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MASTER'S DEGREE THESIS

**ISSUES AND TRENDS OF SUPPLY MANAGEMENT: THE CASE OF HINDUSTAN
PAPER CORPORATION LIMITED - CACHAR PAPER MILL**

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Author's STATEMENT

I, Brajen Dekar, hereby certify to be the author of this Master's thesis that was written under mentorship of Prof. Dr. Borut Rusjan and co-mentorship of Dr. Marko Jakšič in compliance with the Act of Author's and related Rights- para.1, Article 21. I herewith agree this thesis to be published on the website pages of ICPE and the Faculty of Economics.

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ABBREVIATIONS

AFBC	Atmospheric Fluidised Bed Combustion
ASEB	Assam State Electricity Board
BG	Bank Gurantee
BIFR	Board for Industrial and Financial Reconstruction
BIS	Bureau of Indian Standards
BSS	British Standards Society
BTPS	Bongaigaon Thermal Power Station
BV	Barak Valley
B2B	Business to Business
B2C	Business to Customer
B2E	Business to Enterprise
B2G	Business to Government
CC	Contract Cell
CDM	Clean Developement Mechanism
CE	Chief Executive
CHQ	Calcutta Head Quarter
CIE	Computer Integrated Enterprise
CIL	Coal India Limited
CPFR	Collaborative Planning, Forecasting, and Replenishment
CPI	Composite Performance Index
CPM	Cachar Paper Mill
CRP	Continuous Replenishment Plan
CVC	Central Vigilance Commission
DFO	District Forest Officer
DIN	Deutsches Institut fur Normung
D(O)	Director (Operations)
DOP	Directorate of Printing
DPE	Department of Public Enterprises
EC	Electronically Connected
EC Coupling	Enhanced Capacity Coupling
ECF	Elemental Chlorine Free
ECR	Efficient Consumer Response
ED	Executive Director
EDI	Electronic Data Interchange
EDP	Expansion-cum-Diversification Project
e-marketplace	Electronic Marketplace
EMCC	Engineering Materials and Contract Coordination
EMD	Earnest Money Deposit
E-Procurement	Electronic Procurement

ERP	Enterprise Resource Planning
FC	Financial Concurrence
FDCM	Forest Developement Corporation of Meghalaya
FRM	Financial Resources Management
FSA	Fuel Supply Agreement
GDS&D	Director General Supply and Disposal
GM (W)	General Manager (Works)
GNIB	Global Notice Inviting Bid
GOI	Government of India
GPS	Gate Purchase Scheme
GRV	Goods Receipt Voucher
HNL	Hindustan Newsprint Limited
HOD	Head of Department
HOS	Head of Section
HPC	Hindustan Paper Corporation Limited
IT	Information Technology
ISO	International Organisation for Standerdisation
ITJ	Indian Trade Journal
JIT	Just In Time
KAAC	Karbi Anglong Autonomous Council
KWR	Kilo Watt Hour
L1	Lowest Tenderer
L2	Lowest Tenderer 2
L3	Lowest Tenderer 3
LD	Long Distance
LNIB	Limited Notice Inviting Bid
LPP	Last Purchase Price
MOFAP	Managerial, Operational, & Financial Action Plan
MRO	Maintenance Repair and Operating
MSTC	Metal Scrap Trade Corporation
MT	Metric Tonne
MTA	Mid Term Appraisal
MTG	Metric Tonne Green
MTUP	Modernization and Technical Upgradation
M V O	Mission Vission and Objective
NBSK	Northern Bleached Softwood Craft
NCA	National Commission on Agriculture
NC Hills	North Cachar Hills
NCHAC	North Cachar Hills Autonomous Council
NE	North East
NEC	North Eastern Council
NECL	North Eastern Coalfields Limited

NEH	North Eastern Himalayan
NER	North East Region
NF	Northeast Frontier
NGO	Non Governmental Organization
NH	National Highway
NIT	Notice Inviting Tender
NMBA	National Mission of Bamboo Application
NPM	Nagaon Paper Mill
NPPC	Nagaland Pulp and Paper Company
NSIC	National Small Industries Corporation
ODMT	Oven Dry Metric Tonne
OEM	Original Equipment Manufacturer
ONIB	Open Notice Inviting Bid
PD	Purchase Department
PDS	Public Distribution Scheme
PO	Purchase Order
POL	Products of Oil (Mineral)
PPR	Petty Purchase Requisition
PQ	Pre-Qualification
PSU	Public Sector Undertaking
RC	Rate Contract
R&D	Research and Developement
SAIL	Steel Authority of India Limited
SCCL	Singareni Collieries Company Limited
SCM	Supply Chain Management
SD	Security Deposit
SEZ	Special Economic Zone
SSI	Small Scale Industries
SWOT	Strength Weakness Opportunity Threat
TCL	Tissue Culture Laboratory
TPA	Tonne Per Annum
TPH	Tonne Per Hour
TQM	Total Quality Management
UNFCCC	United Nations Framework Convention on Climate Change
UPC	Under Postal Certificate
VAN	Value Added Network
VMI	Vendor Managed Inventory
WRQ	Wood Research Quarterly
WTO	World Trade Organization

INTRODUCTION

Hindustan Paper Corporation Limited (HPC) is an ISO 9000, ISO 14000 company of India. Due to lack of planned development of paper industry in India, the government of India set up HPC on May 29, 1970 for the growth in paper industry (www.hinpaper.in). HPC is a public sector undertaking under the ministry of heavy industries, government of India. In a public sector, to understand the relevance of supply chain management one must know the difference between objectives of a public sector and that of a private sector. A government/public sector enterprise is not solely oriented for maximization of profit, but is also aimed at the economic development of the nation (as a long-term goal) and the welfare of the society. This is in contrast to the private sector enterprise, which is oriented towards the sole objective of maximization of profit.

The main raw materials for production of paper and related services are bamboo, lime, coal, salt etc. Along with these other equipment related services are necessary. With the help of proper planning the limited resources (of the enterprise/nation) can be efficiently utilized by the public sector to acquire undistruptive production. In a mass production manufacturing industry like HPC, purchasing plays an important role in the entire production process. Apart from the ones listed above many additional inputs are required in paper-making. Since it is a 24 hour running mill, all raw materials should be available in sufficient quantities. This is an absolute necessity for the production process to continue without halting. Supply chains have critical role in maintaining the reliable and consistent production flow.

Supply chains are often beset within problems caused by the mismatch between material and information flow. The lack of timely and accurate information relating to order status, inventory levels or delivery times for example can introduce uncertainty and variability in a supply chain. One of the keys to effective supply chain management is supply chain integration. A complete seamless integration of the supply chain enables real-time, digestable data in a collaborative manner, all across the supply chain (Zaharuddin et al., 2002, p.5). Approaches such as VMI, CRP, FRM, JIT, ECR, EDI, VAN or even CPFR are all methodologies for integrating aspects of the supply chain. They enable a company to work more closely with partners to identify areas for improvement and address deficiencies.

The supply of raw materials to the HPC mill is done through external agency, with whom a supply contract is negotiated. The contract process starts with advertising bids through newspapers and the official website of the organization. Thereafter a contract is offered to one or more suppliers as per the advertisement. In the process of offering a supply contract a number of constraints arise related to money and time. Hence the process of offering a supply contract is called constrained directed negotiation as outlined by Sathi (Sathi and Fox, 1989, p.1). When a conflict occur, agents involved negotiate by modifying either the current solutions or the constraints, until a solution is reached. Joint solutions are generated through a process of negotiation, which configures individual offerings (Sathi and Fox, 1989, p.4). In

traditional supply chain strategies, each party in the chain focuses on other supply chain partners. Relationship is established between suppliers and buyers by means of supply contracts and this specifies, 1) pricing and volume discounts; 2) minimum and maximum purchase quantities; 3) delivery lead time; 4) product or material quality; and 5) product return policies. These contracts address issues which arise between a buyer and a supplier. The issues addressed may be whether the buyer is a manufacturer purchasing raw materials from a supplier or retailer purchasing manufactured goods from a manufacturer (Anupindi et al., 1999, p.53). Supply contracts are very powerful tools that can be used for many more purposes apart from ensuring adequate supply of goods. In the contract offered by HPC to the suppliers terms and conditions about the supply quantity, mode of supply and quality of raw material (like for bamboo maturity, moisture content etc. and for coal ash content etc.) are set. The quality of incoming material is inspected at the point of acceptance of raw material. The materials which do not conform to the specifications are rejected. The late quality expert Philip Crosby estimated that suppliers are responsible for 50% of a firm's product related quality. Furthermore, the average manufacturing firm spends more than 55% of its sales price on purchased goods and services and some manufacturers spend even more than this. Poor supplier quality can quickly undermine a firm's total quality improvement effort (Monczka et al., 2009, p.275). Thus the quality of bamboo supplied is crucial for the final quality of the product that is paper. For instance fiber yields of bamboo highly depends on its maturity and moisture content.

Transportation is one important aspect of logistics in supply chain network. The reliability of the transportation network is one of the main aspect for transportation of material. Any threat to the reliability of the transportation network constitutes a weakness in the supply chain. This weakness in the transportation network as a part of the supply chain is of particular interest in countries or regions with hilly areas or thinly populated areas. The area, where from raw material, particularly bamboo, is collected by supplier to supply for CPM is also such an area. In such regions there are only a few transportation modes, for example only one railway line and one road. In such regions the transportation network, and hence the supply chain is exposed to many different kinds of external risks.

