CHAPTER II

ORGANIZATIONAL STUDY
The present study encompasses two manufacturing units of Public Sector behemoth Bharat Heavy Electricals Limited (hereinafter BHEL). The two Units are Insulator Plant (IP) located at Jagdishpur, UP and Electro Porcelain Division (EPD) located at Bangalore. Before discussing about the Units, let us briefly summarize the activities, systems, organizations, products etc. of BHEL. Introduction about BHEL is more pertinent to our study because, both the Units being part of BHEL, have similar structures, procedures, policies etc.

2.1 BHEL : AN OVERVIEW

Today, BHEL is the largest engineering and manufacturing enterprise in India in the energy-related/infrastructure sector. BHEL was established more than 40 years ago, ushering in the indigenous Heavy Electrical Equipment industry in India - a dream that has been more than realized with a well-recognized track record of performance. The company has been earning profits continuously since 1971-72 and paying dividends since 1976-77.

BHEL manufactures over 180 products under 30 major product groups and caters to core sectors of the Indian Economy viz., Power Generation & Transmission, Industry, Transportation, Telecommunication, Renewable Energy, etc. The wide network of BHEL’s 14 manufacturing divisions, four Power Sector regional centres, over 100 project sites, eight service centres and 18 regional offices, enables the Company to promptly serve its customers and provide them with suitable products, systems and services -- efficiently and at competitive prices.

BHEL has acquired certifications to Quality Management Systems (ISO 9001), Environmental Management Systems (ISO 14001) and Occupational Health & Safety Management Systems (OHSAS 18001) and is also well on its journey towards Total Quality Management.

Major achievements of BHEL are:

It has:

- Installed equipment for over 90,000 MW of power generation -- for Utilities, Captive and Industrial users.
- Supplied over 2,25,000 MVA transformer capacity and other equipment operating in Transmission & Distribution network up to 400 kV (AC & DC).
- Supplied over 25,000 Motors with Drive Control System to Power projects, Petrochemicals, Refineries, Steel, Aluminum, Fertilizer, Cement plants, etc.
- Supplied Traction electrics and AC/DC locos to power over 12,000 kms Railway network.
- Supplied over one million Valves to Power Plants and other Industries.
- Export presence in more than 60 countries around the globe.

BHEL’s operations are organized around three business sectors, namely Power, Industry - including Transmission, Transportation, Telecommunication & Renewable Energy - and Overseas Business. This enables BHEL to have a strong customer orientation, to be sensitive to his needs and respond quickly to the changes in the market.
The greatest strength of BHEL, as claimed by it, is its highly skilled and committed 43,500 employees. BHEL asserts that “Every employee is given an equal opportunity to develop himself and grow in his career”. Continuous training and retraining, career planning, a positive work culture and participative style of management – all these have engendered development of a committed and motivated workforce setting new benchmarks in terms of productivity, quality and responsiveness.

### 2.2 PRODUCT RANGE

BHEL produces around 180 products grouped into 30 categories. The major groups and products are listed below:

<table>
<thead>
<tr>
<th><strong>THERMAL POWER PLANTS</strong></th>
<th>Steam turbines and</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>GAS BASED POWER PLANTS</strong></td>
<td>Gas turbines</td>
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<tr>
<td><strong>HYDRO POWER PLANTS</strong></td>
<td>Custom-built conventional hydro turbines</td>
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<tr>
<td></td>
<td>Min/micro hydro sets.</td>
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<td></td>
<td>Spherical, butterfly and rotary valves and auxiliaries for hydro station</td>
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<td><strong>DG POWER PLANTS</strong></td>
<td>HSD, LDO, FO, LSHS, natural-gas/biogas based diesel power plants</td>
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<td><strong>INDUSTRIAL SETS</strong></td>
<td>Industrial turbo-sets of ratings from 1.5 to 120MW.</td>
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<td></td>
<td>Gas turbines and matching generators</td>
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<td></td>
<td>Industrial steam turbines and gas turbines for drive applications and co-generation applications.</td>
</tr>
<tr>
<td><strong>BOILERS</strong></td>
<td>Steam generators for utilities,</td>
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<td>boilers with super critical parameters up to 1000 MW unit size.</td>
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<tr>
<td></td>
<td>Steam generators for industrial applications</td>
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<td></td>
<td>biomass, lignite, oil, bagasse or a combination of these fuels.</td>
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<tr>
<td></td>
<td>Pulverized fuel fired boilers.</td>
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<td>Stoker boilers.</td>
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<td></td>
<td>Atmospheric fluidized bed combustion boilers.</td>
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<td>Circulating fluidized bed combustion boilers.</td>
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<td>Waste heat recovery boilers.</td>
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<td>Chemical recovery boilers for paper industry, ranging from capacity of 100 to 1000 t/day of dry solids.</td>
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<tr>
<td></td>
<td>Pressure vessels.</td>
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<tr>
<td><strong>BOILER AUXILIARIES</strong></td>
<td>Fan</td>
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<tr>
<td></td>
<td>Axial reaction fans</td>
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<td></td>
<td>Axial impulse fans</td>
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<td></td>
<td>Single and double-suction radial fans</td>
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<td></td>
<td>Air-Pre-heaters</td>
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<td></td>
<td>Gravimetric Feeders</td>
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<td></td>
<td>Pulverizers</td>
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<td></td>
<td>Bowl mills of slow and medium speed of capacity up to 100 t/hour.</td>
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<td></td>
<td>Tube mills for pulverizing low-grade coal with high-ash content.</td>
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<td></td>
<td>Pulse Jet and Reverse Air Type Fabric Filters (Bag Filters)</td>
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<td></td>
<td>Electrostatic Precipitators</td>
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<tr>
<td></td>
<td>Mechanical Separators</td>
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<tr>
<td></td>
<td>Soot Blowers</td>
</tr>
</tbody>
</table>
Valves
Piping Systems, Constant Load Hangers, Clamp and Hanger components, variable Spring hangers
HEAT EXCHANGERS AND PRESSURE VESSELS
CS/AS/SS/Nonferrous shell and tube heat exchangers and pressure vessels.
Air-cooled heat exchangers.
Surface condensers.
Steam jet air ejectors.
Columns.
Reactors, drums.
LPG/propane storage bullets.
LPG/propane store mounded vessels.
Feed water heaters.
PUMPS
Pumps for various applications to suit utilities up to a capacity of 660 MW.
POWER STATION CONTROL EQUIPMENT
Microprocessor-based distributed digital control systems.
Data acquisition systems.
Man-machine interface.
Sub-station controls with SCADA.
Static excitation equipment/automatic voltage regulator.
Electro-hydraulic governor control.
Turbine supervisory system and control.
Furnace safeguard supervisory systems.
Controls for electrostatic precipitators.
Controls for HP/LP bypass valves.
SWITCHGEARS
Switchgear of the various types for indoor and outdoor applications and voltage ratings up to 400 kV.
BUS DUCTS
Bus-ducts with associated equipment to suit generator power output of utilities of up to 500 MW capacity.
TRANSFORMERS
Power transformers for voltage up to 400 kV.
HVDC transformers and reactors up to + 500 kV rating.
Series and shunt reactors of up to 400 kV rating.
Instrument transformers:
Current transformers up to 400 kV.
Electro-magnetic voltage transformers up to 220 kV.
Capacitor voltage transformers up to 400 kV.
Cast resin dry type transformers up to 10 MVA 33 kV.
Special transformers: earthing, furnace; rectifier; electrostatic precipitator; freight loco and ACEMU and traction transformers
INSULATORS
High-tension ceramic insulators.
Disc/suspension insulators for AC/DC applications, ranging from 45 to 300 kV electro-mechanical strength, for clean and pollute atmospheres.
Pin insulators of up to 33 kV.
Post insulators suitable for applications of up to 6 units.
Hollow porcelains of up to 400 kV.
Solid core insulators of 25 kV rating (both porcelain and hybrid) for railways.
Disc insulators for 800 kV AC and HVDC transmission lines (BHEL is the first Indian manufacturer to supply such insulators).
CAPACITORS
Power capacitors for industrial and power systems of up to 250 kVAR rating for application up to 400 kV.
Coupling/CVT capacitors for voltages up to 400 kV.
Low Tension Thyristor Switched Capacitors (LTTS) for dynamic power factor correction
ENERGY METERS
Single Phase, Poly Phase and Special-purpose electro-mechanical and electrical meters.
INDUSTRIAL ELECTRICAL MACHINES
AC squirrel cage, slipring, synchronous motors, industrial alternators and DC machines

