwal Containers Private Ltd.  
   Capital : Rs.50 lakhs  
   Production : Rs. 2.50 crores  
   Products : Mild Steel barrels.

3. Agarwal Fabrication Private Ltd.  
   Capital : Rs.50 lakhs  
   Production : Rs.65 lakhs  
   Products : Fabrication of steel and stainless steel chemical plants and machinery, agricultural equipments.
4. **Amphetamine Ltd** : Capital : Rs.124.96 lakhs
   Production : Rs.119.40 lakhs

   **Products** : Printed circuit connectors,
   rank and panel connectors,
   military service circular connectors.

5. **Antifriction Bearings** : Capital : Rs. 6.33 lakhs
    Corporation Ltd.
   Production : Rs. 5.6 crores

   **Products** : Cylindrical roller bearing
   25 to 60 mm bore,
   taper roller bearings
   11 to 100 bore.

6. **Associated Bearing Company Ltd.** (S.K.F.) : Capital : Rs.1800 lakhs
    Production : Rs.1762 lakhs

   **Products** : Deep groove ball bearings,
   taper roller bearings, Pendulum arms,
   jockey pulley, cradles.

7. **Atlas Capco Ltd.** : Capital : Rs.429,47,212
   Production : Rs.4,05,11,490

   **Products** : Air compressors, rock drills,
   Pneumatic equipments.
8. B.G. Shirke & Co.: Capital: Rs.1.18 crores
Production: Rs.2,86,78,000

Products: Fabricated structural steel,
prefabricated houses of steel,
wood panel product.

9. Bajaj Auto Ltd.: Capital: Rs.16.84 crores
Production: Rs.61.81 crores

Products: Scooters, three wheelers,
spare parts thereof.

10. Bajaj Tempo Ltd.: Capital: Rs.11.34 crores
Production: Rs.22.34 crores

Products: Light commercial vehicles below
3 tons capacity, diesel engines
for automotive purposes and
spare parts thereof.

11. Bharat Forge Co. Ltd.: Capital: Rs.16 crores
Production: Rs.24 crores

Products: Not Available
12. Buckau Wolf New India Engineering Works Ltd.  
   Capital: Not Available  
   Production: Not Available  
   **Products**: Sugar mill machinery,  
   centrifugal machines,  
   boilers for sugar plant,  
   plants for breweries and malteries.

13. Chloride India Ltd.  
   Capital: Rs.868.14 lakhs  
   Production: Rs.1988.60 lakhs  
   **Products**: Automotive batteries,  
   train lighting stationery,  
   minor cap lamp,  
   ground starter etc.  
   Servicing of all types of batteries.

   Capital: Rs.3,46,500  
   Production: Rs.60,56,000  
   **Products**: Electric hoists and cranes,  
   capacity 500 kgs. to 15,000 kgs.
16. **Cooper Engineering Ltd.**  
Capital: Rs. 954.27 lakhs  
Production: Rs. 474.2 lakhs

*Products*: Medium and heavy duty shaping machines, planing machines, slotting machines, vertical turret lathes, gear hobbing machines, horizontal boring machines and special purpose machines.

16. **C T R Manufacturing Industries Limited**  
Capital: Rs. 239.07 lakhs  
Production: Rs. 202 lakhs

*Products*: Milling cutters, pressed steel radiators, on-load tachungers for transformers, LT Oil circuit breakers, electronic plastic film capacitors.
17. Dalco Engineering Pvt. Ltd. : Capital : Rs. Not Available

Production : Rs. 75 lakhs

Products : Storage tanks, pressure vessels, reaction kettles, autoclaves, crystallisers, separators, mixing tanks, vacuum receivers, steam jacketted tilting kettles, heat exchangers, fermentors, resin plants, distillation units, vacuum filters, distillation columns, fractionating columns, evaporators, trays, size cookers, size storage tanks, starch mixing tanks, jiggers, sizing tanks, dueing winches, blenders double cone vacuum dryers.