The main input for making paper in Cachar Paper Mill (CPM) is bamboo. Bamboo is available in the surrounding area of the mill till about 300 km. In addition, another raw material coal required for in-house generation of power and steam, comes mainly from Meghalaya, a neighbouring state. The coal source is located about 200 km away from Assam where the mill is located. The materials are supplied by the suppliers from the field mainly by trucks. But from NC Hills the raw material is transported by railway wagons (mainly bamboo). High coordination between the railway department and HPC is necessary in getting railway wagons for transporting bamboo. With only few transportation modes and links available between such places the transportation system is extremely vulnerable to any disruption in it. In a possible worst case scenario no suitable alternative exists for deliveries to and from these regions (Husdal, 2008, p.3). As there is only a single railway line and road connection to the site of the mill from the rest of India, so the condition of the roads play a

crucial role in the supply and delivery of goods to and from the mill. About four years back one railway bridge was broke and the construction of a new bridge to replace it took about six months. So bamboo from that region could not be carried to the mill site. A major part of virgin bamboo is being supplied from that region to the mill. In addition there is another place named Sonapur which remains cut off from the rest of the country for about one month during rainy seasons because of landslide problems almost every year. Coal is transported through that road to the mill site and this is the only connectivity available. There is no alternative road for transportation of coal to CPM from that region. So CPM is forced to maintain sufficient stock of coal to continue with production without any disruption.

There has been a crisis of bamboo supply to the mill since the past one year or so, which actually has forced the mill to temporarily shutdown many times. In addition, there has been scarcity of coal for running the boiler during the period of low supply. There are contract systems for supply of bamboo from different sources like home grown and from that of lease land. But the contractors are unable to supply it in adequate quantity. Similarly the coal contract is given to suppliers for about 3 years. Despite the fact that supply conditions of the contract are mentioned for required quantity, quality etc., quite often then not the materials are not supplied in sufficient quantities. There are infrastructure problems like bad road conditions along the strip from which bamboo is collected and loaded to trucks.

From another source where in bamboo is transported by means of railway wagons, it is difficult to get wagons for carrying bamboo. This is because of the higher priorities given to other essential comodities by Indian Railway service. Coal is normally transported by the suppliers on trucks through the single road connected to the mill from source of raw material. Due to the disruption in the supply of raw materials, the mill has had to shutdown forcefully many times. This actually contributes to the lower production, lower revenue and finally lower profit. Also due to unplanned stoppages, cost of production goes up and overall morale of employees goes down.

Purpose of the thesis

The quality and quantity of any paper industry depends on many factors such as raw materials, chemicals used and also sophistication of machines etc. Cachar Paper Mill through years of operational improvements and quality support systems has been able to achieve its 90%-100% capacity utilization in the last few years. But about one year ago, the mill faced severe raw materials crisis particularly due to lack of bamboo and sometimes lack of coal. Through the research I am trying to find out the causes and solutions to the problem of disruption of supply of critical raw materials particularly bamboo and coal, which effects the smooth running of the mill. The shortage of raw material causes loss of production and finally loss of profit. The survival of the mill may be affected in the long run if it continues like this. I have tried to find out solutions to supply problems for Cachar Paper Mill by trying to answer the following questions:

- What are the issues related to supply management of CPM?

- What are the solutions available for smooth supply of raw materials to CPM?

Besides these I have covered other areas like contract system, transportation problem and location problem (if any) etc. and analysed them. But my prime purpose has been to find solutions to the present raw material crisis by reviewing various options and ideas available.

Objective of the thesis

The objective of the research is to find out the causes of the supply side disruption of critical raw materials particularly bamboo and coal by analyzing the data of bamboo and coal for the last nine years. The opening stock of bamboo and coal on 1st April and receipt per year are analyzed and graphs are drawn to visualise the trend. In addition, the production trend during that period has been studied. Finally, measures have been suggested to maintain smooth supply of raw materials. Apart from this methods have been suggested for effective maintenance of stock so that continuous production is not affected. Thus, the research has the following objectives:

- To find issues of supply of critical raw material like bamboo and coal to CPM.
- Better understanding of supply chain management to avoid risk and inventory management to avoid unplanned stoppage of mill due to non availability of raw material.
- Highlighting the importance of coordination between various different departments including logistics in general and for supply of raw materials to CPM.
- Role of infrastructure in the supply of raw material in general and for CPM in particular.
- To find present procurement procedures of critical raw materials like bamboo and coal. To find the importance of quality context with CPM and government regulation if any in raw material procurement.
- To find out ways for better coordination and relationship management between suppliers and CPM management and other intermediaries.
- To find out role of technology development like e-procurement, recycling and bamboo forest plantation as an alternative way for supply of raw material to CPM.
- To find out ways for smooth supply of critical raw material like bamboo and coal for continuous running of the mill CPM.
- To find CPM's trend of procurement of raw material, initial inventory and total production from financial year (April to March) 2000-01 to 2008-09.

So the main objective of the thesis is to find out ways for smooth supply of critical raw materials so that the mill's production does not suffer. Last but not the least the ultimate goal is to suggest measures to avoid loss of revenue and profit.

Method of the thesis

The research methodology used in the thesis is a combination of exploratory and case study. While carrying out the research various research strategies were adopted. Exploratory study was carried out on supply chain and related fields from the supply side. Firstly a survey on literature available in the library, in the web, in the journals is presented. As the research was carried out from Slovenia, secondary sources were used and observation strategy was adopted for the findings. The research methods adopted form the backbone of the entire research process and are crucial for the correctness of the research results. As I followed the inductive approach first data were collected from various sources and after that empirical study conclusions were drawn. The data were collected from various departments of CPM by secondary source e.g. through e-mails. The various data related to bamboo and coal purchases were acquired by e-mail from Forest Department, Purchase Department and IT Department etc. of CPM. For contract procedures, EMCC Department was contacted. And for logistics Transportation Department was contacted and necessary informations were collected via e-mail or as and when necessary via telephonic conversation. After collecting data, analysis was carried out to study the trend. Both primary data and secondary informations were used in the research. Finally, some solutions were developed by quantitative and qualitative analysis of the critical raw materials in supply management. Conclusions were drawn based on different findings.

Limitation of the thesis

The purpose of this study, is to understand the supply side management concepts and the problems faced by Cachar Paper Mill in the supply side. The exact problem of CPM in supply side, along with solution can not be pinpointed as there are many related aspects like government regulations and situational problems etc. All these require more time and resources, specially financial feasibility. However, an attempt has been made through the study, to analyze the problem and to suggest possible solutions to it. The problem is only specific to CPM and generalization to all companies would ask for some modifications.

Most of the analysis for the study has been carried out from secondary data collected from a number of sources. There have been limitations in obtaining latest and current data. Because of this for quite a few cases and projections have been used based on the past trends to arrive at certain figures.

Scope for further study

Because of the limitations of time and resources in this study only supply side analysis has been carried out. Analysis of supply management in raw material has been done here. This leaves scope for further study in all other areas related to supply chain. In particular it is necessary to carry out further study in the following areas:

- The supply chain study is to be carried out from operations to delivery of product.
- Detailed feasibility study of the proposed solutions.

Structure of the chapters

The thesis has been presented in five chapters with references at the end. The compositions of the chapters are as follows:

In chapter one, a brief description of the problem handled in the thesis has been given. The purpose of the thesis, the methodology adopted, the limitations, scope for further study and the schemes of the various chapters are presented.

In chapter two, provides an overview of the concept of supply chain management, role of logistics in supply side, coordination of inter and intra departments, government regulation in purchasing, transportation, forest etc. and new concepts in supply management are briefly discussed here.

In chapter three, the organization, Hindustan Paper Corporation Limited and its profile and mission are described in brief. Then the issues of purchasing of raw material particularly bamboo and coal are discussed. The system of procurement of raw material in CPM, logistics and coordination of inter and intra department are described.

In chapter four, final production trend of CPM are analyzed. Also purchasing trends of bamboo and coal in CPM are analyzed for past few years with inventory stock. Also Further the strength and weakness of CPM in purchasing of raw material are discussed. Opportunities and threats of external environment are also discussed with respect to CPM.

In chapter five, mainly recommendations of the entire study and findings has been summarized and conclusions are given.

2. LITERATURE REVIEW ON SUPPLY MANAGEMENT AND RELATED ISSUES

The various concepts of supply chain management are described below. The concepts of various other related fields in supply chain like logistics, government regulations etc. are given in the later part of this chapter.

2.1 The concept of supply chain management

A supply chain is a network of manufacturer and service providers that work together to convert and move goods from raw materials' stage to the end user. These manufacturer and service providers are linked together through physical flow, information flow, and monetary flows. In other words, supply chains link together the operations of many different organizations (Bozarth and Handfield, 2006, p.4). Supply chain is as old as trade itself. The evolution of supply chain management practices can be partitioned into four periods: the industrial revolution (1876-1900), the mass production era (1901-1974), the lean

production/quality control era (1975-1995), and the mass customization era (1996-2010) (Basu and Siems, 2004, p.2). During the industrial revolution, many businesses arose from the division and specialization of labour, from expanded markets and opportunities arising from the development of electricity, railways, transportation, and communications. In the mass production era, business adopted and utilized capital equipment to improve production operations. Efforts during this era were focussed on defining and improving specialized tasks through scientific management methods, operation research techniques, and mass production moving assembly lines. In the lean production/quality control era, businesses were focussed on improving internal processes, particularly by monitoring production methods and implementing production ideas such as just-in-time inventory systems, total quality management (TQM) programs, and enterprise resource planning (ERP) systems. Finally, during mass customization era, firms began to develop and implement e-business technologies, such as internet and e-commerce systems, and started to improve service and processes by integrating internal systems with external partners. India's development path is unique. From 1981 to 2006, the service sector contributed 55.3 percent while industrial sector contributed 25.6 percent to growth (Li and Zhang, 2008, p.3). But in leading economies development of services began after industrial maturity and when manufacturing got slowed down.

