Chapter - I

MANAGEMENT INFORMATION SYSTEMS
FOR
EFFECTIVENESS
IN
CEMENT INDUSTRY
1.1 Introduction

A secure place to live, regenerate and sustain has been the endeavor of all living beings in the world, human being distinguishes himself in this act by using shelters for purposes other than living, which are projects (irrigation and power), administration, providing services, transportation, production, distribution, sales, and the list goes on. All these endeavors of human beings invariably need cement, which has replaced other traditional agents of bonding. Today’s technology driven competitive environment offers customers a global range and quality in products at an affordable price at a flick of a button.

Though it is an objective of manufacturing firms to increase their sales, also of paramount significance is transforming the traditional firms to keep pace with ever changing technological environment. Information and Communication Technology (ICT) is highly dynamic and is characterized by faster, cheaper and flexible processing technologies swarming the manufacturers and customers at highly short intervals. Today’s new millennium is highly competitive business world and is marked by firms using Internet and Networking technologies to provide appropriate information, across the organization for integration of operations and effective decisions to streamline the flow of work internally, and also to create electronic links with its Customers, Suppliers and others externally. Today using Management Information Systems (MIS) along with Networks and Internet technology to enhance efficiency, increase profitability and finally gain competitive edge is inevitable for all business firms eyeing success. Knowledge of Information Systems is now crucial for survival, sustenance and expansion, new product development, new jobs and workflows and finally transformation\(^1\).
Table 1.1: IT Investments in India².

<table>
<thead>
<tr>
<th>YEAR</th>
<th>IT INVESTMENTS (RS. IN CRORES)</th>
<th>GROWTH (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1999-2000</td>
<td>52,450</td>
<td>27.5</td>
</tr>
<tr>
<td>2000-01</td>
<td>68,850</td>
<td>31.3</td>
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<tr>
<td>2001-02</td>
<td>80,124</td>
<td>16.4</td>
</tr>
<tr>
<td>2002-03</td>
<td>97,000</td>
<td>21.1</td>
</tr>
<tr>
<td>2003-04</td>
<td>114,650</td>
<td>18.2</td>
</tr>
<tr>
<td>2004-05</td>
<td>154,200</td>
<td>34.5</td>
</tr>
</tbody>
</table>

Global Environmental Challenges Manufacturing economies across the world are influenced by four important worldwide changes drastically altering the global business environment. They are emergence and burgeoning global economy; transformation of industrial economies into service, transformation of business firms and emergence of MIS oriented firms.

Table 1.2: Growth of Global IT Investments³

<table>
<thead>
<tr>
<th>YEAR</th>
<th>US$ MN</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>565</td>
</tr>
<tr>
<td>2001</td>
<td>930</td>
</tr>
<tr>
<td>2002</td>
<td>1,495</td>
</tr>
<tr>
<td>2003</td>
<td>2,300</td>
</tr>
<tr>
<td>2004</td>
<td>5,200</td>
</tr>
</tbody>
</table>

Multinational or geographical expansions by firms are to increase their sales and to exhaust and exploit cost effective operations available globally. This objective to reduce
the cost of the product is accomplished, through developing and using MIS and related technology, which offers the ability to control, communicate, and coordinate all business functions. Thus, enhancing firm’s capability, to offer global quality products and services, at competitive prices to customers across the world. All major industrial economies of yesterday are knowledge and information based service economies today, which are swiftly shifting their manufacturing operations to low wage countries to achieve cost reduction in operations, and Indian economy can be no exception which employs highest number of information workers.

Employees in manufacturing sector is on decline today and people in education, healthcare, banks, insurance firms etc., are on the rise. Knowledge and information works now account for a major share in GDP. Many of the products like credit cards, reservation systems, overnight package delivery, etc.; available today are knowledge and information intense products. Investments in Information Systems and technology in all the firms are rising, government and institutional support by way of Information Technology parks and cities to attract investments are available in all the states.