18. David Brown Greaves Ltd. : Capital: Rs. 2,28,27,000

Production: Rs. 4,47,98,000

Products : Industrial gear and marine gear boxes, flexible coupling.
19. Elpro International Ltd. : Capital : Rs. 1,97,47,630
Production : Rs. 3,84,26,829

Products : Lightening, arresters, high tension cutouts and accessories, domestic and industrial heating elements including water heaters, oil heaters and air heaters, alloy magnet, hard ferrits, X-ray and electro medical equipments, cobalt 60 teletherapy equipment, intensifying and fluoroscopic screens.

20. Finolex Cables Ltd. : Capital : Rs. 164.22 lakhs
Production : Rs. 4,17,12,000

Products : PVC insulated electrical cables and wires including house wiring cables, flexible cords, telephone coiled cords, armoured cables, paired telephone cables, automobile cables, battery cables, winding wires, PVC insulated cables for submersible pumps, vinyl houses for flexible conducting, vacuum purposes and also for irrigation purpose.
21. **Forbes Forbes Campbell**  
   Capital: Rs. Not Available  
   Production: Rs. Not Available  

*Products*: Office equipments -  
   Faci lists typewriters and calculators, shouries make  
   duplicators, auto accessories, spark plugs, spark plugs testing machines and ceramic products, engineering cutting and threading tools.  
   Pneumatic grinders, spring washers, etc.  
   Communications telecommunication components.

22. **Hind Condensor Pvt. Ltd.**  
   Capital: Rs. 77 lakhs  
   Production: Rs. 129 lakhs  

*Products*: Power capacitors, MFD capacitors,  
   H. T. Power capacitors, 3 phase and single phase air core current limiting reactors up to 22 kv voltages.

23. **Indian Cable Co. Ltd.**  
   Capital: Rs. 1693.81 lakhs  
   Production: Rs. 3938.00 lakhs  

*Products*: Electrical cables and wires.
24. **Indian Card Clothing Company Limited**  
   *Capital*: Rs.3,73,02,983  
   *Production*: Rs.4,82,00,000

**Products**

Flexible card clothing and tops, flexible and metallic stripping fillets, burnishing, flat cleaning fillets, hand stripping cards, Philipson sheets and strips, wooden, worsted and cotton waste card clothing, fancy sheets, hand cleaning cards, raising fillets and brush sheets, metallic card clothing and tops, steel base wire lickerin wire CS 4 wire.

25. **Indoswe Engineers Ltd.**  
   *Capital*: Rs.25 lakhs  
   *Production*: Rs.2.15 crores

**Products**

Copper and copper-alloy tubes and pipes including refrigeration quality tubes, silicon brass tubes, sugar brass tubes, steam and water heater brass tubes, free cutting forging and riveting high tensile brass rods, sections, profiles and hollow bars, aluminium bronze rods/tubes, nickel silver rods in standard shapes and also profiles, beryllium-copper, cadmium copper
and telurim copper rods and profiles, manganese bronze rods in standard shape and profiles, copper nickel silicon alloy rods, phosphor bronze solid and hollow castings, E. C. copper, copper alloy and brass profiles and sections.

26. **International Computers**: Capital: Rs.2,64,89,014
    
    **Indian Manufacture Ltd.**
    
    Production: Rs.1,78,85,380
    
    **Products**: Data processing equipments, tabulating machine cards, Computer system complete with all peripherals.

27. **J. N. Marshall Pvt. Ltd.**: Capital: Rs.20 lakhs
    
    Production: Rs.3.5 crores
    
    **Products**: Process steam equipments, process control and medical instruments, self-locking fasteners, gauges, valves, PH meters, low air pressure burners, textile moisture meters, controllers, safety valve and defectors.
28. **Jaya Hind Industries Ltd.**  
**Capital:** Rs. 111.58 lakhs  
**Production:** Rs. 278.86 lakhs

**Products:** Dye casting, flywheel magnetos, IC engines, gear box, ignition coils.

29. **Jaya Hind Scient Ltd.**  
**Capital:** Rs. 44,91,370  
**Production:** Rs. 59,28,597

**Products:** Resistance friction, fusion, electron beam and other special purpose welding machines for all industries.

30. **K. K. Nag Pvt. Ltd.**  
**Capital:** Not Available  
**Production:** Rs. 50,00,000