Supply chain encompasses all the activities, functions and facilities involved in producing and delivering a product and/or service, from suppliers (and their suppliers) to the customers. The supply chain management (SCM) paradigm is geared towards optimising each component of what is called Production and Operations management (production, warehousing, inventory, transportation and distribution etc.) and the inter-links between these components synergistically (Gupta and Chandra, 1998, p.3). Key elements of an efficient supply chain are accurate pin pointing of process flows and timing of process needs at each stage. Both of these enable the different stages to request items as and when they are needed, thereby reducing safety stock levels to free space and capital (Dunbar and Desa, 2007, p.1).

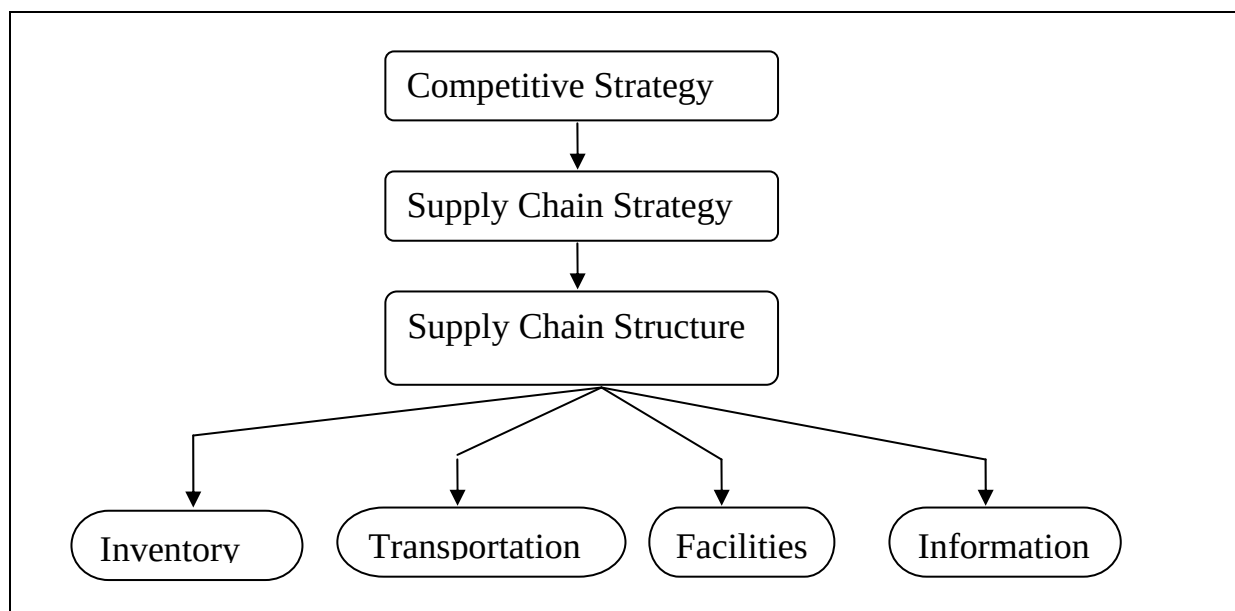
European supply chain trends show that on average, spending on innovation represents 22% of spendings on supply chain improvements, which increased to an anticipated 28% in 2007. Leading companies are investing twice as much on introducing innovations in their supply chains as followers (Roussel and Skov, 2007, p.4). Most companies now consider supply chain management to be a strategic issue and leading companies are focussing less on process improvement and more on using the supply chain to enable internal expansion and to leverage alliances and partners in global economy.

Nowadays integrated manufacturing system has been introduced in many organizations through information integration. In order to acquire efficient flow of information the manufacturing industry should include information integration activities. This integration should encompass the whole process from raw material acquisition to distribution of products. The CIE (Computer Integrated Enterprise) concept increases the responsiveness of enterprise in four areas: delay, cost, quality and quantity (Roboam and Fox, 1992, p.402). Optimising

manufacturing efficiency requires that many sections that comprise a manufacturing enterprise such as design, planning, production, distribution, accounting, sales and marketing, cooperate to achieve their common goal.

Supply chain management involves a strategic, tactical, and operational decision making with a goal of optimising supply chain performance. The strategic level defines the supply chain network, that is, the selection of suppliers, transportation routes, manufacturing facilities, production levels, warehouses, and the like. The tactical level plans schedule activities within the supply chain to meet actual demand. The operational level executes plans. Tactical and operational level decision making functions are distributed across the supply chain. In the supply chain the logistic agent is mainly responsible for coordinating the plants, suppliers, and distribution centers in the enterprise domain to achieve the best possible result in terms of the goal of the supply chain. It includes on time delivery, cost minimization etc. (Fox, Barbuceanu, Teigen, 2000, p.167). It manages the movement of products or materials across the supply chain from the supplier of raw materials to the customer of finished goods.

Figure 2.1: Supply chain decision making framework



Source: Chopra and Meindl, Supply Chain Management: Strategy, Planning, and Operations, 2002, p.51.

The above figure 2.1 depicts the supply chain decision making framework. The competitive strategy, shown in the figure 2.1, refers to the way in which a company competes with its rivals in a particular business. It is concerned with how a company can gain an edge over its rival through a distinctive way of competing. Next shown is the supply chain strategy. It constitutes the actual operations of the organization and the extended supply chain to meet a specific supply chain objective. It also focusses on driving down operational costs and maximizing efficiencies. Apart from this a supply chain strategy is used to establish the ways in which to work with supply chain partners, including suppliers, distributors, customers and even customers' customers. The supply chain structure is constituted of four parts as shown in figure 2.1. A detailed explanation of them is given below.

Inventory: Inventory includes raw materials, work in progress, and finished goods in the supply chain. Inventory decisions have considerable importance on the supply chain management system. Inventory exists in the organizations due to mis-match between demand and supply. It is also a major source of cost in the supply chain. Organizations need to decide how much stock the inventory needs to store at each level of supply chain. A manufacturer will be more responsive to customer demand if there is sufficient stock to meet the demand of the market. On the other hand, if the manufacturer has large stockpile of inventory, the holding cost will increase. So the objective of supply chain management should be to strike an optimum balance between reduction in the inventory cost and the responsiveness of the organization.

Transportation: Organizations use transportation to move components and products between the different stages of the supply chain. It plays an important role not only in efficiency of supply chain but also in terms of profitability of the organization.

Facilities: Facilities are the locations in the supply chain where the raw materials and finished goods are stored, where work-in-progress goods are processed, and also from where the finished goods are distributed. Facilities, capacity and location have significant effect on the performance of supply chain. More facilities close to the supplier/customer may improve the effectiveness of supply chain. But, cost of maintenance of more facilities will also be high. If companies have few facilities then required cost of maintenance will be low but responsiveness will be adversely affected. So a reasonable trade-off between them needs to be established.

Information: Nowadays the importance of information flow plays an uncompromising role in supply chain network. The era is called information technology era so the importance of information flow can be felt. Sometimes, the value of information as a supply chain driver is undermined due to its abstract quality. As the supply chain is made up of various entities, proper coordination is the key to improved supply chain efficiency. The flow of information also affects the other components. With proper information, an organization can predict quantity to be produced and thus plan its supply of materials accordingly etc. This makes the supply chain more effective and responsive. Organizations need to adopt enterprise-wide IT systems. An IT system should handle three kind of capabilities. In short run it should be able to handle day-to-day transactions so that demand and supply can be aligned by sharing information. In medium term, it should help planning and decision making as well as resource allocation. In long term, it should provide top managers with tools for strategic analysis. Only a few companies are adequately connected through IT to outside partners (supplier, distributor etc.) to get all necessary informations. Through electronic connectivity, organizations can improve the performance of supply chain activity to a great extent.

Hence it can be said that the key drivers of supply chain management that determine the overall competitiveness and responsiveness of the organization related to inventory, transportation, facilities and information.

Today's organizations are faced with permanently changing markets, global competitors and rapidly changing cycle of technological innovation. The ability of an enterprise to achieve competitive advantage and to survive in such a dynamic setting largely depends on organizational flexibility, availability of information and effective coordination between decisions and actions. Business processes need to be engineered and managed across geographical borders and beyond traditional functional barriers. One key concept in modern enterprise operation is the efficient management of its supply chain. The supply chain is a world wide network of suppliers, factories, distribution centers, warehouses and end retailers through which raw materials are acquired, transformed and delivered to the customer. In order to optimise performance, supply chain functions must operate in a tightly coordinated manner. However, the dynamics of the enterprise and the market require flexible responses and adaptations with local and global effects on supply chain entities. For implementing such a distributed and coordinated structure successfully, they need to be equipped with adequate information infrastructure that reflects and supports the organizational tendencies (Haase, 1997, p.2). The concept of process maturity, including supply chain processes is derived from the understanding that processes have life cycles or developmental stages that can be clearly defined, managed, measured and controlled throughout the time (McCormack, Ladeira, Oliviera, 2008, p.3). Higher levels of maturity in business process results in:

1. better control of results;
2. improved forecasting of goals, costs and performance;
3. greater effectiveness in reaching defined goals and;
4. improving managements' ability to propose new and higher targets for performance;

The complete supply chain is made up of many channel partners and many processes. The forces which are responsible for making the supply chain effective are consumer demand, globalization, competition, information and communication, government regulations and the prevailing environment. Multi-level supply chain is influenced by many variations such as stocking strategies, shipping policies, information and communication procedures and other parameters. Supply chains generally involve many decision makers, often with conflicting priorities. Providing structures, information and incentives to help these people work together is vital to the overall effectiveness of a supply chain (Hopp, 2003, p.129). The supply chain enablers, which determine performance, are alignment, measurement, participation and involvement, customer/supplier focus, design and periodic review. The scope of supply chain management has increased significantly. Many industries, in order to coordinate with a wide array of activities spanning different geographical locations, are using information technology to an increasing extent at every stage of supply chain.