Firms Competitive Environment: All the above factors influence the firm in its organization and management efforts. Firms of the past that were hierarchical, centralized, structured, based on fixed standard operating procedures that are now required to transform themselves into flattened, decentralized flexible organizations, that rely on instant information to offer mass customization to its customer in place of mass produced product. ICT orientation is enhancing levels of knowledge, learning and decision making of individual employees in their operations. Organization’s effective relationships with its customer, supplier and employee, and its core business processes are digitally influenced, coordinated and focused, by applying MIS to produce a highly
qualitative product or service, to gain a competitive edge. MIS based firms are characterized by their near total reliance on MIS & ICT which forms the core of their business processes used to enhance the speed of data processing⁴.

1.2 Role of MIS

Conventional and traditional organizations faced erosion of their market by IT oriented firms, and needed to resolve for self-evaluation, which involved identifying, evaluating and transforming various core processes. This in turn led to refining and redefining of processes in the organization. An organization endowed with enhanced and refined processing abilities gained by MIS is assured of a competitive edge. Thus, employing MIS based process evaluation and transformation, to gain competitive edge became inevitable by all the firms planning to survive and develop. It is now a common phenomenon or norm for all successful firms to have an MIS approach. Thus, the secret of success is clear and all firms wishing to grow should confirm to the writing on the wall. A spate of literature on MIS in Journals and magazines, and various offers of MIS courses by different universities, is an indication of the growing prominence of MIS as a tool to gain competitive edge in today's highly competitive world⁵.

1.3 MIS and the Firm

The role of MIS in providing enviable success, by lending support to decision-making, coordination, and control is irrefutable. Besides MIS aids managers and workers in their effort to analyze problems, model complex subjects, and create new products by using variety of complex organizational data. Data, which is a record of an event or a transaction, is also called as streams of raw facts representing persons and events in the organizational environment. These are given meaningful and useful shape and are called
information, fit for use by employees to enhance the quality of their routine decision-making. This is the core content of MIS. Conversion or Transformation of data into information includes key activities of input process and output. Input captures data from within the organization and also from its external environment. Processing consists of five important stages of classification, sorting or rearranging, summarizing and aggregating, performing calculations and selection of choice, converts raw data into meaningful and useful information. Output transfers the information to managers for their use of it at various levels and in different functional departments. Successful firms depend to a great extent on formal, organizational computer based information system in which data are defined, so are the procedures for collecting, storing, processing and disseminating of data. Formal MIS can either be computer based or manual, the latter is most prevalent in small firms in their earlier stages in any country. Of course, manual processing is also based on systematic structure and hence cannot to be neglected, as they form the foundation for MIS based on Hardware and Software technology to expedite processing.

Definitions: Many definitions of MIS, by people who were futuristic oriented are, available, and the study itself is well developed in terms literature and as well as applications, and a reference of these enhances our clarity and understanding of the concept. A few definitions are here under.

MIS is “A set of interrelated components that collect or retrieve, process, store, undistributed information to support decision making uncontrolled in an organization.”

Kenneth C. Laudon and Jane P. Laudon

MIS as “An integrated man machine system for providing information to support the operation management and decision making functions of an organization. The system
utilizes computer hardware, software and manual procedures to help management decisions”.

Gordon, B. Davis

MIS as “System intended to provide information for decision making, planning, organizing and controlling the operations of the sub-system of the firm and to provide a synergistic organization in the process3”.

Robert G. Murdick Joel R. Ross and James R. Claggett

In another context Management Information System has been defined as an organized scientific method that would provide timely, relevant and accurate information in a meaningful form of past, present and future, relating to internal operations of an organization and external intelligence which enables management at all levels to make decisions aimed at optimizing the goals of the organization.

1.4 Utility of MIS

Firms now use information to improve their performance, profits, and to create value for the organization. MIS increases firms Return on Interest (ROI), enhance firms’ strategic positions increases value of firms stock. The information value change illustrated in figure 1.1 in which data is transformed to various stages that add value. Better management decisions efficient business processes, lead to higher profitability and are determinants of the decision to invest in any new Information System. The business perspective displays the organizational and managerial nature of MIS providing solutions by application of ICT to face the challenges from the environment. Awareness of organization, management and ICT dimensions of systems is essential for a manager to
understand MIS and their ability to provide solutions to problems and challenges from business environment.