2.4
COMPRESSORS
Centrifugal compressors of varying sizes, driven by steam turbine/gas turbine/motor.

CONTROL GEAR
Industrial Control gear
Control panels and cubicles for applications in steel, aluminum, cement, paper, rubber, mining, sugar and petrochemical industries.
Liquid rotor starters for slipping induction motors of up to 2500 hp rating.
Liquid regulators for variable-speed motors.
Contractors
LT air break type AC for voltages up to 660 V.
LT air break type DC contactors for voltages up to 600 V.
HT vacuum type AC for voltages up to 11 kV.
Traction Control gear
Control gear equipment for railways and other traction applications.
Control and Relay Panels
Control panels for voltages up to 400 kV and control desks for generating stations and EHV sub-stations.
Control and relay boards.
Turbine gauge boards for thermal, gas, hydro and nuclear sets.
Turbine electrical control cubicles.
Outdoor-type control panels and marshalling kiosks, swinging type synchronizing panel and mobile synchronizing trolley.
Transformer tap changer panels.

SILICON RECTIFIERS
Silicon power rectifiers with matching transformers for industrial applications like aluminum/copper/zinc smelting, for electrolysis in chemical industry and AC/DC traction application.

THYRISTOR EQUIPMENT
Thyristor converter equipment.
Thyristor inverter equipment.
Static AC variable-speed drive systems.
Thyristor valves for HVDC transmission up to 500 kV.

POWER DEVICES
High power capacity silicon diodes, thyristor power devices and solar photovoltaic cells.

TRANSPORTATION EQUIPMENT
AC Electric locomotive
AC-DC Dual Voltage Electric locomotive.
Diesel-Electric Shunting locomotive
Diesel Hydraulic Shunting locomotive
OHE Recording cum Test Car.
Electric Traction Equipment (for diesel/electric locos electric multiple units, diesel multiple units and urban transportation systems).
Traction motors.
Transformers smoothing reactors.
Traction generators/alternators.
Rectifiers.
Bogies.
Vacuum circuit breakers.
Auxiliary machines.
Microprocessor-based electronic control equipment.
Power converter/inverter.
Static inverter for auxiliary supply.
Loco control resistances i.e. field diverters, dynamic braking resistors and inductive shunts.
Traction control gear.

OIL FIELD EQUIPMENT
Oil Rigs: A variety of on-shore rigs, work-over rigs, mobile rigs, heli-rigs, desert rigs for drilling up to depths of 9,000 m, completer with matching draw-works and hoisting equipment including: Mast and substructure; Rotating equipment; Mud system including pump Power packs and rig electrics; Rig instrumentation; Rig utilities and accessories.
Well Heads and Christmas Trees/Sub Sea Equipment
Well Head and X-Mas Trees for working pressures up to 10,000 psi.
Choke and kill manifolds.
Mud valves.
Full bore valves.
Block valves.
Mudline suspension system.
Casing support system.
Sub sea Well Heads.

CASTINGS AND FORGINGS
Sophisticated heavy castings and forgings of creep-resistant alloy steels, stainless steel and other grades of alloy steels meeting stringent international specifications.

SEAMLESS STEEL TUBES
Hot-finished and cold-drawn seamless steel tubes with a range varying from outer diameter of 19 to 133 mm and wall thickness of 2 to 12.5 mm, in carbon steel and low-alloy steels to suit ASTM/API and other international specifications.
Studded tubes: Extended surface tubes for high performance heat transfer applications
Spiral finned tubes: High frequency resistance welded finned tubes for WHR systems, economizers and heat furnaces.

NON-CONVENTIONAL ENERGY SYSTEMS
Wind electric generator of up to 250 kW rating.
Solar PV systems and power plant.
Solar water heating systems.
Solar lanterns.
Battery-powered road vehicle

TELECOMMUNICATION
Switching equipments - RAX, MAX-L, MAX-XL

SYSTEMS AND SERVICES

2.3 VISION, MISSION AND VALUES OF BHEL

The Vision, Mission and Values of BHEL were revisited and revised in 2001 keeping the changing business scenario and international marketscape in view.

VISION
A world-class, innovative, competitive & profitable engineering enterprise providing total business solutions.

MISSION
To be the leading Indian engineering enterprise providing quality products, systems & services in the fields of energy, transportation, industry, infrastructure and other potential areas.

VALUES
- Zeal to Excel and Zest for Change
- Integrity and Fairness in all matters
- Respect for Dignity & Potential of Individuals
- Strict Adherence to Commitments
- Ensure Speed of Response
- Foster Learning, Creativity and Team-work
- Loyalty and Pride in the Company
**SHAREHOLDING PATTERN OF BHEL:**

**Distribution of Shareholding as on 30.06.2005**

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Category</th>
<th>No. of Shares Held</th>
<th>%age of Shareholding</th>
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</thead>
<tbody>
<tr>
<td>A</td>
<td>Promoter's Holding</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Promoters</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Indian Promoters</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>President of India</td>
<td>165755000</td>
<td>67.72</td>
</tr>
<tr>
<td></td>
<td>Nominees of POI</td>
<td>200</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Foreign Promoters</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Persons acting in concert</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Directors and Relatives</td>
<td>1300</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Sub Total</td>
<td>165756500</td>
<td>67.72</td>
</tr>
<tr>
<td>B</td>
<td>Non-Promoters' Holding</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Institutional Investors</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mutual Funds and Banks, Financial</td>
<td>12253286</td>
<td>5.01</td>
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<tr>
<td></td>
<td>Institutions, Insurance Companies</td>
<td>7417859</td>
<td>3.03</td>
</tr>
<tr>
<td></td>
<td>(Central/State Govt. Institutions/Non-</td>
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<tr>
<td></td>
<td>Institutions)</td>
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<td></td>
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<tr>
<td></td>
<td>Foreign Institutional Investors</td>
<td>53985825</td>
<td>22.06</td>
</tr>
<tr>
<td></td>
<td>Sub Total</td>
<td>73656970</td>
<td>30.1</td>
</tr>
<tr>
<td></td>
<td>Others</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Private Corporate Bodies</td>
<td>2623578</td>
<td>1.06</td>
</tr>
<tr>
<td></td>
<td>Indian Public</td>
<td>2248705</td>
<td>0.92</td>
</tr>
<tr>
<td></td>
<td>NRIs/OCBs</td>
<td>142214</td>
<td>0.06</td>
</tr>
<tr>
<td></td>
<td>Any Other</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Employees</td>
<td>275520</td>
<td>0.11</td>
</tr>
<tr>
<td></td>
<td>Trusts</td>
<td>13998</td>
<td>0.01</td>
</tr>
<tr>
<td></td>
<td>Shares in Transit (NSDL/CDSL)</td>
<td>42515</td>
<td>0.02</td>
</tr>
<tr>
<td></td>
<td>Sub Total</td>
<td>5346530</td>
<td>2.18</td>
</tr>
<tr>
<td></td>
<td>Grand Total</td>
<td>244760000</td>
<td>100</td>
</tr>
</tbody>
</table>

Table 2.1
2.4 EVOLUTION AND GENESIS OF BHEL

At the dawn of Independence, India faced formidable challenges for development, economic, social, political and institutional. Centuries of alien rule had pushed our country to the spiraling cycle of poverty and underdevelopment. But out of all the challenges, the greatest one before India at the time of independence was to provide a strong infrastructure foundation upon which the edifice of economic and industrial development can be constructed.