2.2 The role of logistics in supply side to organization

Logistics is another important part of supply chain management. Logistics management is that part of supply chain management that plans, implements, and controls the efficient, effective forward and reverse flow and storage of goods, services and related information between the point of origin and the point of consumption. It is necessary to meet customer requirements. Companies depend on their logistics system to move goods and materials among supply chain partners, and to manage the information flows necessary to carry out these tasks (Bozarth and Handfield, 2006, p.363). Logistics cover a wide range of business activities, including: 1. transportation, 2. warehousing, 3. material handling, 4. packing, 5. inventory management, 6. logistic information system.

1. Transportation: Large organizations usually have a specified transportation function to manage the physical and informational links between the supplier and the buyer. For some organizations, transportation is one of the largest category of single cost especially for process industries requiring various inputs. Some organizations may have minimal common purchase requirements among its units. But usually opportunities are available to coordinate the purchase of transportation services.

2. Warehousing: Before a product heads to the customer, it may be stored for a period in a warehouse or distribution center. This is particularly applicable for big companies that produce according to a forecast in anticipation of future sales. But if a company produces its product after receiving an order warehousing is of least importance to them. Otherwise warehouses are normally used for storing goods before delivery to final customer and they also involve some cost.

3. Material handling: All inbound material must be physically received as it moves from a supplier to a purchaser. In non just-in-time environment, material must be stored or staged and it requires physical handling. Receiving the material and storing it in some place requires material handling. It demands for material management practices to control the physical processing and handling of inventory.

4. Packaging: This activity involves physically getting a product ready for distribution to the customer by wrapping with something. Packing is done to prevent damage, completing any special labelling requirements, completing the required shipping document, storage, sale etc. Packaging also refers to the process of design, evaluation and production of packages. Packaging can be in short described as a coordinated system of preparing goods to protect, transport, warehouse, preserve, sale and end use.

5. Inventory management: Inventory management is controlling stock levels within the physical distribution function to balance the need for product availability against the need for minimising stock holding and handling cost. Inventory control group in large organizations is often responsible for determining the appropriate quantity to be ordered based on projected demand and then managing materials required by the suppliers. This also includes release of material purchase requisition, contacting a supplier directly concerning changes, and

monitoring the status of inbound shipments. In large organizations the purchasing department is responsible for these activities.

6. Logistic information system: Logistic information system is the one that facilitates shipping, transportation, and warehousing activities. It aims to ensure customer service by getting adequate quantities of finished products to the proper place in a cost and time-efficient manner. It not only allows to evaluation of actual data, but also helps in planning data. The information system provides an easy way to use planning function. It also helps in forecasting. In logistic information system, sales and operations planning are combined to get one central planning and forecasting tool. It helps in managing logistic processes effectively by the coordination of orders, stock status, and shipment as well as to get up-to-date information about the flow of goods etc.

Transportation as a part of logistics is one of the most important determinant of flow of inbound materials and outbound finished goods. Transportation networks like freeways and interstate highways are the main backbones of modern society and play an important role in supply chains. Consequently then, the reliability of the transportation network or the reliability of supply chain is a decisive factor not only in terms of market out-reach, but also in terms of continuity, to ensure a 24/7 operation of any company. Any threat to the reliability of the transportation network constitutes a vulnerable spot, a weakness in the supply chain. This vulnerability in the transportation network as a part of the supply chain is of particular interest in countries or regions with sparsely populated areas, and hence, a sparse transportation network (Husdal, 2008, p.3). Typically traits of such regions are few transportation modes, for example only one railway line and two roads, no ports, no airport. It should not come as a surprise if the nature of sparse transportation networks, and thus sparse supply chain, makes them vulnerable to different kinds of risks. With only few transportation modes and links available between population centers the supply chain becomes extremely vulnerable to any disruption, since in a worst possible scenario no suitable alternative exists for deliveries of materials to and from these regions.

Transportation decisions are made on the mode of transportation and the route to use in the transfer of products from one point to another. However, there is always a trade-off between responsiveness and efficiency. For example, if an organization uses air transport to transfer its products or components, its responsiveness increases significantly. But its cost efficiency decreases because of high air transport costs. Key components in transportation decisions are: selecting the mode of transportation, route and network. Another decision to consider is that the organization must have transportation infrastructure of its own or it should outsource the transportation requirements.

2.3 The concept of inventory

The term inventory is used in day to day life as manpower inventory, equipment inventory, inventory of raw materials, inventory of spare parts, inventory of semi-finished goods, inventory of finished goods etc. and it is normally defined as stock of goods. Inventory in management represents an idle resource of any kind having an economic value. So long as the resources are kept in the warehouse or store it is idle. But, the material has economic value in the sense that it is capable of being converted to semi-finished and finished goods and sold to the customer to buy more items. The cycle thus goes on. Inventory represents the largest single investment in assets for most manufacturers. The primary categories of inventory are: 1. raw material and semi-finished item inventory; 2. work-in-process (WIP) inventory; 3. finished goods inventory; 4. maintenance, repair, and operating (MRO) supplies inventory; and 5. pipeline/in-transit inventory (Monczka et al, 2009, p.587).

1. Raw material and semi-finished item inventory: This inventory includes the items purchased from suppliers or produced internally to directly support production requirements. Raw materials include those items purchased in bulk or unfinished condition. Semi-finished inventory include those items and components used as inputs during the final production process. Every producer relies on some level of raw material or semi-finished inventory to support final production requirements.
2. Work-in-process inventory: Work-in-process inventory includes the set of large unfinished items in production process. These items are not yet completed but are either just being fabricated or are waiting in a queue for further processing or in buffer storage. The term work-in-progress inventory is used in production and supply chain management. Work-in-process requires storage space, represents bound capital not disposable for investment and carries an inherent risk of earlier expiration of shelf life of the products.
3. Finished goods inventory: Finished goods inventory includes completed items or products that are available for shipment or for future customer orders. In a supply chain management flow, the finished goods of a supplier can constitute the raw material for a buyer. Sometimes firms produce goods in anticipation of future customer orders and hold finish good inventory.
4. Maintenance, repair, and operating (MRO) supplies inventory: MRO inventory includes the items used to support production and operation. These items are not physically part of the finished product but are critical for the continuous operation of plant, equipment, and offices.
5. Pipeline/in-transit inventory: This inventory is in transit to a customer or is located throughout distribution channels. The inventory is owned by the supplying company or distributor, which receives payment when the customer buys the product.

The motives behind organizations to lock up the working capital in an idle inventory are: 1. transaction; 2. precaution; 3. speculative; and 4. decoupling (Gopalakrishnan, 1994, p.173).

1. Transaction: Transaction implies the total time in converting an indent into the material. The time from raising an indent to actual receipt of material is called lead time. In some procedure oriented organizations, the lead time may go upto more than one/two years or even more. During the period of transactions, the demands from the user/customer have to be satisfied and this necessitates idle stock. This inventory maintained to cater to normal consumption in the average lead time is known as buffer stock.
2. Precaution: Precaution means safety or minimum stock as commonly known in the industry. It is likely that the average lead time varies or requirement of any of the component may go up. Consumption may be more than the anticipated level. Safety stock provides the cushion during fluctuation in lead time. Reserve stock provides for an increase in rate of consumption/sales during the average lead time. Safety stock is intended for the precautionary factors of fluctuation in lead time and consumption.
3. Speculative: Speculative inventory could be due to non availability of item as demand exceeds supply or for fear of increase of price in future. All these force the management to squirrel the stock. Another factor considered in increased stock level is trade discounts or quantity discounts. The seasonal factor also forces higher inventories.
4. Decoupling: Finished goods are decoupled from raw materials in engineering and in manufacturing by means of idle stocks. This may be the idle stock of assemblies, sub-assemblies, work-in-progress or semi-finished goods or even raw material stock. For example in engineering industries a continuous run of one process is made and kept as semi-finished good before another process is started to reduce set up cost.

Inventory control signifies the conversion of idle resources into workable resources with minimum wastage or obsolescence. The objective of inventory control is to supply uniform quantity of goods at minimum cost.

2.4 Importance of coordination in the supply management

The ability to quickly respond to environmental changes has been recognised as a key element in the success and survival of corporations in today's market. The ability includes ongoing monitoring of events both inside and outside the corporation. There is need to quickly recognise the exogenous events, and to rapidly replan and reconfigure so as to allow the enterprise to take advantage and minimise costs (Beck and Fox, 1994, p.1). The exogenous events are many and diverse. For example change in customer order, unavailability of a particular resource, price change of a particular resource, an urgent order from a customer and so on. Handling these events require close coordination and cooperation among sales, marketing, accounting, material planning, production planning, production control and transportation etc. Managerial practices for improvement in logistics include policies, methodologies and procedures that are adopted by an enterprise to manage, coordinate and integrate its operation processes. The complexity of an enterprise is described by supplier and

customer characteristics, third party and competitor structures, product class and innovations, process organization (procurement, production, logistics and sales) as well as level of flexibility of its production and logistic processes. Since complex systems are made up of single elements which have intimate connections, and nonlinear links, they present self emerging and chaotic behaviours. In this condition understanding each single factor affecting the complexity does not imply the understanding of the whole system. In addition, interaction among all the variables does not allow to manage them separately. The three typologies are: 1. managing internal operation functions, 2. integration, 3. coordination.

While managing internal operations the relationships between operations, marketing, personnel, and other functions within organizations are considered. Some of the aspects of operations are: 1. work practices; 2. planning; 3. resourcing, 4. administration, 5. customer and supplier relation etc. Managing operations of organization includes managing finance, purchases, inventory, storage, logistics, sales and marketing etc. A great deal of focus is on the efficiency and effectiveness of the processes.