Figure 1.1: The Business Information Value Chain

(Source: Kenneth C. Laudon and Jane P. Laudon “Management Information systems, Managing the Digital firm”, pp-11, Pearson education, Delhi, 2004)

Firms have three levels Viz Top, Middle and Bottom level, and also different functional specializations like Marketing, Manufacturing, Finance, Accounting and Human Resource Departments. Key elements of a firm are its objectives, people, and structure, operating procedures, politics and culture. MIS is an integral part encompassing all; more so in firms like banks, credit reporting firms, share brokering and reservation systems for airways, railways and roadways. A structured work, hierarchy and formal standard operating procedures achieve coordination of work in a firm. Top-level covers
high authority and responsibility, which decrease as are, goes down to middle and bottom level. Standard operating procedures are the formal rules developed over long time to guide employees in a variety of activities to accomplish objectives. Informal practices run parallel to the formalized and written down work practices. Present day firms need various kinds of skills and people as against conventional firms. Examples are knowledge workers (engineers, architects, and scientists) to design product or services, data workers to process paper work and production or service workers (mechanics, fitters, turners, packers etc.).

Management is "the process of planning, organizing, leading and controlling of physical, human, financial, and informational resources to accomplish the organizational objectives efficiently and effectively". Managers make decisions and determine action plans to solve problems; they perceive challenges in the environment and design organizational strategies to respond, and allocate resources and responsibilities. They also take lead in new product development, creative works driven by new knowledge and information where ICT is used in redirecting and redesigning the organization. Senior managers take the lead in long-range strategic decisions concerning what products and services to produce, what markets to expand. Middle managers lead and coordinate the programs of senior management. Operational managers are held responsible for firm's daily activities and targets.

Information Technology is the third most influential invention of the mankind after alphabets and numbers and the combination of these two, which is mathematics and algebra. Information Technology industry is the fastest growing and the only largest after automobile industry is also called as sunrise industry. ICT influences have left no field in the world untouched and encompass all the activities of human kind. Hence there can be
no doubt that the same has influenced the Cement industry. ICT now a days, is no doubt an inevitable tool for managers trying to enhance their efficiency in various decisions made every day, covering gamut of organizational activities and processes. MIS precisely specifies what to be accomplished but the ICT prevailing today greatly enhances the speed of processing, examples online stock markets, ticket reservation and ATM's. A firm's ICT infrastructure consists of computer hardware, software, storage technology and communication technology. Computer hardware is the physical equipment used for input, processing, and output activities in an MIS. It consists of the following; the Central Processing Unit; various input, output, and storage devices; and physical media to link these devices together. Computer Software consists of the detailed preprogrammed instructions that control and coordinate the computer hardware components in an Information System. Storage technology includes both the physical media for storing data, such as magnetic or optical disk or tape, and the software governing the organization of data on these physical media. ICT consists of both physical devices and software, to link the various pieces of hardware and transfers data from one physical location to another. Computers and communications equipments can be networked for sharing voice, data, images, sound, or even video. Information Infrastructure represents resources shared by everyone in the organization and forms the foundation on which a firm can develop its MIS. Skillful design and management of Information Infrastructure accomplishes the MIS objectives.

1.5 Approaches to MIS

A high level of acceptance of ICT applications undoubtedly supports the amazing growth of ICT applications in diversified fields, covering every aspect of human kind. All studies are the results of mutual contributions, so is the case of MIS in which
Information Technology is just a tool enhancing the speed of processing in MIS. Many approaches on Information System prove MIS as a multi disciplinary field. Figure 1.2 brings out major disciplines contributing problems, issues, and solutions in the study of MIS. Basically MIS in a firm is a social technical system and is also affected by behavioral approaches. Besides hard physical technology substantial, social, organizational and intellectual investments are essential for effective performance of MIS.