**Products:** Lead FRP & PVC fabricated and lined chemical equipments, storage tanks, process vessels, heating cooling coils, electrodes ducts, hoods, scrubbers, piping, etc.  
Valves - lead valves FRP valves & CI diaphragm valves with lead/FRP/rubber linings, exhaust system - senoflow ventilation system 'PROMIL' (thermocol) - packaging and insulation materials.
31. K.S.B. Pumps Ltd. : Capital: Rs.190.79 lakhs
Production: Rs.217.35 lakhs

Products: Submersible pumps,
high pressure pumps,
non-clogging pumps,
chemical process pumps, and
mercury pumps.

32. Kinetic Engineering Ltd.: Capital: Rs.1,35,99,000
Production: Rs.3,06,93,000

Products: Luna Moped.

33. Kirloskar Brothers Ltd.: Capital: Rs.16,56,48,386
Production: Rs.13,25,04,195

Products: All types of pumps, valves,
agricultural implements
machine tools, hermetically sealed
- compressors castings.

34. Kirloskar Cummins Ltd.: Capital: Rs.14,18,30,076
Production: Rs.27,36,18,039

Products: Internal Combustion Engines
(Diesel Engines)
35. *Kirloskar Filters Pvt. Ltd.*  
**Capital:** Rs.10,33,000  
**Production:** Rs.70,34,000  
*Products:* All types of fuel, oil and air filters.

36. *Kirloskar Oil Engines Ltd.*  
**Capital:** Rs.22,89,60,000  
**Production:** Rs.33,93,40,000  
*Products:* Engines between 3 HP & 440 HP,  
'R' type engines, bimetal bearings,  
bimetal strips.

37. *Kirloskar Pneumatic Co. Ltd.*  
**Capital:** Rs.9,81,69,567  
**Production:** Rs.9,01,10,347  
*Products:* Compressed air equipments,  
air conditioning and refrigeration compressors and power transmission equipment.

**Capital:** Rs.8,43,764  
**Production:** Rs.63,66,970  
*Products:* Wheels and axle sets for transfer cars, cranes, gear boxes,  
gear coupling,  
bearing housing.
39. Kulkarni Foundries Ltd. : Capital : Rs.73,47,660
Production : Rs.41,98,241

Products : Foundry equipments, CI castings for machinery, engineering, CI castings - sub contracting arc furnace, rotary furnaces, cupolas, grinders, mullers, tumbling, bassels, laddles etc. valves, pumps.

40. LA Precision Springs & Engineering Company Ltd. : Capital : Rs. 72 lakhs
Production : Rs. 4.94 lakhs

Products : Precision springs of all types compression, tension, torsion, wire form and flat springs.

41. Mahindra Owen Ltd. : Capital : Rs.130.88 lakhs
Production : Rs.302.34 lakhs

Products : High and low speed trailers for agriculture, Industry and defence.

42. Mahindra Sintered Products Limited : Capital : Rs.194.38 lakhs
Production : Rs.235.00 lakhs

Products : Sintered bushes and parts filters, copper, tin lead and iron powder for powder metallurgy applications.
43. Matchwel Electricals (India) Limited.  
   Capital: Rs. 171.73 lakhs  
   Production: Rs. 437 lakhs  
   Products: Ceiling fans, table fans, miscellaneous fans, with brand name as Bajaj Bahar, Kassels, Kohinoor.

44. Mather Greaves Ltd.  
   Capital: Rs. 78.33 lakhs  
   Production: Rs. 292.91 lakhs  
   Products: Large and special purpose centrifugal pumps for thermal stations, atomic power plants, industrial applications such as fertilizer complexes, petrochemical industries, mines, refineries and water works; textile processing and finishing machinery, flame proof motors, food processing and packaging machines.
45. **Philips India Ltd.**
   - Capital: Rs.
   - Production: Rs.

   **Products:**
   - Electronic components,
   - piece parts e.g. capacitors, resistors, condensers,
   - loud-speakes, radio/transistor sets, tape recorders, electronic instruments and scientific instruments,
   - public address system.