The life blood of organizations flow through the order to cash flow cycle. This is true whether the primary business is a manufacturing, distribution, or service provider environment. All these activities demand for free flow of information/material between departments to achieve its goals and thus require some kind of integration. The way that multinational businesses in integrated global industries coordinate and control R&D, manufacturing, marketing functions etc. across borders has significant implication on the performance of the organization. Similarly national organizations also demand for integration of various functions. The demand is at least information flow, in order to achieve operational efficiencies. ERP, SAP etc. are some tools which integrate different departments of an organization or different units to have free information flow so that any activity can be communicated to or coordinated with. Supply management acts as a liaison with external parties on multiple fronts like materials, new technology, information, and services. One of the responsibility of supply management is to maintain open communication linkage with supplier so that cooperation is achieved between suppliers and management.

Coordination identifies a further level of development in the growth of a company. In order to achieve not only an integration of its internal functions, but also to strive for an external synchronization with the upstream and down stream partners (i.e. suppliers and customers) involved in its logistic chain coordination is required (LOG4SMEs final report, 2006, p.14). Coordination dimension of supply chain integration defines how work can be assigned to the best supply chain partners. Vendor managed inventory (VMI) and Continuous Replenishment Plan (CRP) are such activities where the replenishment decisions are given to the suppliers as they are better informed about the prevailing situations of the sources of supply. Coordination also involves sharing, redeployment and consolidation of resources such as, warehouses, inventory, transportation etc.

The effectiveness of purchasing activities can be enhanced by proper organization and coordination of activities. There are two types of purchasing systems: 1. centralized purchasing system and 2. decentralized purchasing system.

In a centralized purchasing system, all purchasing activities of an organization are carried out by a separate department called the Purchase department. A centralized system is effective when an organization has a number of production units or many autonomous production sections within the same units which require material with the same or similar specifications. In such cases a centralized purchasing system would be beneficial for bulk purchasing. The centralization of purchasing activities also leads to consistency in buying policies and uniformity in maintaining purchasing records.

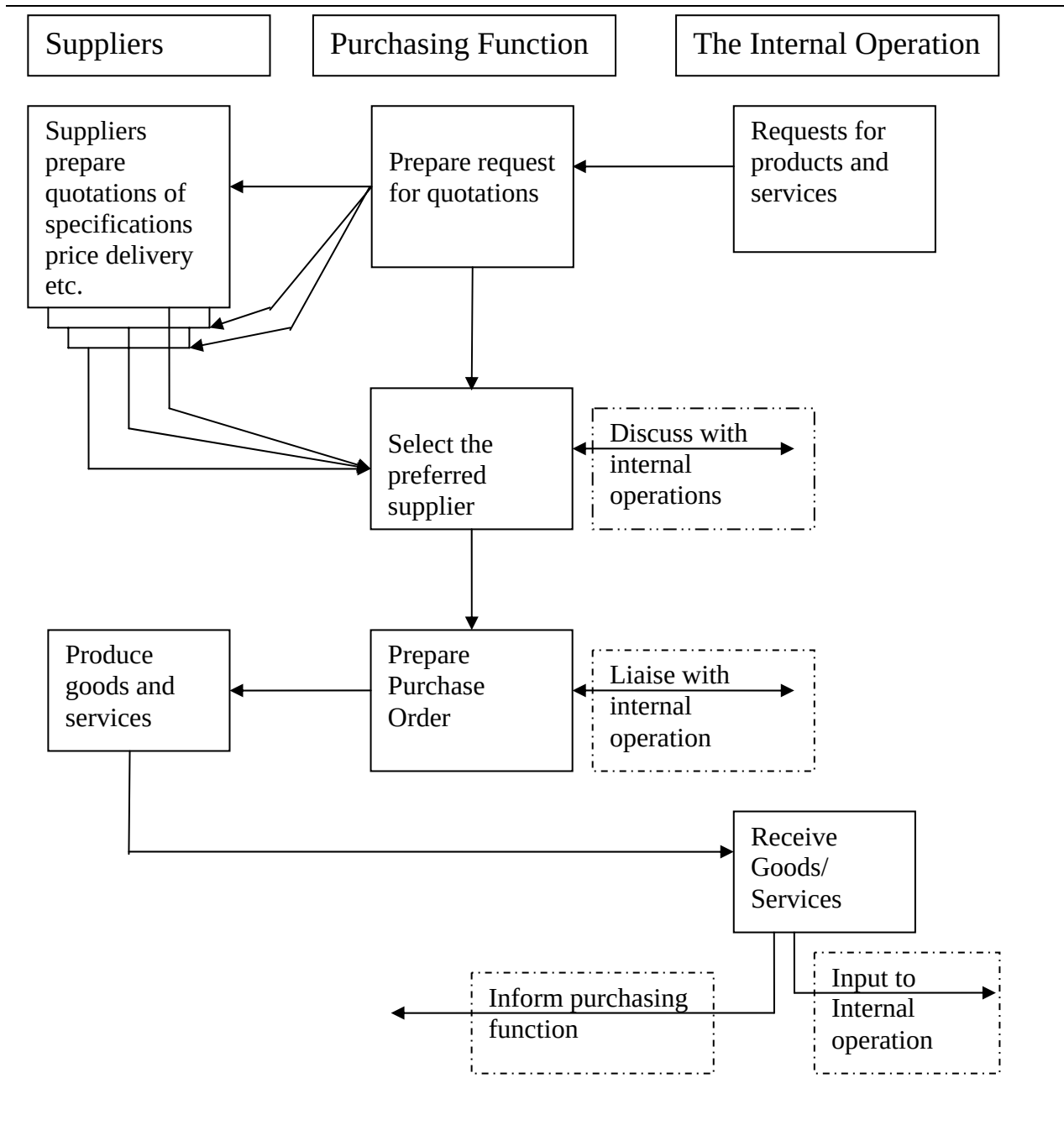
In a decentralized purchasing system, the heads of different departments purchase the needed materials according to their specific requirements. This method gives each department the flexibility to alter its purchasing policy on the basis of specific requirements.

However, most organizations do not depend on any of the two systems solely; instead, they use a combination of both the systems. In such organizations, each division or department identifies its specific purchasing requirements while a central authority, such as a purchasing head or manager, manages the actual purchasing activity.

Most of the organizations now-a-days recognize a need for joint cooperation to achieve cost, quality, delivery and time improvement. Collaboration is defined as the process of two or more parties adopting a high level of purposeful cooperation to maintain a trading relationship over time. There can be open exchange of information which includes information about supplier cost data sheet, production schedule, forecast for purchase requirements etc. A firm can gain many advantages by pursuing closer relationships with suppliers. The purchasing function brings together the internal operations and suppliers. Supplier can be defined as an organization that delivers materials, components, goods or services to another organization. Suppliers play an important role in the market to maintain a healthy relationship with customer for an organization. The basic responsibility of the purchasing department is handling communications with suppliers and developing buyer-supplier interface to improve performance, quality etc. The purchase department generally deals with elements like purchase indents (referred to as requisitions), requests for quotations and purchase orders. These three elements are also called purchasing instruments and are fundamental to the purchase process. The various departments requiring any material have to raise requisitions. After selecting the preferred supplier, purchase department again consults the internal operation department if required. Then finally the purchase department prepares the purchase order for the specific material. And the supplier supplies goods or services as per the terms and conditions. Finally the goods or services are received by user department or stores department and feed back is given to purchase department regarding receipt of material or rejection, if any. Though there may be some variations in purchasing procedures, depending on the material required, the procedure described below is the general procedure that many organizations follow to procure their materials. The various functions of a purchase

department related to the operations department and suppliers can be figured out from figure2.2.

Figure 2.2: The purchasing function brings together the operation and its suppliers



Source: Slack Nigel, Chambers Stuart and Robert Johnston, *Operations Management*, p. 417.

In addition, the purchase department is also responsible for the proper delivery of materials on time. The finance department pays the vendors only when the purchase department and the corresponding indenting department notify it about the quantity of materials received with an acceptable quality level. Hence the coordination between the various elements in the process of purchasing is very important.

Organizations can derive significant cost advantage if they maintain strong and long-term relationship with their suppliers. They can demand the highest level of service from the suppliers, while at the same time it should also be kept in mind that suppliers play an important role in cost reduction. The organizations' dealings with the suppliers are carried out on the basis of market positions and industry structure of the specific organization. For instance some organization may invite competitive bid while some other may have long-term contract or may make strategic alliances etc. These activities require enormous coordination within inter or intra departments/suppliers/transporters etc.

The development of new communication standards that allow buyers and sellers to transmit important purchasing transaction data easily and securely has been a critical element of new technology namely e-procurement. In the following section it is discussed in detail.

2.4.1 E-Procurement

Economic, legal, societal, and technological factors have created a highly competitive business environment in which customers are becoming more powerful. These environmental factors can change quickly, vigorously, and sometimes in an unpredictable manner. Companies need to react quickly to both the problems and the opportunities resulting from this new business environment. Because the pace of change and the level of uncertainty are expected to accelerate, organizations are operating under increasing pressure to produce more products, faster, and with fewer resources.

Electronic Tendering System

Large organizational buyers, private or public, usually make large volume or large value purchases through a tendering (bidding) system, also known as reverse auction. Such tendering can be done online, saving time and money. Pioneered by General Electric Corporation, e-tendering system is gaining popularity. Indeed several government agencies mandate that most of their procurement must be done through e- tendering.

Electronic marketplaces and exchanges

Electronic marketplaces existed in isolated applications for decades (e.g. stock and commodities exchange). However, as of 1996, hundreds of e-marketplaces have introduced new efficiencies to the trading process. If they are well organized and managed, e-marketplaces can provide significant benefits to both buyers and sellers. Of special interest are vertical marketplaces, which concentrate on one industry (like Chemconnect.com for the chemical industry, Turban et al., 2008, p.261).