Figure 1.2: Contemporary Approaches to Information Systems


Under Technical approach, Computer Science, Management Science, and Operations Research are applied to evaluate and understand the MIS and its capabilities. Computer Science helps to develop methods of computations, storage and access, Management Science emphasized models for decision making and Operation Research applies mathematical techniques for optimization of transportation, inventory control and transaction costs11.
Behavioral issues hold the key in development and long-term maintenance of MIS. Aspects like strategic business integration; design, implementation, utilization and management need to be addressed with behavioral approach besides technical approach. Sociology is the study of groups and their behavior, influence of groups on MIS. Industrial Psychology analyzes user and machine interaction. Economies observe the impact of MIS on control and cost. Behavioral approach helps us in understanding changing role of employees, their attitudes on management policy and their final behavior, in an era when structure of organizations is prescribed by technology.

1.6 Scope of MIS

Success prevails and so is failure, few available failures cannot solely be attributed to MIS, but to the implementation or unsuccessful transformation. ICT is prescribing the firms their strategy, new rules and work procedures. All business plans like increasing market share, high quality production, new product development, employee productivity depend upon the kind of MIS prevailing in the firm today. The increasing influence of MIS is giving rise to healthy relationships of organizations with their customers, suppliers and employees. Earlier systems aimed at technical changes, whereas contemporary systems aim at bringing managerial changes and core institutional changes like what to be produced by whom and where and under what conditions.

1.7 Role of Network and Internet

Cheaper, faster and flexible data processing abilities characterize the technologies. For example computing power is doubling every eighteen months and performances of microprocessor have improved over 25,000 times since their invention 30 years back.
Ever increasing power of computer technology is influencing the communication networks firms can use. As stated earlier these Internets and Networks are transforming shape and form of business enterprise. The largest and widely used network in the world is the Internet, which is an international network of networks owned commercially and publicly. It covers 200 countries and 600 million users. Internet is creating new universal technology platform used to build all sorts of new products, services, strategies and organizations.

1.8 Changes in Organizational Design

Explosive growth of ICT is offering information to instantly control and coordinate internal business processes and also processes with other organizations, within and beyond the organization. Thus, we now see redesigned organizations with transformed structures, scope of operations, reporting and control mechanisms, work practices, workflows, products and services.

☐ Flattening Organizations

Conventional firms are often inefficient, static and less competitive, some of them are required to change with their environment. Decision-making, which was coveted, by Top and Middle management in conventional firms has been delegated to lower level employees in transformed firms. Likewise responsibilities are also distributed to lower level employees thus increasing the span of control of managers.
□ Location Independence

Distance as a factor affecting efficiency is disappearing with the advent and expanded application of ICT. Remote management is the order of the day.

□ Reorganizing Workflows

ICT derives today's work procedures, and manual works are replaced with digital. Electronic work flows is a standard norm and successful in today's cement industry, and reducing cost of operations by displaying paper and the manual routines accompanying it. This has further resulted in higher customer satisfaction. These new workflows will always help in new organizational structure, products, and services.

□ Higher Flexibility

Information Technology transforms the organizing abilities of every field and provided the agility to respond to new opportunities. Few advantages available to large are now available to cement Industries with ICT and computing.

□ Extending Organizational Boundaries

ICT, sharing of data, making catalogs, makes external operations of cement firms such as payments and purchase easy and such things are redefining the relationships between a firm and it's customers and suppliers. Today cement firms seek to share knowledge, resources, and business processes to work jointly with suppliers and collaborators on product design. ICT prescribes workflows in manufacturing, procurement, and distribution. This kind of firm collaboration and coordination leads to higher efficiency, customer value and competitive advantage.13.
1.9  New Opportunities with Technology

Information Technology provides opportunities and problems, issues and challenges for managers. The process of building and using MIS in cement firms possess five key challenges to managers.

☐ MIS & ICT Competitive Edge

Reaping benefits from heavy ICT investments is not as easy as expected when firms do not change the structures business models and organizational behavior. To nearly automate without identifying genuine productivity to take advantage will always lead to inability in realizing business value.

☐ Grappling Globalization Challenges

Many global products available at fairly cheap price in India are giving a run for Indian firms for their money. The time has arrived for appropriately addressing the need of globalization for cement firms and using ICT to respond to new challenges and opportunities from access the world.