46. **Racold Appliances Pvt. Ltd.**
   - Capital: Rs.
   - Production: Rs.

   **Products:**
   - Domestic electrical appliances such as water heaters, washing machines, ovens, toasters, iron, etc.

47. **Ruston & Hornsby (India) Ltd.**
   - Capital: Rs.
   - Production: Rs.

   **Products:**
   - 5 to 150 HP diesel engines for various applications like generating sets, marine, agricultural, industrial.
48. Sahyadri Udyog

Products: All types of forging and heat treatment furnaces, including sealed quench, vacuum, potary hearth, bogie hearth, pusher, aluminium heat treatment etc. protective atmosphere generators, recuperators, parts washing equipment; arc melting furnace, material handling equipment associated with furnaces, foundry equipment.

Capital: Rs.25,50,000
Production: Rs.55,00,000

49. Sandvik Asia Ltd.

Products: Tungsten carbide products including integral rock drill steels, bits, detachable bits, extension drill steel equipment, inserts, tips, dies, nibs, studs and other applications, tools milling cutters, carbide burns, scrappers, wear resisting parts, twist drills and similar products, hydrogen gas.

Capital: Rs.7,78,28,168
Production: Rs.8,47,82,000
50. **Spaco Carburettors (India) Ltd.**

   **Capital:** Rs. 10448642
   **Production:** Rs. 17668403

   **Products:** Carburettors and parts thereof for scooters, mopeds, motorcycles, three wheeler etc.

51. **Spirax Marshall**

   **Capital:** Rs. 23,96,744
   **Production:** Rs. 51,92,064

   **Products:** Spirax thermostat steam trap, thermodynamic steam trap, open bucket trap, float trap, strainer sight glass, system unit, air vent, air vent assembly, air eliminator, compressed air trap, ogden automatic pump, steam or air separator, temperature regulator with SB & NB type control valves, flash condenser, DP reducing valves, relief valve, flash vessels, monniters, air filters, regulators & lubricators.
52. Spray Metal (P) Ltd.  
Capital: Rs. 40,00,000  
Production: Rs. 77,00,000  
Products: Shot blasting machines, sand blasting machines, airless spray painting machines, paper plants on turnkey basis, welding rotators, storage tanks, pressure vessels, spherical vessels, general fabrication job work.

53. Tata Engineering & Locomotive Co., Ltd.  
Capital: Rs. 1,79,77,25,581  
Production: Rs. 285.73 crores  
Products: Truck and bus chassis, excavators, vehicle spare parts, excavator spare parts.

Capital: Rs. 79.46 lakhs  
Production: Rs. 120.00 lakhs  
Products: High vacuum degassing, drying and filtering plants, vacuum impregnating plant, epoxy mixing and casting plant, vapour degreasing plant, vacuum degassing plant, complete paper capacitor, winding machine, filament winding machine, coil winding machine, capacitor testing instruments, special vacuum valves.
55. Vanaz Engineering Pvt. Ltd.  
**Capital**: ₹48,20,326  
**Production**: ₹1,98,46,056

**Products**: High pressure cylinder valves for industrial and medicinal gases, L. P. C. natural gas pressure regulators (Domestic & Industrial type) and other low pressure gauges, caliper brakes, coaster brake hubs and 3 speed hubs for bicycles, pressure vacuum valves, emergency vents and fusible links for tank lorries: non-ferrous forging up to 4 kgs. die castings, swing forge machines.

56. Vulcan Laval Ltd.  
**Capital**: ₹53.34 lakhs  
**Production**: ₹10.00 crores

**Products**: Development, manufacture and erection of complete range of machineries for dairy, brewery, cattle feed, refrigeration, spray dryer plants, product range also covers match making machines, ice-cream machines, immersion cooler, stainless steel pumps, plate heat exchanger, industrial separator and refining units, refrigeration compressor,
milk chilling units, road & rail
milk tankers, S. S. Vessels.