The major electronically connected (EC) activity is electronic trading. Typically, a seller (retailer, wholeseller, or manufacturer) sells to consumers. The seller himself buys from suppliers, either raw materials (as a manufacturer) or finished goods (as a retailer). Internally, processes in the different functional areas are supported by enterprise software such as ERP and B2E activities. The customers can be individuals (B2C), businesses (B2B), or government agencies (B2G). The customers place orders and the seller fulfils them.

Company buys materials, products, and so on from suppliers, distributors (B2B), or from the government (G2B) in a process called e-procurement. Sometimes intermediaries are also involved in the process. Customer buys goods online in different modes. The most common mode is purchasing from catalogs at fixed prices. Sometimes prices may be negotiated or discounted. Another mode is dynamic pricing, which refers to nonfixed prices such as those in auctions or stock (commodity) market.

Information brokers (informediaries)

Information Brokers provide privacy, trust, matching, search, content, and other services (like Froogle.com).

Supply chain improvement

One major contribution of e-commerce is in the creation of the new models that change or improve supply chain management. Most interesting is the conversion of a linear supply chain, which can be slow, expensive, and error prone, into a hub.

Direct sale by manufacturers

According to this model, a manufacturer eliminates all intermediaries, selling directly to customers.

Negotiations

The internet offers negotiation capabilities between individuals or between companies. Negotiations can also be facilitated by intelligent agents. Negotiated pricing is commonly used for expensive products. Negotiated prices result from interactions and bargaining among sellers and buyers. However, in contrast to auctions, negotiations also deal with nonpricing terms such as the payment method and credit.

As an example IMARKETKOREA can be presented as an e-market place where on time delivery increased from 72 percent to 93.7 percent; average lead time was reduced from 5.3 to 2.8 days; catalog search speed has increased 40 percent; 12 to 18 percent saving in purchase price; 30 to 50 percent saving in process cost; 5 to 15 percent savings in inventory management cost; and 40 to 60 percent saving in reduced inventory. The site offers Korean, English and Japanese options to registered users (Turban et al., 2008, p.299). So the advantages can be seen.

Public sector of India, Coal India Limited (CIL) plans to procure about one-third of its equipment, consumables, spare parts and other stores, electronically to cut delays and boost efficiencies. Another public sector company, MSTC, has been selected as the service

provider. The whole process has been undertaken as per Information Technology act of 2000 and the bidders have been asked to conform to the guidelines.

2.5 Government regulations in supply management of public sector of India

Governments have played a significant role in many activities relating to various parts in the supply chain like purchasing, transportation, use of forest based raw material etc. An organization's supply chain decisions have to take into account the regulations and policies of other countries as well. Trade barriers, duties and other such trade related decisions are in the hands of governments of various countries. These rules and regulations directly affect the functioning of supply entities. With the formation of international trade organizations like the WTO, and other regional trade agreements, governments around the world are trying to bring in consistent regulations in all member countries. In India purchasing process of the industries owned by the Indian government, is guided by purchase policy of government. At the central level, procurement is administered by the individual government agencies. These agencies may issue more detailed instructions in conformity with the rules. The individual procuring agencies are also responsible for developing their own handbooks, model forms, and model contracts. Certain control and oversight functions are carried out by central authorities such as the Comptroller and Auditor General and the Central Vigilance Commission (CVC). CVC is conceived to be the apex vigilance institution. It is free of control from any executive authority. It monitors all vigilance activity under the central government. In the following section the important procurement procedures provided by CVC are described in brief.

2.5.1 Contract system guidelines by CVC (Central Vigilance Commission), in

Purchase process

Public sector of India has to act as per law and guidelines provided by CVC (Central Vigilance Commission). It has to adhere to the prescribed rules and procedures issued by government from time to time. It has to adhere to fairness and equity in supply contract for any raw material.

The technical aspects of the purchase procedure as directed by CVC are many for various agencies like central government, state government, public sector etc. Here only the processes related to procurement in public sector of India are described in brief. The technical aspects are important as they provide an insight into the various steps to be followed in procurement for public sector. They also provide the information that public sector of India is not independent in procurement of any material. Apart from this it gives the bureaucratic structure of procurement activities which differs from that of private sector in procurement activities. Public sector of India has to follow the guidelines as described below (Central Vigilance Commission, 2006).

Purchase processes of government industries in practice: The job of purchase department in a government industry is to provide, to the user departments, right material at the right time in right quantity at the right price from the right source. To meet these objectives the activities undertaken include selection of sources of supply, finalization of terms of purchase, placement of purchase orders, follow up, maintenance of relations with vendors, approval of payments to vendors, evaluating, rating and developing vendors. The aim of the purchase process is to provide effective and timely procurement of various goods and services in a fair, transparent, and objective manner. Purchase policies are framed as per the requirement of the company and in accordance with the industry to which it belongs. Purchase policy is translated into purchase manual, which guides the purchase process of the company. As per the policy, every government organization needs to have well documented policy guidelines to execute the procurement activity in a uniform and well-coordinated manner with least time and cost over-runs. This is a very important document which is required to guide officials in their day-to-day work.

The provisioning of stores need to be done with utmost care to avoid any surplus purchases. In order to give equal opportunity to all the bidders and to maintain terms and conditions, specifications, tender opening date etc. are notified to all bidders, sufficiently in advance of the revised tender opening date. The specific loading criteria should be incorporated in the tender enquiry in unequivocal terms and evaluation of offers should be done on the basis of the laid down criteria. This is to be done so that the sanity and transparency in the tender system could be maintained. It should be ensured that under no circumstances, a bidder is counter offered a rate higher than what has been quoted by him. Techno-commercial evaluation of offers should be carried out as per laid down criteria in a transparent manner. Once it has been established that the offers meet the laid down specifications, there should not be any further 'grading'. The contract needs to be awarded to the lowest bidder meeting the laid down specifications. In order to safeguard the government's interest, it should be appropriate to take reasonable amount of Bank Guarantee (BG) valid upto the warranty period, for due performance of the contract. The genuinity and validity of the Bank Guarantee needs to be carefully checked and monitored. Whenever extension in the delivery period is granted, the validity of the Bank Guarantee should also be appropriately extended so as to protect the government's interest. The genuineness of the Bank Guarantees and the wordings should be checked from the issuing bank to be in order.

After conclusion of the contract, any relaxation in the contract terms/specifications should be discouraged. However, in exceptional cases where modification/amendments are considered to be absolutely essential, the same should be allowed after taking into account the financial implications. The delivery period should be extended on bonafide request and not in a routine and casual manner. In case of delay in supplies by supplier, the liquidated damages should be recovered. In short, there is a need to discipline the suppliers so that the non-performers could be weeded out and the suppliers who can be relied upon with consistent performance, in terms of the quality and delivery schedules are encouraged. So it has got impact on the supply system of an organization.

To procure any material the normal procedure is tendering in public sector undertakings. There are various ways of tendering and all are transparent in delivering the final contract to the desired supplier. The various procedures of tendering are described below:

Various modes of tendering for placement of orders: For procurement in government of India departments and industries procedure followed is domestic open tender, which is also known as advertised tender. This is normally applicable for all demands above certain indent value. Open tenders are advertised in leading newspapers, as per policy of press publications of respective companies. The website address is also published in the advertisement/NIT (notice inviting tender) published in the newspapers. They are categorised as:

- Global tender (advertised);
- Limited tender;
- Single enquiry;
- Operating DGS&D (Director General Supply and Disposal) rate contract;
- Operating rate/running contracts concluded by its subsidiaries;
- Repeat orders (repeat orders are avoided normally);
- Orders for products with administered pricing;
- Emergency purchase/local purchase/committee purchase as per delegation of power;
- Purchase without resorting to normal tendering procedures may be resorted to 1. spot/cash purchase for low value purchases, 2. purchase without tender (negotiated);

Registration of suppliers: In order to have dependable sources of supply of stores, spares and equipments of right quality at the appropriate time, suppliers are registered after ascertaining certain basic facilities available with them. Performance of such registered suppliers are reviewed from time to time. It gives the tenderer readily available probable suppliers for any specific material.

Vendor rating: Vendor performances are evaluated on three major parameters quality, delivery and price. Vendors are classified on the basis of Composite Performance Index (CPI). It also helps the purchaser by giving it an opportunity to judge the vendors for repeat order in case necessary and quality of supply.

The tendering process is a multi-step activity normally done by purchase department of any organization. The steps of tendering are described below which gives the information about how the processes move and about how time taking it is.

Notice inviting tender: In order to give wide publicity, generate enough competition and to avoid favoritism, as far as possible, issues of advertised/global tender inquiries should be resorted to and published in ITJ and selected National Newspapers. The copies of the tender notices should be sent to all the registered/past/likely suppliers by UPC and also to the Indian embassies of major trading countries in case of imported stores. With a view to have wider, fair and adequate competition, it is important that sufficient time say 4–6 weeks in case of

advertised/global tenders and 3–4 weeks in case of limited tenders is allowed. This is exception to cases of recorded emergencies, wherein also, a reasonable time should be permitted and tenders should be sent by faster means like speed post/fax. The tenders should preferably be kept open for sale till the date of tender opening or just one day prior to the date of tender opening. With the widespread use of Information Technology, the tender notices should also be put on the website and e-mail address of the organization should be indicated in the tender notice. In case of proprietary purchases, the detailed justification for purchase from a single vendor is to be placed on record. As by issuing single tender, the competition is totally eliminated and the possibility of paying higher prices cannot be ruled out. It is imperative that the purchase on single tender basis be made with the detailed justification in support and with the approval of competent authority, including associated finance.