The cornerstone of all infrastructure facilities and industrial growth is power. So planners and leaders gave top priority to indigenous growth of a robust power sector. The existing electrical equipment industry in the country was mainly confined to manufacturing of a wide range of smaller, lower voltage products like smaller capacity motors, transformers etc. for industrial use and items like fans, lamps etc. for domestic use. In terms of technology in power equipment manufacturing, India was almost 50 years behind the global scenario. The first statement on Industrial Policy made by the Govt. of India in 1945 emphasized the need for promoting and encouraging rapid industrialization of the country and stated that bulk generation of power should be a state concern. Subsequently the Advisory Planning Board of Govt. of India recommended the establishment of a heavy electrical equipment factory in the public sector in 1947. And thus came into being the Public Sector Undertaking, Heavy Electricals (I) Ltd. at Bhopal on 29th August, 1956 to undertake manufacture of electrical equipment required for generation, transmission and utilization of electrical power with emphasis on utilization, transmission and distribution. As the infrastructure plan began taking shape, the Govt. laid strong emphasis on backward integration by setting up plants at Haridwar, Hyderabad and Trichy in 3rd FYP focussing “generation” under a separate company known as Bharat Heavy Electricals Ltd. These plants went into production in mid-60s. To synergise the country's power equipment manufacturing capabilities in the country, the operations of all the four plants were integrated from July 1972 and the Chairman & Managing Director as well as the Board of Directors were made common for both the companies. While integration started in July 1972, the formal merger of HE (I), Bhopal and BHEL was completed on 1st January 1974.

Early seventies marked the move towards orchestrating a series of organizational changes aimed at improving the efficiency and effectiveness of the company’s operations. Having established itself as a manufacturer of power equipment, BHEL systematically upgraded its facilities to manufacture thermal generating sets of individual capacities ranging from 30 MW to 210 MW and transmission product up to 40 kV ratings. The organization began transforming itself from the production/operations management phase to strategic planning and management phase. By 1973-74, BHEL with its team of 45000 technicians and engineers notched up a turnover of Rs.230 crore and contributed 910 MW of power generating equipment to the India’s capacity of 4,579 MW by end of IVth five year plan.

In the early years itself, BHEL realized that future business growth could come only through providing total solution to customers though system integration and service capability. It foresaw the changes likely to come in future and set into action a plan to convert itself from “Production Orientation” to “Engineering, Development and Market Orientation”. This led to a development of a vision document “Outline of a Corporate Plan, March 1974”. The main focus was on giving the company a functional orientation, rationalization and standardization of
products, development of basic R&D, vertical integration, focus on system sales, business expansion through acquisition, thrust on exports and strengthening customer service capability. The second generation manufacturing facilities were set up as Transformer Factory, Jhansi, Central Foundry Forge Plant, Haridwar, and Seamless Steel Tube Plant, Trichy during mid 70’s to meet the objective of vertical integration. Further diversification was achieved in 70’s by the acquisition of Radio and Electrical Manufacturing Company (REMCO) and Mysore Porcelains located in Bangalore.

By the end of 70’s, systems concept had taken a deep root and BHEL was providing total services from concept to commissioning to its customers in energy, industry and transportation segments. Marketing and Sales Division (MSD) at New Delhi was spearheading the company’s marketing efforts in system sales for both energy and industrial segments. Projects Engineering Division (PED) at New Delhi was providing system-engineering services to the power utility customers in the area of thermal, hydro and transmission projects. Erection and commissioning services for these projects were extended through the Power Projects and Services Division.

The company also set its sight to become world class engineering organization with global presence. It set up 2 X 120 MW power plant at Tripoli West from concept to commissioning. Next generation of manufacturing facilities were added for Insulator manufacture at Jagdishpur, for Boiler Auxiliaries at Ranipet, for industrial valves at Goindwal and for NCES products at Rudrapur by mid 80’s.

The period of 80’s was a phase of market orientation for the company and the company faced increased overseas competition due to resource constraints for power projects in the country. The customer expectations were increasing. The Corporate Plan for 80’s stressed upon the company’s focus on customer and resource generation. The company’s operations were recognized around business sectors and regions. The product manager concept was introduced to address increased accountability and responsibility for an integrated approach towards maintaining growth of the products. The thrust was given on commercialization of in-house developed technologies and entering into new potential growth areas such as Gas Turbines, Locos, and Fluidized Bed Combustion Boilers.

Continued thrust on technology absorption and assimilation resulted in speedy stabilization of 210 MW TG and Boiler sets which were introduced in 1977 for the first time in Indian Power System. By mid 80’s the company started supplying 500 MW thermal power equipment and BHEL had already established itself as a premier public sector organization in the country, capable of rising to any challenge posed by the environment. This has been made possible through the process of learning mainly from various stakeholders including customers. The company developed strengths in engineering and manufacturing areas to take up production and supply of equipment of any complexity. Latest technologies comparable to the best in the world were absorbed and assimilated successfully for traditional as well as for new lines of business. This had generated optimism and greater confidence in the organization, enabling adoption of new directions and strategies to suit the dynamic environment.

The period of 90’s was a phase of innovation and business solutions for the company. The business was undergoing a major transformation due to economic liberalization and lowering
of trade barriers in the WTO regime and there was a reduced availability of technology as
global players were directly participating in the domestic market. The company had to meet
the increased expectations of all stakeholders. The Corporate Plan for the 90's enabled the
company to respond to the challenges by reorganizing/strengthening of markets and project
execution capabilities. New growth areas were identified as Defense, Telecom, Large GTs, 3-
phase AC Locos. The company opted for selective financing and syndication services to meet
the goal of cycle time and cost reduction. Corporate visioning exercise was carried out to
define the goals and values. Subsequent Corporate Plans re-emphasized the long term vision
and mission of the company and brought more focus to them. Greater emphasis was on
ensuring technological edge, competitiveness and export efforts in addition to new initiatives in
Finance and HR functions.

BHEL has built over the years a robust domestic market position by becoming the largest
supplier of power plant equipment in India and with strong market position in select segments
of the Industrial sector. It has not only grown in operations substantiality, but has been paying
dividend since 1976-77.

Today, BHEL has considerable strengths in its areas of operation of providing total business
solutions from concept to commissioning, with substantial resource raising capability.

The first plant of BHEL was set up nearly 46 years ago in August, 1956 at Bhopal (M.P., India)
with a view to reach self sufficiency in industrial products and power equipment vital for the
Industrialization of the country.

Manufacturing Units of BHEL:

BHEL has 14 manufacturing units. These are:

ISG (Industrial System Group) - Bangalore
EDN (Electronic Division) - Bangalore
EPD (Electro-porcelain division) - Bangalore
HEP (Heavy Electrical Plant) - Bhopal
PC (Piping Centre) - Chennai
IVP (Industrial Valve Plant) - Goidwali
HEEP (Heavy Electrical Equipment Plant) - Hardwar
CFFP (Central Foundry & Forge Plant) - Hardwar
HPEP (Heavy Power Equipment Plant) - Hyderabad
TP (Transformer Plant) - Jhansi
IP (Insulator Plant) - Jagdishpur
BAP (Boiler Auxiliaries Plant) - Ranipet
CEP (Component Fabrication Plant) - Rudrapur
HPBP (High Pressure Boiler Plant) &
SSTP (Seamless Steel Tube Plant) - Tiruchirapalli
2.5 ORGANIZATION OF BHEL

The concept of organizing a company's business in the form of Strategic Business Units (SBUs) and grouping the SBUs into sectors of business for their integrated and effective management was first developed and pioneered by General Electric, USA. In BHEL the same approach was taken in 1976.