57. **Wandlesside National Conductors Limited.**

**Capital:** Rs. 19.99 lakhs  
**Production:** Rs. 02.83 crores

**Products:**  
Varnish bonded glass braided rectangular and round copper conductors; enamelled and glass lapped rectangular and round copper conductors, enamelled rectangular copper conductors, silk/rayon covered round copper wires, Kapton insulated rectangular and round copper conductors, PTTE - insulated copper wires, paper covered bunched and rope - stranded flexible copper conductors for use in transformers as leads, bare copper conductors, flexible insulating sleevings for electrical use, terminal lead wires for hermetic motor services, woven tapes, tinned copper-strips/foils/round wire nomex covered conductors, teflon moulded components, flexible braids, PVC winding wires, resi glass tapes, stage 'B' (semi-cured).
Wanson (India) Pvt. Ltd.  
Capital: Rs. 1,54,77,487  
Production: Rs. 4,73,63,700  

Products: 'Vaporax' packaged fully automatic instant steaming boilers, multitherm - multiful boilers, thermopac - thermic fluid heaters, thermobloc - hot air generators, inicinex - incinerators, hydrobloc - hot water generators, vapor jet steam cleaners, dal dryers, grain/seed dryers, seed/grain drying/storage systems, seed processing centres, cars spray painting & drying booths.

Above list will illustrate that large engineering industries in Pune do represent large scale engineering industries at national level. (given details of engineering industries earlier in this chapter).

4.5  Relevance of the Study:

4.5.1  Constitution of India, in its preamble states that economic growth must result in elevating the lot of the millions to whom political freedom will remain meaningless, unless their economic circumstances were substantially bettered. Leaders in all developing countries have held the removal of poverty as the main
objects of economic planning. The principle reasons for poverty in developing countries like India, are -

(1) Underdevelopment and inadequate harnessing and use of resources that can be or are available.

(2) Low rate of growth insufficient for the magnitude of the task and for the growth in population.

(3) Size of population.

(4) Inequalities and maldistribution of the nation's wealth and the gross national product.

4.5.2 The first post independence decade 1951-60 achieved growth rate of 3.8 per cent, which dropped to 3.7 per cent in the second decade, 1961-70. This slow growth rate was overtaken by the population increase.

Some idea of enormity of the challenge can be had from the fact that even with the higher growth rate postulated sometime age, the second poorest decile of the population is restricted to a per capita consumption at 1963-69 prices of only 27 Rs. a month. Measured at 1960 prices, the level of consumption will amount to only 15 Rs. per month. It is worth recalling that the minimum consumption level at 1960 prices was calculated at Rs.20 per month, a level which is considered
well below the poverty line. A similar picture of varying shades emerges in other developing countries.

4.5.3 The given picture of the task in developing countries like India poses a great challenge because the enormous demand for fulfilment of needs must be met by producing massive quantities of physical goods within two major constraints:

(1) Constraint of time:

The physical targets of production of goods must be met within a given time span, otherwise the socio-economic system of the developing countries will be disturbed.

(2) Constraint of resources:

All developing countries including India have limited resources such as capital and skilled manpower, which are necessary for economic development, so efficient utilisation of already scarce resources assume great significance. To put it in other words, productivity of each resource available will have to be increased to optimum level.

This study will reveal the factors that affect productivity their relations to each other and give recommendations for improving productivity. This will be of great interest to academicians, industrial executives, union leaders, Government policy planners.
4.6 Selection of Companies:

From the list of engineering industries given above, it was decided to cover fifteen percent of the industries by random sampling.

A chit for each company was prepared and all of them were thoroughly mixed in an urn. One chit was picked up at a time and name of the company was noted down. The chit was again mixed with the other chits. The procedure was repeated 16 times, to arrive at the list for the purpose of data collection & analysis. In the process of making the list, chit for a particular company was picked up twice. Hence second time it was rejected as it was already taken.

Thus a list of sixteen companies was made out of fifty eight companies falling under the category of large scale industries defined for the purpose of the study. The list is given below along with the products.