☐ Information Architecture and Infrastructure

Expensive ICT investments without intention to transform and build new Information Architecture and Information Infrastructure will result in inabilities to respond to the challenges and opportunities in the environment. Information Architecture is design of applications for accomplishment of organizational goals, an interactive part are managers and employees. The Information Architecture of a firm comprises of vertical business application system, to each of the major functional areas including Sales and Marketing,
Manufacturing, Finance, Accounting and Human Resources, which are the first to be built in most organization.

Figure 1.3: Information Architecture and Information Technology Infrastructure

The ICT applications in the above levels and functions integrate suppliers and customers externally with that of employee knowledge and expertise internally. A sound blend of technology and technical personal by general management will result in effective ICT investments. Developing MIS is a formidable task as fragmented and incompatible Hardware, Software, Network, Telecommunications, and Information Systems preventing free flow of information among different functional centers hamper many firms' efforts.
MIS Investment

In the prevailing ICT applications in cement firms problems are countered, not with the technology but with management and organization. Organizations are required to evaluate their ICT investments as they do in case of other investments. The feasibility stage comprising of technical, economical and operational feasibilities is an important stage. Firms need clarity about the kind of technology investments to perceive and manage.

Responsibilities and Control

Finally, control need to be exercised on Information Technology as most of Information Technology applications do have negative implications. It is essential for a firm to have MIS to assure security and control and provide accurate and reliable information. The results will be disastrous if the above are not realized.
1.10 Cement Industry- a glance

Introduction

Cement is a key infrastructure industry. It has been decontrolled from price and distribution on 1\textsuperscript{st} Mar’, 1989 and de-licensed on 25\textsuperscript{th} Jul’, 1991. However, the performance of the industry and prices of cement are monitored regularly. The constraints faced by the industry are reviewed in the Infrastructure Coordination Committee meetings held in the Cabinet Secretariat under the Chairmanship of Secretary (Coordination). The Cabinet Committee on Infrastructure also reviews its performance.

1.11 Historical Perspective

Cement like steel is one of the basic materials for the technical development of country. Cement, as a building material has been known in one form or another since the time of ancient Sindh Civilization at Mohenjadaro in India. Though it has a long history of its use in India, its manufacturing is relatively of recent origin. Cement industry is one of the major and oldest established manufacturing industries in the modern sector of Indian economy. It is an indigenous industry in which the company is well endowed with all the necessary raw materials, skilled manpower, equipment, and a machinery technology. It produces a commodity that enters into various construction, investment and welfare activities in almost every segment of the economy. Firms, bridges, buildings, water supply projects, dams, roads, hydroelectric power projects, seaports, airports, and irrigation schemes require cement. It thus a vital industry, which assumes a crucial part in the economic development of the country. Thus it regards, as major nation building industry whose importance in a
developing economy can never be over emphasized. The information about the preparation and use of cement before 18th century was scantly. Egyptians are known as the first users of cement. The Greek civilization used some of mortar but Romans has developed it. When one speaks about the cement industry, it invariably refers to Portland cement, which has its origin in England, but until the 19th century a mixture of limestone with pozzoland of volcanic earth was known as cement. The first cement factory was established around 1890 in both Canada and Australia, while it was invented in 1884 in New Zealand. The cement industry occupies a position of predominance not only in an infrastructure for development but also it is eight largest in the world, which directly employs about millions of persons.

1.12 Indian Context

In India it came to be established during the beginning of 20th century. In fact the cement era in India commenced with the establishment of a small cement factory at WASHERMANPET in Madras in 1904 by South India Industry Ltd. a company that dates back to 1879. The potential capacity of this plant was only 10,000 metric tonnes per annum. This was the first attempt of manufacturing Portland cement with calcareous seashells as a principal raw material. There was sufficient demand for that product, but because of technological defects and inadequate supply of raw material, the plant didn't operate economically, a later on collapsed. India is ranked fourth in the world after China, Japan, and USA in cement production. Yet the per-capital consumption of cement in India is however low at 70 to 80kgs against the world average of around 220kgs.
Cement industry in India is eight decades old. However, the growth has not kept pace with period of its existence. Decades of government control have restricted the growth of industry. The real foundation stone of the present industry was laid in the year 1942, when a small factory was established Porbandar in Kathiwar by India Cement Company Limited. This factory commenced its production in 1914 at a rate of 199 metric tonnes per day. This company adopted “dry process”. This plant had easy access of limestone quarries of Porbandar. This initial attempt could cause the attempt of two or more factories. One at Kanhi (MP) another at Lakheir (Rajasthan) Kanhi Cement Limited and Bundi Portland Cement Limited respectively in January 1915 and December 1916. The advent of the First World War gave fillip to this industry and the output of the plants was taken under government control. The government control was lifted immediately after the world war and the boom period of the industry started. The demand for cement increased very steadily as the cement was used not only for housing but also for dams, roads, bridges and other developmental activities.