The Apex Level Marketing Committee of BHEL in its meeting held on June 7, 1976 noted: "System sales should be a further extension of the already extended product sales concept. This view recognizes that:

a. BHEL manufactures a variety of principal industrial equipment even today.

b. BHEL has the engineering capability – at the manufacturing plant level, Consultancy Service Unit (CSU), Energy Systems & New Products (ESNP) etc – to tailor-make complete systems.

c. An industrial product does not usually satisfy a customer's need in isolation, or itself, but only as part of a larger integrated system of manufacture, process, or end service.

Thus offering a total system to the customer may be of great mutual interest and benefit to the buyer and seller alike".

The first planned efforts towards the above approach were taken with the formation of strategic business units in (a) industrial drives and control systems, namely, the Industrial System Group (ISG) on 16 June 1977 and (b) Transportation Group on 24 June 1977.

ISG was established at Bangalore as an off-shoot of Consultancy Services Unit and Project Engineering Divisions at Delhi – through the integration of technical expertise and manpower of Industrial Project Engineering & Sales of Bhopal Plant and Industrial Application Engineering and Sales of Haridwar Plant. ISG was formed to provide a one-point contact to the industrial customers for systems design, project engineering, supply, erection and commissioning and training in Drive Systems and Automation Systems for Metallurgical industries such as Steel, Aluminium, Mining, Material Handling and other non-metallurgical industries like Cement, Paper, Rubber, Fertilizers, Oil Exploration, Refineries, Space Research and other R&D establishments.

Transportation Group was also set up at Delhi in 1977 to strengthen and develop BHEL’s capabilities in the area of surface transportation. The Group became a single point contact for coordination with customers, consultants and manufacturing divisions with respect to product design, manufacture and development of transportation systems.

ISG and Transportation Group were the first two SBUs in the company addressing specific businesses and providing total business solutions right from concept to commissioning, sourcing the products and equipment from BHEL Units and other vendors both from foreign and Indian sources. These Groups became forerunners to the setting up of customer-focused groups in the company and the success of Business Sectors in the organization.
2.6.1 FORMATION OF BUSINESS SECTORS IN BHEL:

BHEL’s role in participating in an industry as a whole was highlighted by the marketing committee during the presentations related to the fertilizer and steel industries, total energy concept, etc. in its 8th meeting held on April 15, 1977. Further, the need to restructure BHEL on the lines of sectors was mooted through a Board Memorandum dated November 8, 1977 and was also discussed by the then Executive Committee in its 8th meeting held on February 13 and 14, 1978 at Haridwar. In short, a strong and widely dispersed need was felt in the organization for taking a look at technological, market and organizational needs for serving a segment larger than a product and sometimes even a system. This next level of segmentation envisaged was that of a “Business Sector” in BHEL and the company’s business was organised along three business sectors, viz. Power, Industry and International Operations, to serve its customers effectively and give it a strong marketing orientation.

In early 80’s, it was noted that thermal power projects were contributing more than 60% of BHEL’s turnover. Thus a focussed Thermal Projects Group (TPG) was formed in June 1981 and high level of importance was accorded to it by creating a Board level position to head its operations. The existing commercial, project engineering, project and construction management functions were reorganized to provide a single point contact for the power utility customers. The aim of the Group was to provide prompt, cohesive, and efficient services to the customers and increase their satisfaction. In 1981, after the formation of TPG, the remaining groups of PED were merged with Motor Group from MSD to form Hydro Transmission and Motor Products (HTMP). The new division was housed in BHEL’s own office complex at Lodhi Road, New Delhi. Similar to TPG, the integration of marketing and system engineering functions in HTMP was aimed at providing total services to the customers.

The customers of both thermal and hydro projects were from power utilities and thus the TPG was further expanded to take charge of the business in hydro and nuclear projects in addition to thermal projects. TPG was renamed as Power Sector and brought under Director (Power). It was noted that integration of marketing and commercial activities of thermal, hydro and nuclear projects under commercial management helped in providing efficient and total service to the customer. This move was oriented to boost customer confidence in product quality, performance and service.

In order to give a focused emphasis to customers in industry segments, where BHEL is a major contributor of equipment to industries like Cement, Fertilizers, Refineries, Petrochemicals, Steel, Paper etc. all business activities of BHEL were grouped under Industry Sector and this sector was assigned the responsibility of offering a single point contact for marketing of industrial products and services for industry, transmission and transportation areas.

In the mid-seventies, the idea of centralized exports was implemented with a view to providing single point contact and satisfaction to customers. The erstwhile activities of manufacturing units in the area of exports were reorganized and brought under a single agency. Thus, the Exports Division was formed in 1975 under the Corporate roof. This division was renamed as International Operations Division after the restructuring based on Business Sector concept in
1982. Over the years, the International Operations Division has established BHEL’s references in around 60 countries of the world, ranging from USA in the West to New Zealand in the Far East. These references encompass almost the entire product range of BHEL including turnkey power projects.

2.6.2 INDUSTRY SECTOR

With a view to enhancing BHEL’s capabilities to offer integrated systems and to integrate under one umbrella the various products and systems in industry, transmission and transportation area, Industry Sector (IS) was formed in June 1982. The mandate was to offer integrated systems in areas such as: Drives and Controls, Material handling, Automation, Turbo-compressors, Waste heat recovery, Oil exploration, Captive Power Stations, Photovoltaic cells, Power transmission and distribution, and transmission.

Besides integrated systems, Industry Sector was assigned the responsibility to market loose products like Valves, Pumps, Seamless Steel Tubes, Power devices and Silicon, Meters, Switch gear, Transformers, Capacitors and Castings & Forging.

Objectives and Functions:

At the time of formation of the Industry Sector, the following objectives were set:

- To develop marketing strategies and plans for future growth of business in this sector, and to provide orders for optimal utilization of capacities in plants.
- To provide single point contact for marketing and sale of related products and services, and to equip organizationally to provide total service to customers.
- To ensure co-ordination with Govt. agencies and various decision-making bodies with reference to business in this sector.
- To ensure development of engineering capabilities for systems in this sector.
- To organize feedback from the customers on performance of products and systems of this sector and evolve plans to correct recurring problems.
- To provide regional operations support to the company.

Industry Sector was assigned the total responsibility from tendering to execution of contracts and after-sales service in the identified areas.

Industry Sector Set-Up

The Industry Sector set up has been evolving since its inception. Different business or service groups have been created or revamped depending upon the influence of market forces on the industry segment. The organization charts of Industry Sector for 1982, 1986, 1992, 2000 and 2003 are shown here.

The set-up of Industry Sector in 2004 headed by Director (Industrial Systems & Products) comprises the following customer-facing business groups:
2.6.3 CERAMIC BUSINESS UNIT (CBU)

BHEL forayed into ceramic operations in 1976, when it took over the Karnataka State owned "Mysore Porceleins Ltd." (a company involved in manufacture of porcelain insulators at Bangalore), as a wholly owned subsidiary. It was merged with BHEL in 1978 and was rechristened as “Electro Porceleins Division” (EPD). This was done with a special objective of backward integration in the area of Transmission & Distribution, as the company required a reliable source for its requirements for bushings and other ceramic insulation products.

To upgrade its technological capabilities and start production of higher ratings of insulators, a technological collaboration was entered into with M/s NGK, Japan, who were and continue to be world leaders in insulators. With inputs from NGK, the company graduated to manufacture of 400 kV bushings with glaze joints. There was a substantial improvement in the technological capability of the personnel, who got an opportunity to get trained at the works of NGK at Nagoya in Japan.

Simultaneously, the company started considering an augmentation of its capacity for insulators in view of a very optimistic projection for growth by CEA and Planning Commission. Thus, while NGK was providing technological support to EPD, an agreement was entered into with them to support the setting up of a new insulator factory. The location for the new plant was decided as Jagdishpur, about 80 km from Lucknow. The foundation stone of this plant was laid on 10th February, 1982 by SH. Rajiv Gandhi, the then MP from Amethi Parliamentary Constituency. Jagdishpur is a part of this constituency. The plant was constructed in a record time of 24 months and was inaugurated by the then Prime Minister of India, Smt. Indira Gandhi on 3rd March, 1984. While NGK provided the plant design, A-category equipment and start-up support, the technology transfer was done through EPD< Bangalore. The new plant was initially named as “High Tension Ceramic Insulator Plant” but was later changed to “Insulator Plant” (IP) and was brought under administrative control of Director (IS&P).