1. Associated Bearing Co. Ltd. : Capital : Rs.1800 lakhs
   (S.K.F.).                                  Production : Rs.1762 lakhs

    Products : Deep Groove ball bearings, taper
               roller bearings, pendulum arms
               jockey pulley, cradles.
2. **Atlas Copco Ltd.**
   - Capital: Rs. 4,29,57,212
   - Production: Rs. 4,05,11,490
   - **Products**: Air compressors, rock drills, pneumatic equipments.

3. **Bajaj Auto Ltd.**
   - Capital: Rs. 16.84 crores
   - Production: Rs. 51.81 crores
   - **Products**: Scooters, three wheelers, spare parts thereof.

4. **Bajaj Tempo Ltd.**
   - Capital: Rs. 11.34 crores
   - Production: Rs. 22.34 crores
   - **Products**: Light commercial vehicles below 3 tons capacity, diesel engines for automotive purposes and spare-parts thereof.

5. **Bharat Forge Co. Ltd.**
   - Capital: Rs. 16 crores
   - Production: Rs. 24 crores
   - **Products**: Not Available

6. **Buckau Wolf New India Engineering Works Limited**
   - Capital: Not Available
   - Production: Not Available
   - **Products**: Sugar Mill Machinery, centrifugal machines, boilers for sugar plant, Plants for breweries and malteries.
7. Cooper Engineering Ltd. : Capital: Rs. 954.27 lakhs
Production: Rs. 474.2 lakhs

Products: Medium and heavy duty shaping machines, planing machines, slotting machines, vertical turnet lathes, gear hobbing machines, horizontal boring machines and special purpose machines.

8. Elpro International Ltd. : Capital: Rs. 1,97,47,630
Production: Rs. 3,84,26,829

Products: Lightening arresters, high tension cutout accessories, domestic & industrial heating element including water heaters, oil heaters and air heaters alloy magnet : hard ferrits, X-ray & electromedical equipments, cobalt 60 teletherapy equipment, intensifying and fluoroscopic screens.

9. International Computers
Indian Manufacture Ltd. : Capital: Rs. 2,64,89,014
Production: Rs. 1,78,85,380

Products: Data processing equipments, tabulating machine cords, computer system complete with all peripherals.
10. **K. S. B. Pumps Ltd.**  
   Capital: Rs.190.79 lakhs  
   Production: Rs.217.35 lakhs  
   **Products**: Submersible pumps, high pressure pumps, non-clogging pumps, chemical process pumps and mercury pumps.

11. **Kirloskar Cummins Ltd.**  
   Capital: Rs.141830076  
   Production: Rs.273618039  
   **Products**: Internal Combustion engines (Diesel engines)

12. **Kirloskar Oil Engines Ltd.**  
   Capital: Rs.228960000  
   Production: Rs.339340000  
   **Products**: Engines between 3 HP & 440 HP, 'R' type engines, bimetal bearings, bimetal strips.

13. **Matchvel Electricals (India) Ltd.**  
   Capital: Rs.171.73 lakhs  
   Production: Rs.437 lakhs  
   **Products**: Ceiling fans, table fans, misc. fans, with brand name as Bajaj, Bahar, Kassels, Kohinoor.
14. Ruston & Hornsby (India) Ltd.: Capital: Rs. 438 lakhs
Production: Rs.1217.81 lakhs

Products: 5 to 150 HP diesel engines for various applications like generating sets, marine, agricultural, industrial.

15. Sandvik Asia Ltd.: Capital: Rs.7,78,28,168
Production: Rs.8,47,82,000

Products: Tungsten carbide products including integral rock drill steels, bits detachable bits, extension drill steel equipment, inserts, tips, dies, nibs, studs & other applications, tools, TC tipped, Sandvic coromant tools, milling cutters, carbide burns, scrappers, wear resisting parts, twist drills and similar products, hydrogen gas.

16. Tata Engineering & Locomotive Company Limited

Capital: Rs.1797725581
Production: Rs.285.73 crores

Products: Truck and bus chassis, excavators, vehicle spare parts, excavator spare parts.
4.7  Data Collection:

4.7.1  Selection of departments:

Productivity tends to be higher if work or task is well defined and structured and vice-versa. In order to test the hypothesis machine shop and assembly shop from each company were selected for the purpose of data collection as work in machine shop is well defined and highly structured. On the other hand, assembly activity is least defined and least structured from manpower complement point of view.