As selling prices remained low and the output not be raised the desired rate. There was unsatisfied demand for the materials. On February 28th 1982 when government of India announced the partial decontrol of cement it made the beginning of new era for the cement industry. In March 1989, the government withdrew all restrictions on distribution and pricing. As a result of this with in a decade nearly 34 million tons was added. The production control disappeared completely in 1991 with de-licensing. Dependence on imported cement was stopped after 1986-87.
The demand for cement would go up significantly with the acceleration in the economic growth. Cement industry would likely to grow at the rate of 8 to 10 percent annually to satisfy the increasing needs of domestic demand as well as growing export market. The industry has a turnover of around Rs.19, 500crores and accounts for direct and indirect employment of 110 million persons. Private sectors contribute over 85 percent of cement output in the country. India today compares well with the world standards in terms of products, quality, range and also process technologies used in cement manufacture. Currently India has 165 large cement plants and more than 315 mini cement plants. Cement industry has made a tremendous progress in both capacity addition and production. There is a slow down in infrastructure and real estate projects. Hence, cement market is depressed since growth of the economy is leasing to investments in infrastructure and housing sector and as the cement industry’s growth is seen to and linked with growth of the economy. Cement companies are planning, expansion, integration and diversification.

A new impetus to the cement industry was provided during the post independence period through setting up of targets for cement production less than five-year plans.

**Salient features**

- Indian cement industry is the second largest in the world with an installed capacity of 151.69 MTPA. It accounts for nearly 6% of the world production.

- There are 128 large plants and around 365 mini plants. The industry presents a mixed picture with many new plants that employ state-of-the-art dry process technology and a few old wet process plants having wet process kilns.
• Production from large plants (with capacity above 1 MTPA) account for 85% of the total production.

• The cement industry has achieved significant progress in terms of reducing the overall energy intensity.

• Dry process plants that the weighted average thermal energy consumption was 734 k.Cal/kg clinker, and weighted average electrical energy consumption was 89 kWh/tonne of cement. The best energy consumption is 692 k.Cal/kg. clinker and 66 kWh/ton of cement.

Table 1.3: Production, Exports, and Capitalization of Indian Cement Industry

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<thead>
<tr>
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<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>Production</td>
<td>10.35</td>
<td>8.88</td>
<td>9.27</td>
<td>102.40</td>
<td>93.61</td>
</tr>
<tr>
<td>Export</td>
<td>0.38</td>
<td>0.33</td>
<td>0.40</td>
<td>3.38</td>
<td>3.15</td>
</tr>
<tr>
<td>Capitalization</td>
<td>92</td>
<td>79</td>
<td>93</td>
<td>79</td>
<td>82</td>
</tr>
<tr>
<td>(%)</td>
<td></td>
<td></td>
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</tbody>
</table>

Source: (www.cement.org)

Note: Figures in millions
1.13 Cement Industry in Andhra Pradesh

Cement was first manufactured in America in the year 1875. In India, in 1914 the India Cements Company Limited was established a cement factory at Portland. Andhra Pradesh is the second largest cement Production State in India; one third of the limestone (138 crore tonnes) is available in A.P.I.A.P. the cement production was started in 1936 with two factories. Of these two factories one is Andhra Cement Company Limited and another is Krishna Cement Factory. One is on the side of Krishna River and another is in between Krishna and Guntur districts respectively. In 1955, one more factory was established at Panyam in Kurnool Dist., named as Panyam Cement and mineral industries. At the same time one more factory has been established at Maacherla in Guntur district. At the end of July 1985 the total capital invested on cement industry was Rs.427.81 lakhs and provided employment for 1262 persons and 19 factories were functioning with a production of 85 lakh tonnes.