Similarly, in 1987, EPD Bangalore, that was manufacturing solid core, post and pin insulators and bushings was brought under the aegis of Industry Sector to bring about total synergy in the insulator business.
As the production of Disc Insulators was getting stabilized at Jagdishpur, EPD started their endeavor for entering into higher technological products. During late eighties, EPD developed Station Post Insulators with Alumina body and then started work on developing alumina body for higher-rating disc insulators in early nineties. This was necessary to develop insulators for 800 KV transmission system, which was projected as the next higher voltage system in the country in the perspective plans of CEAA and Power Grid Corporation of India Ltd. (PGCIL). The alumina body conforming to the relevant international standard was ready with complete in-house efforts by end of 1993 and the development of 210 KN insulators was started. The first samples of 210 KN insulators were developed and tested successfully in November 1994 and PGCIL placed a developmental order for these insulators in March 1995. With this, BHEL became one of the very few insulator manufacturers in the world to have developed insulators of these ratings. In 1998, BHEL again responded to the need of PGCIL for HVDC insulators and successfully developed them indigenously. The development activities in the area of ceramics continued and now the unit is in the process of developing Isolators and Station Post Insulators for 132 kV and 400 kV substations.

In the mid eighties, EPD Bangalore initiated developmental work on Alumina based ceramics and developed a high abrasion resistance product “Ceralin”. This in-house development proved to be a boon for enhancing the life of “Pulverized Fuel Bends” used in transportation of pulverized coal to boilers. This was a revolutionary innovation, which gave the impetus to development work at EPD. Thereafter, to take up developmental work in the area of advanced ceramics, “Ceramic Technological Institute” (CTI) was set up at EPD with assistance from United Nations Development Program (UNDP). This center of excellence has been responsible for a number of new developments in the areas of alumina, cordierite, zeolite and other advanced ceramic materials for industry and strategic applications. Notable amongst the developments made by CTI is the development of Honeycomb substrate for pollution control applications. The institute has also developed the ‘Diesel Particulate Filter’ to arrest the emission of hydrocarbon particulars from diesel engines. The product is under field trials in vehicles.

‘Ceralin’ was introduced as a new product in IP Jagdishpur in 1989, thereby creating facilities for its production at both the plants.

To ensure synergy between the two units, the company decided to create the first Strategic Business Unit (SBU) for ceramics at the turn of the century. Thus the ‘Ceramic Business Unit’ was formed in the year 2000 by combining the manufacturing units at EPD and IP and the Ceramic Technological Institute.

To achieve synergy of operation, restructuring of the organization was necessary. Departments which were common to all the three units such as Marketing, Finance, HRM, Materials Management, Engg. & Quality Assurance, Technology, Management Services were brought under CBU while other departments such as Production, Ceramic laboratory, Maintenance & Services, Commercial, Engineering, EDP, Safety, New Products remained with the units. Subsequent to this restructuring personnel were deputed in consonance with new organisational needs.
The insulators for overhead lines provide insulation to the power conductor from the ground. The insulators are connected to the cross arm of the supporting structure and the power conductor passes through the clamp of insulator. Insulators are mainly made of either glazed porcelain or toughened glass. The materials used for porcelain are silica 20%, feldspar 30% and clay 50%. The porcelain should be ivory white, sound and free from defects. It should be vitrified because the presence of pores of air in the porcelain will lower the dielectric strength. Any sealed air impurity will also lower the dielectric strength of porcelain. It is, therefore, desirable that porcelain to be used for insulators should be air free and impervious to the entrance of liquids and gases. The dielectric strength of porcelain should be 15KV to 17KV for every one-tenth inch thickness. Normally it is difficult to manufacture homogenous porcelain and, therefore, for a particular operating voltage, two, three or more pieces construction is adapted in which each piece is glazed separately and then they are connected together. Porcelain is mechanically strong, less affected by temperature and has minimum leakage problem.

Toughened glass is also sometimes used for insulators because it has higher dielectric strength, which makes it possible to make use of single piece construction, whatever be the operating voltage. Glass being transparent, it is very easy to detect any flaw like trapping of any air etc. It has lower coefficient of thermal expansion and, as a result, the strains due to temperature changes are minimized. The major drawback of glass is that moisture condenses very easily on its surface and hence its use is limited to about 33KV. The design of the insulator is such that the stress due to contraction and expansion in any part of the insulator does not lead to any defect. It is desirable not to allow porcelain to come in direct contact with a hard metal screw thread. Normally cement is used between metal and the porcelain. It is seen that cement so used does not cause fracture by expansion or contraction. Insulators are much older than power transmission: telegraph insulators, introduced about 1835, had reached an advanced state of evolution by 1878, whereas the first transmission line was not run before 1882. This short line, from Miesbach to Munich, for 1343 V DC, was designed by von Miller and Duprez, to run an artificial waterfall at the Munich Electrical Exhibition.

The next major steps were taken by C.E.L. Brown, son of the Charles Brown who founded the Brown Boveri Company. In this early twenties he first built a 2 KV line over the 8 km from Kriegstetten to Solothurn in 1886 and then went on, in 1891, to design a line no less than 175 km in length, for 15 KV originally but later for 25 KV. This ran from Lauffen, on the Neckar, to the Frankfurt Technical Exposition. Brown used oil-bath insulators, based on the Johnson and Philips patented telegraph insulator. Development was then rapid: a 40 KV line from Gromo to Nembro of 1903 was followed by others, rated between 50 KV and 66 KV, in Germany, France and Spain, all operating by 1910. As for North America, Lundquist as early as 1912 describes line for 140 KV in Michigan and illustrates a switch insulator for 150 KV.

Transmission practice has diverged, over the last fifty years, into the long lines and very high voltages, as used in USA and the USSR, and the highly dense and interconnected networks of Europe. Voltages of 750 KV and above have been needed, as well as high-voltage direct current, for the former but only rarely for the latter. A second divergence has been between
continental Europe and USA with UK. Germany and much of central Europe agree in favouring long rod porcelains to strings of discs and in a somewhat more receptive attitude to glass than that of USA and UK.

All insulators have dual functions, mechanical and electrical, which commonly present conflicting demands to the designer. The most serious complicating factor is the impossibility, in practice, of providing an ideally nonconductive element. All insulators have external surfaces, which will become contaminated, to some extent in service. The contamination will carry leakage current: the surface layer, on a typically polluted insulator, will contain inert mineral matter, electronic-conductive dusts like carbon or metal oxides, soluble salts and water. This layer will behave as a highly variable and nonlinear resistance when it carries current will give rise to heat, electrochemical products of electrolysis and electrical discharges. Secondary consequences will range from electrochemical erosion through discharge ablation to complete bypassing of the electrical insulation by flashover. Leakage current and its consequences largely govern the design of an insulator, especially one, which is to be, used outdoors in atmospheric wetting and pollution. A large transmission-type insulator presents a massive and impressive appearance; it is, however, not a monument of strength but a demonstration of weakness. The large bulk for a relatively trifling mechanical duty is imposed by the need to use a brittle insulant, while the complex and convoluted profile exists solely to combat the effects of leakage. Whereas a column of air, three meters long, is ample insulation for a 400 KV conductor, a surface liable to outdoor contamination must provide at least threefold that path length. Another result of the interrelation between electrical, mechanical and environmental variables has proved to be the impracticability of completely designing an outdoor insulator on purely theoretical bases. Although the making and selection of insulators is no longer a ‘black art’ it is certainly not yet an exact science.

Although insulators for duty on outdoor power lines under alternating voltage represent the overwhelming majority, special applications exit where the required properties are different and sometimes difficult to achieve. Important cases of this kind arise on railways, in electrostatic precipitators, in DC transmission and in live working.