Preparation of tender enquiry: The invitation to tender and instructions to the tenderers are the most important documents as the firm's proposal/tender is based on them. The important clauses relating to earnest money, delivery schedule, payment terms, performance/warranty bank guarantee, pre-despatch inspection, arbitration, liquidated damages/penalty for the delayed supplies and risks-purchase etc. are to be incorporated in the bid documents. The tender enquiry should, therefore, be carefully prepared setting out clear terms of the requirements of the purchaser as to quality, quantity, delivery required etc. Some reasonable amount of EMD (Earnest Money Deposit) should always be asked for from the bidders with tender. The primary objective of submission of EMD is to establish the earnestness of the bidder so that he/she does not withdraw, impair or modify the offer within the validity of the bid. It also helps in restricting if not eliminating 'speculative', 'frivolous' or 'wait and see' bids. Any relaxation regarding submission of EMD has financial implications besides giving encouragement to the bidders to submit frivolous bids as indicated above. The terms and conditions should clearly stipulate that the offers without EMD would be considered as unresponsive and hence rejected. Some organizations incorporate a specific delivery schedule inter-alia mentioning that bids offering delivery beyond stipulated date will be treated as non-responsive and will be summarily rejected. In order to meet project requirement, it would be prudent to incorporate an acceptable range of delivery period. It should include with stipulation that no credit will be given for earlier deliveries. Also offers with delivery beyond the acceptable range should be treated as unresponsive. Within this acceptable range, for the purpose of evaluation, an adjustment per month of about 2% could be added to the quoted prices of bidders offering deliveries later than the earliest delivery period specified in the bid documents.

Evaluation of tenders: Tenders are to be treated as confidential documents and except at the time of public opening of tenders, prices quoted are not to be disclosed to anybody by any employee of the company. Techno-commercial evaluation of offers is carried out as per laid down criteria in a transparent manner. The contract needs to be awarded to the lowest bidder meeting the laid down specifications. Whatever the procedure followed and forms adopted for conclusion of contracts the same has to fulfill the provision of certain basic laws of the country, namely the Indian Contract Act and the Sale of Goods Act. In the agreement between

the seller and the buyer, the contracts provide for settlement of dispute by arbitration. The relating law of Arbitration is applicable in that case.

The detailed generic technical specifications including performance parameters and the technical evaluation criteria, if any, need to be specified in the bidding documents in unequivocal terms. While following tender for purchase for government industries it is of paramount importance that equal opportunity be given to all the bidders and the sanctity of the tendering system is maintained. The government instructions on reservation of items and price preference to SSI (Small Scale Industry) units and purchase preference to PSUs need to be incorporated in bid documents. A proper arrangement for receipt of tenders at scheduled date and time through tender box needs to be adopted.

As post tender negotiations are the main source of corruption, post tender negotiations are banned, except in the case of negotiations with L1 bidder (i.e. Lowest tenderer) as provided by CVC. The CVC has further given the following clarifications (Central Vigilance Commission, 1999):

- The government of India has a purchase preference policy so far as the public sector enterprises are concerned. The ban on the post tender negotiations does not mean that the policy of government of India for purchase preference for public sector should not be implemented.
- Some organizations have been using the public sector as a shield or a conduit for getting costly inputs or for improper purchases. This should be avoided.
- Another issue that has been raised is that many a time, the quantity to be ordered is much more than L1 alone can supply. In such cases, the quantity order may be distributed in such a manner that the purchase is done in a fair, transparent and equitable manner.

The instructions/guidelines circulated by CVC on post tender negotiations with L1 need to be strictly followed.

It is very important to establish the reasonableness of prices on the basis of estimated rates, prevailing market rates, last purchase prices, economic indices of the raw material/labour, other input costs and intrinsic value etc., before award of the contract. The payment terms should not be changed after award of the contract. The pre-qualification criteria are the yardstick to allow or disallow firms to participate in the bids. Pre-qualification criteria should be fixed in such a manner that all competent contractors are brought into competition as desired by CVC. From the above literature it can be concluded that the procurement in public sector of India is a tedious process. For further details appendix can be viewed. In critical situation also many steps are to be followed which delay the actual procurement. It also reduces the competition with private sectors which are in advantageous position in procurement compared to public sector.

Another important aspect is transportation. Transport infrastructure is often a barometer of a nation's prosperity. Developed economies take a greater interest in it and build and maintain a

variety of facilities and modes: from road to rail and air, from bus to train, ship and aircraft. Transportation is a public utility in the sense that it is vital to the overall public interest. Almost every business enterprise and every individual is directly affected by the transportation industry.

2.5.2 Regulation under transportation in India

The public, strategic and business interest may often conflict with one another. The overall purpose of regulation is to balance and prioritize conflicting interests in such a way that the entire society is benefited. It is for this reason that the Committee on Transport Policy and Coordination was set up by the Planning Commission of India in 1966 (Padam, 1998, p.790). The National Transport Policy Committee in 1980, argued for a National Transport Commission to advise the government from time to time to keep up with the changing priorities. The transportation sector is often regulated in order to bring it in conformity with economic priorities. There are basically two parts in transport regulation. They are economic regulation and physical and infrastructure regulation. Economic regulation can be further divided into fare regulation, entry regulation, quality of service regulation and tax regulation.

Fare regulation: In order to ensure even spread of transportation it is necessary to regulate fares so that passengers are not exploited and at the same time economic viability of the operators is not jeopardised. The government authorities fix the fares through regulation from taxis to aeroplanes. In developing countries, the public sector began operating transportation systems mainly to 'promote, provide or secure' an efficient and properly coordinated transportation service. Hence large public/government sectors were established like the railways, airways, roadways etc. to bring in economies of scale, provide adequate infrastructure and make the enterprise economically viable. The need for explicit subsidies was sought to be avoided in this way. As fare is fixed by government it sometimes become a challenge for regulatory mechanism to safeguard the interest of other organizations or public in general.

Entry regulation: Transport system by their nature do not operate in isolation. In case of railways, due to monopoly, it is easy to identify owner and hold them responsible for any breach in quality of service in India. Tight regulation also exists in air transport where safety is of paramount importance. Inspection and approval by governmental agencies have also been in vogue in shipping industry. However, in case of road transport, where ownership is diffused and almost everyone can enter easily, the standards of quality are low.

Quality of service regulation: The entry regulation to a great extent, ensure the quality of service offered by transport operators. The regulatory mechanism should encourage the setting up of appropriate training institutions to improve service and safety standards.

Tax regulation: Transport is considered to be a source of revenue for government. Users on every mode are taxed either for the use of infrastructure or to augment government's resources. In India from road transport sector, it is contended that only a fraction of the tax collected is spent on roads. The appalling state of almost all the roads inclusive of the

highways is mainly because of this. If money is spent properly on maintenance of roads, there will be greater mobility and the operating cost for users will also come down. This will also lead to an increase in revenue earning for government.

Physical and infrastructure regulation: Some structure or operating procedure is needed to ensure operational discipline. The objectives of physical and infrastructural regulation are to ensure safety and reliability of the service. The end standard of quality of road or railway construction, provision of advanced facility etc., requires the maintenance of certain minimum standards. In transport system the regulators, operators and the government take care of certain minimum standards, either by regulatory mechanism or by influencing its own undertakings.

Finally to sum up the transportation regulations it can be said that the government's role in major transport networks like railways and various tax systems is vital. It also determines the existence and profitability of many organizations. In order to build, maintain and strengthen a viable transportation network, it is equally necessary to encourage manufacturers and operators who can produce and run a variety of transportation modes on land, sea and air.

2.5.3 Use of forest based raw material

Growing concern for the environment has had made an impact on supply of forest based raw materials. The government of India's new agricultural policy envisages that 'private sector participation will be promoted through contract farming and land leasing agreements to allow accelerated technology transfer, capital inflow and assured market for crop production'. Following this many Indian corporate sectors and rural India has entered into collaborative partnership through vertical coordination and contract farming (Singh, 2005, p.1). There can be enormous amount of diversity due to the type of the firms, nature of contracts and socio-economic environment. Socio-economic environment as well as regulatory and technological environment shapes the way for the vertical coordination. Firms cannot ignore these drivers, which facilitates their growth of the business.

The result of implementation of Forest (Conservation) Act, 1980, and following the provisions of the National Forest Policy, 1998, supply of raw material from government forests to wood-based industries has gradually declined. This has forced the industries to look for alternative sources such as import of timber and pulp. Some others are sourcing timber through farm forestry. The forest based industries tie up with farmers by supplying seedlings, arranging micro credit, providing technical back-up and entering into buy-back arrangement with farmers. The companies are selling high quality clonal seedlings through local nurseries to the farmers. Farm forestry/agroforestry is now a viable land use option in many parts of India. The farmers are getting diversified income and reducing the risk of growing only agricultural crops on their farmlands. A notable aspect of the farm forestry sector has been the investment by the companies, though only few in numbers, in the research activities. Researchers are trying to develop high yielding clones and appropriate silvicultural and agroforestry practices. For example, the annual productivity of clonal seedlings for eucalyptus developed by ITC Badrachalam, a paper making company range from 20-58 cubic meter per

hectare per year. While the productivity of seed-raised eucalyptus plantation is only 4-5 cubic meter per hectare per year (WINROCK, International India, 6th framework, 2009, p.67). The National Forest Policy (1988) focusses on conservation. The policy emphasizes environmental stability and maintenance of the ecological balance. The derivation of direct economic benefits is subordinate to this aim. The policy lays heavy emphasis on meeting the requirements of fuelwood, fodder, non-timber forest products and small timber for rural and tribal people who have been given priority over the raw material requirements of forest-based industries. Almost all of the natural forests, including large-scale forest plantations lying within forest reserves, are owned and managed by the government through the state forest departments. The private sector (i.e., farmers, individuals, wood-based industries and entrepreneurs) has established only small-scale and scattered plantations. The land ceiling laws forbid the holding of large areas (maximum: 21.85 hectare) by the private sector. It is thus difficult for private industries to raise commercially viable plantations. Due to the increasing emphasis on forest conservation, the production of industrial wood from natural forests has gradually declined over the last two decades. The establishment of the National Commission on Agriculture (NCA) marked the turning point in plantation development. The NCA realized the potential of plantations in meeting India's industrial and fuelwood needs, and pointed out the lack of investment in the sector. The NCA recommended the establishment of plantations on wastelands outside forest areas through social forestry programmes. Several forest-based companies have recently set up in-house research centres for the production of clonal seedlings to be supplied to farmers. The Department of Wasteland Development has recently initiated the Investment Promotion Scheme. It offers a grant covering 25 percent of the cost of plantation establishment to enterprises for rehabilitating wastelands. One of the conditions for the subsidy, requires that the activity should not adversely affect the livelihoods of poor people. However, regulatory frameworks for the operation of such schemes have not been developed, and this has led to some problems. According to reports, Indian government is proposing to lease out degraded lands within 100 miles of production facilities to boost resources.