Today there are 18 large-scale cement plants and 18 mini cement plants in the state, with the total capacity of 1.80 crore tonnes per annum and it is expected to rise to 2.15 crore tonnes per annum in the year 1989-90. Our state consumes 217 lakhs of cement per annum. The remaining production is distributed to other states. Power cut is the main reason for low production in Andhra Pradesh. Due to their heavy coal prices, railway freight, etc., it is very difficult to service the cement industry in Andhra Pradesh.

Today, Portland cement is an essential commodity on which our modern standard of living is greatly dependent. Buildings, water supply projects, dams, bridges, roads hydro electric
power project, seaports, airports, irrigation schemes etc., all demand cement. Cement is manufactured either by “Wet process” or “Dry process”. Wet process is remained popular for many years. With the modern development of the technique of dry missing of powered materials using compressed air, the dry process gained momentum. Nowadays in most of the plants cement is being manufacture by dry process.

The basic raw material for manufacturing cement is limestone. This is available in plenty in the form of limestone deposits in nature. Limestone is excavated for mines by mechanical equipment with the help of stocker and reclaimed the correct blending of limestone is ensured. The same is passed through crushes to bring it to the required size. The raw materials consist of limestone, iron ore and bauxite or literate, in the correct proportions are fed into a grinding mill where they are reduced to a very fine of compressed air. The power from the storage ribs is fed into rotary kiln, the material is subjected to a temperature of about 1500 C. chemical reaction takes place between the various materials resulted in the formation of cement compounds like tri calcium silicate (about 24%), dicalcium silicate (about 20%), tri calcium aluminate (about 7 to 10 %), tetra calcium alumino ferrite (about 10 to 12%) \(^6\).

1.14 Capacity and Production

The cement industry comprises 128 large cement plants with an installed capacity of 151.69 million tonnes and more than 300 mini cement plants with an estimated capacity of 11.10 million tonnes per annum resulting in total installed capacity of 163 million tonnes. Actual cement production in 2003-04 was 123.50 million tonnes as against a production of 116.35
million tonnes in 2002-03, which is an increase of 6.15% over 2002-03. Cement production during the year 2004-05 (April-January, 2004-05) was 108.06 million tonnes (provisional), registering a growth of 7.10%.

**Table 1.4: Growth of Cement Industry**

<table>
<thead>
<tr>
<th>Year</th>
<th>Capacity at the end of the year (tonnes)</th>
<th>Cement production (tonnes)</th>
<th>Production growth (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1999</td>
<td>109.44</td>
<td>91.72</td>
<td>15.5</td>
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<tr>
<td>2000</td>
<td>116.82</td>
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<td>2001</td>
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<td>98.35</td>
<td>2.5</td>
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<tr>
<td>2002</td>
<td>137.53</td>
<td>109.59</td>
<td>11.4</td>
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<td>1.6</td>
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<td>146.38</td>
<td>117.50</td>
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<tr>
<td>2005</td>
<td>153.59</td>
<td>127.57</td>
<td>8.60</td>
</tr>
</tbody>
</table>

**Source:** www.cement.org

**1.15 Recommendations**

For the development of the cement industry ‘Working Group on Cement industry’ was constituted by the Planning Commission for the formulation of X five-year plan. The working Group has projected a growth rate of 10% for the cement industry during the plan period and has projected creation of additional capacity of 40-62 million tonnes mainly through expansion of existing plants. The Working Group has identified following thrust areas for improving demand for cement:
• Further push to housing development programmes;
• Promotion of concrete Highways and roads; and
• Use of ready-mix concrete in large infrastructure projects.

Further, in order to improve global competitiveness of the Indian Cement Industry, the department of Industrial Policy & Promotion commissioned a study on the global competitiveness of the Indian Industry through an organization of international repute, viz. KPMG Consultancy Pvt. Ltd. The report submitted by the organization has made several recommendations for making the Indian Cement Industry more competitive in the International market. The recommendations are under consideration.