2.8 HR PRACTICES OF BHEL:
BHEL, with its nearly 44000 manpower, is one of the few organizations in India known for its outstading and time tested HR Practices and Systems. The HRM Mission of BHEL is depicted in 2.1 The HR processes in BHEL are summarized in table 2.2.
Like any organization managed with modern management principles, BHEL has also identified certain HR objectives. Table 2.4 shows some of the HRM objectives of BHEL.

**Exhibit 2.2**

**HRM OBJECTIVES**

1. Attract, retain, develop and maintain effective & efficient human resources to meet organizational requirements in tune with dynamic business profile, personal requirements and technological changes.
2. Maintain positive Industrial relations concomitant with high levels of employees' participation productivity & quality responsibilities
3. Develop and implement schemes related to reward, compensation benefits and motivation keeping pace with social environment and employee motivation linked to effective job performance
4. Support and nurture an organizational culture and climate that enables joint optimization of organizational goals and individual potential.

**Exhibit 2.3**

The policies related to Human resources management and development are formulated at Corporate level and percolated to the unit level. Strategies and plans are formulated at the unit level. HR policies / practices are regularly monitored and improved based on Employee Perception Surveys (EPS) which are carried out annually.

BHEL has a well-designed recruitment, placement, training & development and redeployment policy. People in BHEL generally enter at Induction level (Artisan Trainee, Supervisor Trainee, Executive Trainee & Engineer Trainee) and progress through organizational ladders
according to their skills, capabilities and additional qualifications acquired during their tenure with BHEL. Basically there are 4 career structures:

**Recruitment:**

Process of identification of organisation’s manpower requirement begins at the Functional/Departmental level. Depending upon the requirements under various job skills as well as trades/discipline, request is sent to HR Department. The Total manpower requirement is reviewed at the unit as well as at Corporate level. Every year Engineer Trainees and Executive Trainees (for HR & Finance) are recruited at Corporate level and allocated to Units/ Divisions based on requirements.

In addition, need based induction is also done for experienced specialists. The duly constituted selection committee inducts all employees through a selection process of written test and interview to ensure transparency in recruitment process. Government Rules for reservations to SC/ST/OBC and other such categories, compulsory Employment Exchange Notification Act and other regulations prescribed in Company’s Personnel Manual are followed in recruitment and promotions.

The recruitment is carried out through:

- Local Employment Exchange
- Nationwide search for talented people
- Campus interview at leading Educational Institutions

BHEL has been placed at the 7th position among 25 best employers in the country by a survey conducted by “Business Today” jointly with “Hewitt Associates” (a global management consulting firm). The attributes on which the companies were evaluated are Employee satisfaction, opportunities for growth, commitment and sense of ownership, effectiveness of HR practices in the business context, stature of the organization in the community, etc.

**Personnel Policy:**

BHEL is one among the first few PSUs to publish a well structured Personnel Manual in 1977 detailing Recruitment Policy & Rules, Promotion Policy & Rules, Transfer Policy & Benefits, Training and Management development, Industrial Relations & Welfare and General Terms & Conditions of Service etc. Subsequent updations were done through a Feedback – Review – Decision mechanism and Communicated through circulars. Board meetings, Joint Committee Meetings, Management Committee Meetings, Personnel Heads Meetings etc. invariably discuss the related Human aspects and take decisions to align the HR policies & Terms of Employment with Vision, Mission and Overall Strategy & Policy of the Company. The new & updated Personnel Manual is a result of these discussions and deliberations. These decisions are facilitated by a well structured computerized Database of Human Resources.
Employee empowerment and motivation:

Recognition and rewards for innovative work is made through various means such as promotions, additional increment, higher responsibility, oral recognition from top management and concerned officers, BHEL’s Excel awards, Awards for best productivity project and best suggestions, forwarding employees achievements for National awards such as Vishwakarma Rashtriya Puraskar, PM’s Shrama Awards, sponsoring for National Quality Circle conventions, etc.

BHEL is well known for its initiatives in involving employees in decision making process. Following is the gist of Scheme of Employee Participation in BHEL.

Employees’ Participation in Management has many firsts in BHEL through:

1. a Joint Committee at the apex national level
2. a Plant Council in each manufacturing Unit
3. a Shop Council in each major area of work in the various plants

The Joint Committee for BHEL, since 1973, has institutionalized the epitome of participation and has discussed and settled issues of mutual concern ranging from revision of pay structure and allowances to framing employees participation schemes at the various levels. The deliberations of the Joint Committee have also encompassed discussions and decisions on fringe benefits, bonus and incentive payments, rationalization of leave facilities, facilities to the Unions etc. his forum does not concern itself to the settlement of Employees’ demands only, but also the health of the organization, the production and productivity and the quality of its products. Another dimension of the success of this apex level forum is revealed by the stability witnessed in the industrial relations climate in the organization.

The Joint Committee initially started was having two representatives each from the recognized Unions of different manufacturing Units and 3 representatives each from Central Trade Union Organizations of INTUC and AITUC on one side and the Chairman & Managing Director, Functional Directors, and Heads of Divisions on the other. Subsequently with a view to broaden the representation on this forum, besides corresponding representation to Central Trade Union Organizations of INTUC, AITUC, CITU, and BMS in proportion to the following of their affiliates in the different Units. The tenure of the Joint Committee has been decided by the Committee itself in a true bi-partism spirit.

The effectiveness of this forum has been distinctly built on certain features which are essentially very special to this BHEL forum, namely:

1. **The Decision Making Process:** The decisions have been taken in the Joint Committee in an atmosphere of cordiality and understanding and have been always by consensus.

2. **The Sanctity of Decisions:** The Joint Committee decisions/agreements have enjoyed an unquestioned sanctity and respect.
3. **Participation based on equal opportunity**: The representatives on the Joint Committee irrespective of their affiliation etc. have an equal opportunity for frank and open expression of their viewpoints or position.

4. **Broad-based Representation**: The Joint Committee has a broad-based representation which represents over 90% of the employees through various unions.

**Suggestion Scheme:**

BHEL has recently introduced one WEB based suggestion scheme, “IMPRESS”, acronym for “Improvement Projects Rewards Scheme”. The Scheme tries to tap the diffused creativity and innovation of the employees, and use that for enhancing productivity, profitability and overall organizational health. The Scheme also envisages a transparent reward system for employees for their constructive suggestions and efforts. Following Exhibit briefly summarises the Scheme:

**Performance Evaluation:**

The performance evaluation and management of workers and supervisors are done through traditional Annual Confidential Reporting method. But for executives, which number around 9000, a web-based performance evaluation system has been in vogue since 2002.

Exhibit 2.4: A systematic method of alignment of Individual and team objectives with Company’s Targets has been ensured through the implementation of MAP. In MAP, the Company’s targets w.r.t. Financial, Customer, Process, Capability cascades down to individual level objectives through Unit level and Departmental Balance Scorecards. Company’s target flows from the MoU signed by BHEL with the Ministry of Heavy Industries, GoI. While setting the targets at all levels, MAP provides a sophisticated tool called Stretch, which helps in factoring in the external and internal influences on the achievement of the targets.
A vast potential exists within a complex commercial organization to achieve higher efficiency of conversion of basic inputs like material, capital and human resources into sellable products and services. Quantum increases are possible through significant capital investments but such opportunities are more risk-prone and are less frequent in view of large amount of resources required. On the other hand, much greater collective jumps in productivity are possible through small-scale ground level improvement projects identified (based on their direct everyday experience), conceptualised, proposed and implemented by the employees themselves. Such projects require very little or no additional investment and bring much greater proportional return to the organization on a recurring basis besides creating significant alignment of the employees to the organization. On the basis of such a felt need for the organization, the IMPRESS scheme has been envisaged to exploit this vast untapped potential in the organization (the scheme conceived and set in motion in BHEL, Haridwar and now being considered for company-wide implementation).