4.7.2  Preparation of questionnaire:

The factors affecting labour productivity were identified. The investigations revealed four distinct groups involved in productivity dynamics e.g. workers and supervisors directly determine productivity levels. The other two groups apparently not so closely involved in productivity levels. So it was decided to interview all, involved in the process.

1. Workers
2. Supervisors
3. Union leaders
4. Management
Suitable questionnaires were designed separately. For each group, to collect relevant data for further analysis. These questionnaires for management were sent to the senior executives, from:

(1) Kirloskar Tractors Ltd., and
(2) Crompton Greaves Ltd.

A worker from Tata Engineering and Locomotive Co. Ltd., and a worker from Bharat Forge were interviewed to test the questionnaire for workers. The answers were studied carefully and questionnaires were modified to get more precise and accurate data. These questionnaires are presented in appendix. These questionnaires were sent to the companies selected explaining in details the academic scope of the study. The companies were also assured that the data received will be used only for the study without divulging their identity. They were further guaranteed to keep the data confidential.

Ten companies replied very promptly, without positive or negative response. The answers from six organizations were disappointing. They refused to give any co-operation in the process of collection of data. They did not want the third parties to interview their workers in "the age of labour unrest". To quote one of the answers, "for several reasons, it is difficult for us to give the details or discuss in depth this matter for the purposes of thesis or publication". Further they suggested to exclude their company from the study.
One of them allowed interviews of management only. But in absence of workers' interviews, the interviews with management had no meaning. So the same had to be omitted. The other refused interviews and any sort of discussion with management, however, sent a 'write-up' giving the basis or general approach for developing the time standards which alone is hardly of any use in the connection with the study.

Three out of the above six regretted that "they did not have the data required for the study".

Three companies did not give any response positive or negative in spite of continuous requests and reminders. So naturally these had to be omitted.

It is an unpleasant thing that the interviews were not allowed and information was refused to be given. Because the same study could have been of great help to these industries.

Seven companies gave positive answers. These were personally contacted for further data collection. Four out of these seven, willingly gave very good cooperation. There was no need of follow ups and so on. Remaining three also gave a good response, however,
it took a too long time to get their approvals. It included long awaited meetings with management executives to get approvals. Once the approval was given, everything went on very smoothly.

Most of the industries in Pune region are located in Pimpri-Chinchwad industrial area. The distances from the city to different companies vary from 7 to 19 kilometers. Commuting from the city to the industrial units concerned was time consuming. During shift change-overs public transport is overcrowded and otherwise frequency of public transport is limited. Considering all these problems, private transport was resorted to.

In this process, first the workers were interviewed. Instead of writing down the answers, interviews were tape-recorded. The management was hesitating that the workers may refuse to tape record their answers. But in fact, the workers were too eager to tape record their answers.

It should be noted that workers from all organisations gave very good response. They gave prompt and appropriate answers to various questions. Whenever they had difficulties in getting the questions, the questions were still simplified and made easier. The form of the most of the interviews was just a sort of informal discussions. So the workers were free, comfortable and they themselves spoke out including even their own family things etc.
A chief production manager from a company went through the questionnaires for workers and worried whether the workers will give any response. He tried to convince me that the workers will never answer these questions, and so on.

Then the productivity indices of the interviewed workers were collected. Wherever the data was available, it was presented by the industrial engineers without any hesitation. Then the other relevant information was collected from respective offices.

Local labour union leaders were contacted at the same time. Relevant questions were asked to them and information collected.

Supervisors of the same workers were interviewed. In most of the cases, supervisors and workers were very cooperative.

The interviews with top management personnel in this connection, was a typical experience. It is obvious that they are very busy and to get their appointments was really a difficult task. The process included a number of requests and reminder calls on the part of the research trainee. However, almost all top management people gave their valuable time, a whole hearted cooperation and very very detailed and elaborate answers.
All this process of contacting relevant parties and collection of relevant data took six months period.

All the data collected was analysed. Analysis and conclusion, and recommendations are presented in the next chapters.