1.16 Technological Edge

Cement industry has made tremendous strides in technological upgradation and assimilation of latest technology. At present 93 percent of the total capacity in the industry is based on modern and environment friendly dry process technology and only 7 per cent of the capacity is based on old wet and semi-dry process technology. There is tremendous scope for waste heat recovery in cement plants and thereby reductions in emission level. One project for co-generation of power utilizing waste heat in an Indian cement plant is being implemented with Japanese assistance under Green Aid Plan. The induction of advanced technology has helped the industry immensely to conserve energy and fuel and to save materials substantially. India is also producing different varieties of cement like Ordinary Portland Cement (OPC), Portland Pozzalnad Cement (PPC), Portland Blast Furnace Slag Cement (PBFS), Oil Well Cement, Rapid Hardening Portland Cement, Sulphate Resisting Portland
Cement, White Cement etc. Production of these varieties of cement conforms to the BIS Specifications. It is worth mentioning that some cement plants have set up dedicated jetties for promoting bulk transportation and export. Indian cement industry is modern and uses latest technology. Only a small segment of industry is using old technology based on wet and semi-dry process. Efforts are being made to recover waste heat and success in this area has been significant.

1.17 Overview of the Performance

The Indian cement Industry not only ranks second in the production of cement in the world but also produces quality cement, which meets global standards. However, the industry faces a number of constraints in terms of high cost of power, high railway tariff; high incidence of state and central levies and duties; lack of private and public investment in infrastructure projects; poor quality coal and inadequate growth of related infrastructure like sea and rail transport, ports and bulk terminals. In order to utilize excess capacity available with the cement industry, the government has identified the following thrust areas for increasing demand for cement:

- Housing development programmes
- Promotion of concrete highways and roads
- Use of ready-mix concrete in large infrastructure projects; and
- Construction of concrete roads in rural areas under Prime Ministers Gram Sadak Yojana
1.18 Development Council for Cement Industry

For the development of the Cement Industry, Development Council has been set up. The duration of the Council is for 2 years. The present council was constituted on 21.6.2001. The council promotes the development of the Cement Industry in India through various measures by providing funds for developmental projects. The source of funding the activities of the council is the cess collected by it from the cement manufacturers in terms of Cement Cess Rules, 1983. During 2000-01, Rupees four crore were made available to the Development Council for its promotional activities and similar provision has been made during the current year. For the performance of its activities, a Cess Committee assists the Development Council, which is responsible for recommending projects to be funded out of the Cess collected from the cement manufacturers. The council reviewed the performance of ongoing projects funded out of the cement cess fund in its meeting held on 29.1.2002.

(Source: Annual Report 2001-2002, Department of Industrial Policy and Promotion)

1.19 Prospects and Future Developments

China is expected to maintain its moderate growth in cement production and the trade balance is expected to remain positive. Foreign investment is expected to play a key role in the growth of the cement industry. Bulk cement is expected to become a larger proportion of Chinese cement output — reaching 182 million tonnes by 2005.
In comparison to the Chinese market, India is looking at concentrating on increasing demand, mainly from the housing and the infrastructure sector. New capacity addition does not seem likely in the near future. The Indian cement industry is getting consolidated with 60 per cent of the cement production being controlled by the top five players\(^9\). However, the only concern that seems to be faced by the industry is the extremely low pricing as compared to other countries.

According to a report on the cement sector by Credit Suisse First Boston, the six stages of macro development are:

- Opening the economy to capital and trade flows
- Foreign investment allowance in key sectors
- Control of inflation
- Appearance of credit
- Government-driven infrastructure spending
- Long-term industrialization

When you compare India and China on the above six parameters based on the ratings submitted by the Global Competitiveness Report (World Economic Forum), one can see there is definitely a gap that needs to be filled and its potential that needs to be harnessed\(^{20}\).

On the basis of competitiveness ranking of 75 countries, as in the Global Competitiveness Report 2001-02, both are noncompetitive — China (39) and India (57). The vivid aspect is that India is more noncompetitive vis-à-vis China and the gap is significant enough. If China
has reached somewhere India too will reach that point at a later date. The gap, from what it seems, will persist, but India can narrow the gap if it decides to run faster.

1.20 Reference


2. http://www.mit.gov.in


21. www.cement.org