**OBJECTIVE**

1.1 To encourage continuous improvement in every sphere of organization’s activities.  
1.2 To develop and tap the creative potential of employees for achieving Business Excellence.  
1.3 To encourage employees’ to take up projects for improvement of ‘processes and systems’ that will enhance the capability of the function to deliver better results on a sustained basis in future.  
1.4 To provide for an objective system for assessment of improvement projects.  
1.5 To recognize individual contribution for improvement projects by providing suitable rewards.  
1.6 To create a competitive environment of striving for excellence.

**2.0 METHODOLOGY**

The scheme is e-network based and the modus operandi is as follows.  
2.1 Each individual / team leader (senior most member of the team) will register his project through a Central Registration System and give his assessed score. Project can be proposed either by an individual or by a team.  
2.2 The departmental head, at this stage, shall ensure that the project being registered is not a repetition of some project already registered. Necessary search engine facility shall be available in the computer for this purpose. He will also ensure that the Project undertaken is not a routine job of the individual concerned.  
2.3 At this stage, the departmental head, if satisfied, shall send the information, to Finance Dept for pre-evaluation award of Rs. 100/- to the team leader/ individual. Departmental head will also review the project, at this stage, for relevance to the department and assess the expected score.  
2.4 After completion of the project, the individual will submit the completion report with his assessed score to his departmental head.  
2.5 Departmental head will give his score separately, including the marks for relevance to the deptt. and will send the project completion report to the ‘Area Suggestion and Improvement Projects Committee’ or ‘ Plant Level Committee, as described below, for final evaluation.  
2.6 There shall be Area Suggestion and Improvement Projects Committees as per for deciding the rewards up to Rs.5000/-.  
2.7 Improvement Projects, eligible for higher level rewards shall be sent to “ Plant Level Committee” either directly by the concerned HOD or by the function level committees.  
2.8 There is a threshold level of score for four categories of employees (Artisans, Supervisors, E1-E5 and E6 & above). Projects with score above or below the threshold levels shall be normalized according to a normalization principle which is detailed separately.  
2.9 Each completed project will be reviewed by respective committee and final normalized score will be assigned.2.11 The committees will send the project report along with its final score, to the appropriate department in the Unit for further action.

Exhibit 2.5
Career development:

The career development of employees are done through a well documented and systematic procedure of promotion and training. Promotion is done on the basis of a judicious mix of following criteria:

- Seniority
- Performance
- Qualification
- Interview
- Other factors like suitability etc

On promotion, employees are entrusted with added responsibility or new roles, increased pay and facilities and more decision making power. Following table depicts the designations of employees.

**Executive and Supervisor designations:**

<table>
<thead>
<tr>
<th>Technical Grade</th>
<th>Designation</th>
</tr>
</thead>
<tbody>
<tr>
<td>SAI</td>
<td>Chargeman</td>
</tr>
<tr>
<td>SAIi</td>
<td>Asst. Foreman</td>
</tr>
<tr>
<td>SAIii</td>
<td>Foreman</td>
</tr>
<tr>
<td>SAIv</td>
<td>General Foreman</td>
</tr>
<tr>
<td>SAVI</td>
<td>Sr. Executive Foreman</td>
</tr>
<tr>
<td>SAVII</td>
<td>General Executive Foreman</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Non-technical Supervisors:</th>
</tr>
</thead>
<tbody>
<tr>
<td>SBI</td>
</tr>
<tr>
<td>SBII</td>
</tr>
<tr>
<td>SBIII</td>
</tr>
<tr>
<td>SBIV</td>
</tr>
<tr>
<td>SBV</td>
</tr>
<tr>
<td>SBVI</td>
</tr>
<tr>
<td>SBVII</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Executives Designations:</th>
</tr>
</thead>
<tbody>
<tr>
<td>E1</td>
</tr>
<tr>
<td>E1A</td>
</tr>
<tr>
<td>E2</td>
</tr>
<tr>
<td>E3</td>
</tr>
<tr>
<td>E4</td>
</tr>
<tr>
<td>E5</td>
</tr>
<tr>
<td>E6</td>
</tr>
<tr>
<td>E6A</td>
</tr>
<tr>
<td>E7</td>
</tr>
<tr>
<td>E8</td>
</tr>
<tr>
<td>E9</td>
</tr>
</tbody>
</table>
Facilities and Benefits for Employees:

BHEL provides scores of facilities to its employees. The major amenities and facilities provided to BHEL employees are summarized in Table:2.2

<table>
<thead>
<tr>
<th>Facilities/ benefits/services</th>
<th>coverage</th>
<th>Type of benefit</th>
</tr>
</thead>
<tbody>
<tr>
<td>LTC/LTA</td>
<td>All Employees</td>
<td>Leisure</td>
</tr>
<tr>
<td>Holiday Home for employees at Hill Stations/Tourist Places</td>
<td>All Employees</td>
<td>Leisure</td>
</tr>
<tr>
<td>Provision of Club/Community Center</td>
<td>All Employees</td>
<td>Leisure/Personal needs</td>
</tr>
<tr>
<td>Medical Facility including treatment in renowned multi-specialty Hospitals</td>
<td>All Employees</td>
<td>Health</td>
</tr>
<tr>
<td>Special services like preventive inoculation, immunization, anti-malaria measures and sterilization</td>
<td>All Employees</td>
<td>Health/Hygiene</td>
</tr>
<tr>
<td>Subsidised transport facility for wards for commuting to schools, Education allowance/assistance for wards, Festival advance</td>
<td>All Employees</td>
<td>Financial support for family obligations</td>
</tr>
<tr>
<td>Grant of special leave for social commitments like blood donation, civil defence work, census work, election duties, national calamities</td>
<td>All employees</td>
<td>Fulfillment of social/national obligation</td>
</tr>
<tr>
<td>Resolution of employees’ grievances</td>
<td>All employees</td>
<td>Performance improvement</td>
</tr>
<tr>
<td>Group insurance, Death Relief Fund, PF, GSLIS, EDLI, Accidental/Medical Insurance, Compensation in cases of those killed in Terrorist Attacks, Gratuity, Family Pension, Workmen's Compensation etc</td>
<td>All Employees</td>
<td>Social Security</td>
</tr>
<tr>
<td>Interest Subsidy on loans for Housing</td>
<td>All Employees</td>
<td>Financial Support for Basic needs</td>
</tr>
<tr>
<td>Interest subsidy on loans for purchase of vehicle</td>
<td>All Employees</td>
<td>Improving living standard</td>
</tr>
<tr>
<td>Highly subsidised medical facility for retired employees</td>
<td>All employees</td>
<td>Post retirement</td>
</tr>
<tr>
<td>Subsidised food, tea, snacks through Canteen</td>
<td>All employees</td>
<td>Financial Subsistence</td>
</tr>
<tr>
<td>Provision of uniforms, shoes, sweaters, jackets etc.</td>
<td>All employees</td>
<td>Distinct identity and Belongingness, comfort</td>
</tr>
<tr>
<td>Reimbursement of conveyance, washing allowance</td>
<td>All employees</td>
<td>Financial subsistence</td>
</tr>
<tr>
<td>Reimbursement of cost of newspaper, Internet charges, Fees for Professional body membership, Telephone Bill.</td>
<td>All employees</td>
<td>Professional skill improvement</td>
</tr>
<tr>
<td>Company residential premises</td>
<td>All employees</td>
<td>Basic need</td>
</tr>
<tr>
<td>Providing special casual leave, allowance, TA, DA for participating in Inter Unit, National level Sports event</td>
<td>All employees</td>
<td>Extracurricular activities</td>
</tr>
<tr>
<td>Providing study leave, cash award for acquiring higher qualifications</td>
<td>All employees</td>
<td>Professional improvement</td>
</tr>
</tbody>
</table>

Table:2.2
2.9 INSULATOR PLANT, JAGDISHPUR

Bharat Heavy Electricals Limited located at Jagdishpur (U.P.) in Sultanpur Distt., is North India's first Integrated Insulator Plant. The plant is located on the LUCKNOW – Sultanpur National Highway, 78 kms from Lucknow. The foundation stone of this plant was laid on 10th February’1982 and on 3rd March 1984 the Prime Minister Late Smt. Indira Gandhi inaugurated BHEL’s 11th Manufacturing unit at Jagdishpur, for manufacturing of the Disk Insulators of different ratings (45kn to 160 KN ) for high voltage transmission lines (upto 400 kV). The production volume has been continuously stepped upto 6190 CMT whereas installed capacity is 6050 CMT. This unit is equipped with highly, sophisticated plant and machinery. The unit also offers wear resistant, high-Alumina, Ceramic lining material for power, steel, cement and mining industries, as well as a wide range of Industrial Ceramics.

The manpower profile of IP Jagdishpur is shown at Table 2.3.

<table>
<thead>
<tr>
<th>Category</th>
<th>No. of Employees (As on 30.9.2003)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unskilled &amp; Semiskilled level</td>
<td>91</td>
</tr>
<tr>
<td>Skilled working level</td>
<td></td>
</tr>
<tr>
<td>- Artisans / Sr.Artisans</td>
<td>301</td>
</tr>
<tr>
<td>- Ministerial Staff</td>
<td></td>
</tr>
<tr>
<td>Supervisory level</td>
<td>34</td>
</tr>
<tr>
<td>Executive level</td>
<td>55</td>
</tr>
<tr>
<td>Total Manpower</td>
<td>524 (including support tech staff, clerical, OSS, Trainees and others)</td>
</tr>
</tbody>
</table>

Table 2.3

As part of the philosophy of pursuing participatory management and empowering all employees, many Committees are in existence in IP Jagdishpur. These Committees meet regularly to discuss issues related to their work area, productivity, welfare, safety etc and suggest suitable decisions to management. List of Committees of IP are shown at Table Exhibit 2.6.
### Forums for Team Work/Collective Decision Making

- Telephone Advisory Committee
- Suggestion, Productivity, Value Engg and Energy Conservation Committee
- Library Committee
- Township Advisory Committee
- Medical Advisory Committee
- Grievance Committee
- Sports Committee
- Condemnation and Disposal Committee
- Community Center
- Plant Council
- Shop Council (Production area)
- Shop Council (Allied)
- BHEL Co-Operative Society
- Mahila Kalyan Samiti
- Quality Circles
- LMP Club
- Vidyalaya Management Committee
- Safety Committee
- Canteen Managing Committee
- Hindi Committee
- Executive Committee of the KV BHEL
- Education Society

**Exhibit 2.6**
2.10 ELECTROPORCELEIN DIVISION, BANGALORE

As discussed earlier, before being acquired by BHEL, EPD was a state Govt undertaking, and was known as Mysore Porcelain. Mysore Porcelain was started in 1932. It is located at the heart of the Bangalore City. BHEL acquired Mysore Porcelain in 1976 and the merger was completed in 1978.

The strength of manpower of EPD is depicted in Table 2.4.

<table>
<thead>
<tr>
<th>Category</th>
<th>No. of Employees (As on 31.03.2003)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unskilled &amp; Semiskilled level</td>
<td>141</td>
</tr>
<tr>
<td>Skilled working level</td>
<td></td>
</tr>
<tr>
<td>- Artisans / Sr.Artisans</td>
<td>474</td>
</tr>
<tr>
<td>- Ministerial Staff</td>
<td>48</td>
</tr>
<tr>
<td>Supervisory level</td>
<td>91</td>
</tr>
<tr>
<td>Executive level</td>
<td>112</td>
</tr>
<tr>
<td>Total Manpower</td>
<td>866</td>
</tr>
</tbody>
</table>

Table 2.4
The identified thrust areas of EPD Banagalore are shown in Exhibit 2.9.

### THRUST AREAS – HRM FUNCTION

1. Reconstitution of Plant and shop councils and make their functioning more effective
2. Bringing awareness among the employees on all levels on the importance of HINDI, in communication and correspondence through training, workshops, lectures etc.
3. Counseling and rehabilitation of Chronic Absentees by involving their families
4. Computerisation of HRM activities.
5. Introduction of OHSAS 18001

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**Exhibit 2.9**

BHEL EPD has always been a forerunner to introduce innovative organisation methodologies to get the best from its people. It is this innovativeness that made EPD as the only unit of BHEL that was able to achieve its monthly turnover for a continuous 168 months. EPD also has the distinction of realizing many in-house technology developments that include such products as very High Strength Disc Insulators, HVDC insulators, SF6 Insulators, Ceralin, Honeycomb substrates and Composite insulators made possible by innovative thinking of its people.

At EPD also, there are many participatory forums to empower and involve employees in decision making processes. List of such forums is given at Exhibit 2.10.

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**COUNCILS & COMMITTEES**

- House Allotment Committee
- Township managing committee
- Conveyance reimbursement committee
- Canteen Managing committee
- Special cell for SC/ST's, OBC's, Physically handicapped
- Sports managing committee
- Grievance committee
- Hindi Committee
- Public Grievance cell
- Telephone allotment committee
- Nehru Memorial welfare committee
- Provident fund committee
- Library committee
- Shop Council
- Plant council

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**Exhibit 2.10**
2.11 COMPARISON BETWEEN IP AND EPD

Though both IP and EPD are units of BHEL, there is discernible differences between them. IP is located in north India, EPD is in South India. Size wise, IP is almost 60% to that of EPD. EPD was established in 1932, and was a state PSU till BHEL acquired it in 1970's. But IP is comparatively young, established in 1983, and from the beginning was a part of BHEL. In IP, all most 95% employees are localites or come from nearby areas. But in EPD, employees are from various places, but mainly from south India. A financial comparison of the two units are shown in Table 2.4.

<table>
<thead>
<tr>
<th>Financial Comparison of BHEL EPD and IP Jagdishpur</th>
</tr>
</thead>
<tbody>
<tr>
<td>EPD</td>
</tr>
<tr>
<td>----------</td>
</tr>
<tr>
<td>TURNOVER</td>
</tr>
<tr>
<td>VALUE ADDED</td>
</tr>
<tr>
<td>PBT</td>
</tr>
<tr>
<td>CAPITAL EMPLOYED</td>
</tr>
<tr>
<td>INVENTORIES</td>
</tr>
<tr>
<td>DEBTOR</td>
</tr>
<tr>
<td>PERSONNEL PAYMENT EMPLOYES</td>
</tr>
<tr>
<td>PERSONNEL PAYMENT EMPLOYES</td>
</tr>
<tr>
<td>TURNOVER PER RUPEE OF CAP.EMPLOYED</td>
</tr>
<tr>
<td>PER EMPLOYEE(RS.LACS)</td>
</tr>
<tr>
<td>PER RUPEE OF WAGES</td>
</tr>
<tr>
<td>VALUE ADDED % OF TURNOVER</td>
</tr>
<tr>
<td>PER RUPEE OF WAGES</td>
</tr>
<tr>
<td>PER RUPEE OF CAP.EMP</td>
</tr>
<tr>
<td>PER EMPLOYEE(IN LACS)</td>
</tr>
<tr>
<td>PRODUCTIVITY INVENTORY DAYS</td>
</tr>
<tr>
<td>COLLECTIBLE DEBTS DAYS</td>
</tr>
<tr>
<td>CURRENT RATIO</td>
</tr>
<tr>
<td>INCREASE IN % TURNOVER</td>
</tr>
</tbody>
</table>

Table 2.5
References:

1. BHEL Website: www.bhel.com
2. EPD website: http://www.bhelceramics.com
3. Intranet Sites of BHEL IP and BHEL EPD
4. Ram, Dr. R. and Kumar, R., 2005, Propelled by dynamics of environment. BHEL Industry Sector
5. BHEL Personnel Manual
6. BHEL Training Manual