The final paper quality determines the raw material choice. Absence of sound raw material base prevents mills from growing in size to achieve economies of scale. Many industries use various species of hard wood as raw material due to limited availability. Raw material constitutes 40 to 50 percent of variable cost and it is one of the highest percentage of variable cost in the world (FAO advisory committee on pulp and wood products, 2006, p.22). India needs to resolve these issues effectively through industrial plantation policies to become a global player in paper making.

3. HINDUSTAN PAPER CORPORATION LIMITED (HPC) AND SUPPLY MANAGEMENT OF CACHAR PAPER MILL (CPM)

In the following sections the profile of HPC and its vision etc. are described. Later on the infrastructure, logistic problems and location problems are addressed and procurement procedure followed by CPM is described to better understand the situation. Apart from that impact of recycling and farm forestry etc. are described at the end of this chapter.

3.1 Profile of Hindustan Paper Corporation Limited (HPC)

Hindustan Paper Corporation Limited (HPC) is an ISO 9000, ISO 14000 company of India. HPC was incorporated on May 29, 1970 when the country was plagued by a pervasive paper famine which did affect the supply of quality text books and other commonly used products for the education sector. HPC, a wholly owned government of India enterprise was thus the outcome of a genuine national concern for having paper in plenty, employing state-of-the-art production process know-how and utilising the forest based raw materials available in the North Eastern Region and Kerala (Executive diary, 2009). HPC is today synonymous with the quest for affordable quality paper, especially for mass consumption.

The HPC group has four paper mills, two of which are direct units and two are subsidiary units. HPC is the holding company of Hindustan Newsprint Limited (HNL) and Nagaland Pulp and Paper Company Limited (NPPC). Nagaon Paper Mill (NPM) and Cachar Paper Mill (CPM) function directly under HPC's control and their performance is reflected in HPC's operating result. Over a period of three decades HPC has built up a total capacity of about 320,000 tonnes per annum (TPA) of paper and newsprint. HPC is currently operating in three large integrated mills, two of which are in Assam namely, Nagaon Paper Mill at Jagiroad and Cachar Paper Mill at Panchgram. The other one is in Kerala through wholly owned subsidiary Hindustan Newsprint Limited (HNL) at Newsprint Nagar. Each has an installed capacity of 100,000 TPA of paper. NPM and CPM manufacture writing and printing paper, while newsprint is manufactured by HNL. Printing and writing paper is made primarily for the mass consumption segment from virgin fiber sourced from locally available bamboo. HNL produces newsprint, which is comparable in mechanical, optical, and surface properties to the best quality newsprint produced in developed countries. Two third of raw materials are used from virgin fibers sourced from locally available bamboo, reed, and plywood species like eucalyptus, casuarinas, acacia etc. in HNL (Executive diary, 2008). One-third of raw materials are recycled fibers from old magazines, old newspapers, and mixed office waste, indigenous and sometimes, imported in HNL.

The per capita consumption of paper in India is 7 Kg per annum against the World average of 54 Kg and Asian average of 28 Kg. The demand for paper is estimated to grow between 7% to 8% per annum. To meet the increasing demand, the paper industry is witnessing a major

capacity expansion and a shift towards production of high quality paper. The demand for paper is expected to grow by 1,000,000 MT by 2010 and another 500,000 MT by 2015 (www.hindpaper.in). The total paper production in India during 2007-08 was 8.5 million MT. The Eleventh Five Year Plan document has observed that despite the fact that India is self-sufficient in most forms of paper, the industry is affected by difficulties like high production cost, problems related to handling pollution, non-conforming quality standards and shortage of raw materials forcing their increased imports. Poor infrastructure is a major bottleneck for the Indian paper industry.

Imported pulp price is in the range of \$750 a tonne in the international market, up by about \$100 since April, 2007 and the prices are expected to increase further (www.hindpaper.in). However, the Union budget 2008-09 has provided some relief to the Indian paper industry. The reduction of excise duty from 12% to 8% is expected to spur the demand for paper. Budget allocation in education sector has been hiked by 20% from euro 4,461,538,461 to euro 5,230,769,230 (1 euro = 65 rupees approx.). The 'Sarva Siksha Abhiyaan' being implemented by the government to boost the literacy level in India will also increase the demand for paper.

The HPC group achieved the highest ever combined production output of 327,857 tonnes and sales volume of 329,335 tonnes and sales turnover euro 175,384,615 (1 euro = 65 rupees approx.), during 2007-08 exceeding the 100% capacity utilisation made for six times in a row. HPC units registered a 11% rise in profit before tax at euro 21,076,923 (1 euro = 65 rupees approx.). HNL recorded a profit before tax of euro 2,769,230 (1 euro = 65 rupees approx.) during financial year 2007-08. NPM has gone past the 100% capacity utilisation mark for 8th time in succession since its commissioning in October, 1985 with an all time high production out put of 115,125 tonnes during financial year 2007-08.

HPC has so far paid dividend and redeemed preference share for a cumulative quantum of euro 9,292,307 (1 euro = 65 rupees approx.) since it wiped out the accumulated losses which touched euro 120,769,230 (1 euro = 65 rupees approx.) on 31st March 1994, on the strength of uninterrupted net profit track record since financial year 1996-97 (Executive diary, 2009).

The future plans of HPC is to sustain as a leader in paper production and expand the market. HPC recognises that the demand for paper will swell in tandem with general economic upsurge. It is committed to pursue a path of 'gainful growth' marked by volume augmentation and value enhancement for capturing durable scale economies. It also strives for attaining sustainable competitiveness by ascending the 'value spiral' while upgrading plant and equipment and scaling up manufacturing capabilities. HPC has embarked upon major capital investment programmes. HPC units in Assam undertaking Modernisation and Technical Upgradation (MTUP) and HNL's Expansion-cum-diversification Project (EDP) seeking to add capacity for production of 170,000 TPA finer papers. It is striking to recontemporise the process technology and equipment into environment-friendly, energy-efficient and resource-conserving modes. HPC is also spearheading the Revival and Upgradation Scheme of the NPPC, Tuli, Nagaland which has remained inoperative since October 1992. The rehabilitation Scheme was sanctioned by BIFR in June, 2007 and the project will be completed by

September, 2009. HPC's endeavour has been to reduce carbon-dioxide emission by way of pursuing Clean Development Mechanism (CDM) projects out of which one of the project is in the advanced stage of registration with United Nations Framework Convention on Climate Change (UNFCCC) under Kyoto Protocol. As a part of its commitment to corporate social responsibility, HPC has been endeavouring to encourage entrepreneurship for incubating micro and small enterprises in the vicinity of the mills to enable them to become enduring supply chain partners on commercially sound and sustainable principles.

3.2 HPC's Mission, Vision and Objective (M.V.O.)

To become a major contributor to the cultural segment in the paper industry in terms of volume as well as quality, production standard, customer services, R&D and technology upgradation HPC has made the following mission, vision, and objective (www.hindpaper.in):

- To ensure optimum utilization of existing assets to generate maximum internal resources for renovation, growth and expansion.
- To generate professional management culture consistent with the requirement of the industry to attract, develop and retain committed and skilled workforce with emphasis on trust and teamwork.
- To preserve the ecological balance and explore eco-friendly production process to strike a harmonious relationship between nature and industry.
- To explore and implement technological upgradation of the existing equipment for improved quality, increased productivity and greater cost effectiveness.
- To enlarge market channels for perennial supply of all variety of paper (like SS map litho, crème wove, copier etc.) and to ensure customer satisfaction through value addition and constant upgradation of quality.
- To increase utilization of unconventional raw materials and adopt recycling methods to reduce dependence on forest resources for maintaining ecological balance.
- To provide adequate thrust on product diversification and manufacture value-added items like computer stationery, copier paper, SS map litho, etc. and create brand equity for higher profitability and greater market share.

3.3 Cachar Paper Mill (CPM) as a unit

Cachar Paper Mill is situated by the side of the Barak river in the Hailakandi district of Assam on the National Highway No. 57. The mill is located at a distance of 25 km from Silchar. The nearest airport is Silchar airport. The Panchgram railway station of NF Railway is situated

close to the Mill. Cachar Paper Mill (CPM) is the only major industrial undertaking in south Assam and the adjoining states of Mizoram, Meghalaya and Tripura. Despite lack of infrastructural facilities in this remote location, CPM has had a continuous record of steady improvement. During the year 2006-07, the mill recorded the highest annual production of 103,155 MT registering over 103% capacity utilization (www.hindpaper.in). Annual capacity of the mill is 100,000 MT and major raw material for fiber is bamboo. The products are writing and printing papers and newsprint. The demand of paper produced in CPM is high in the mass market. High quality paper like copier paper is also produced here. But in this segment there is stiff competition from private players. The sales figure given in the table below shows the market demand.

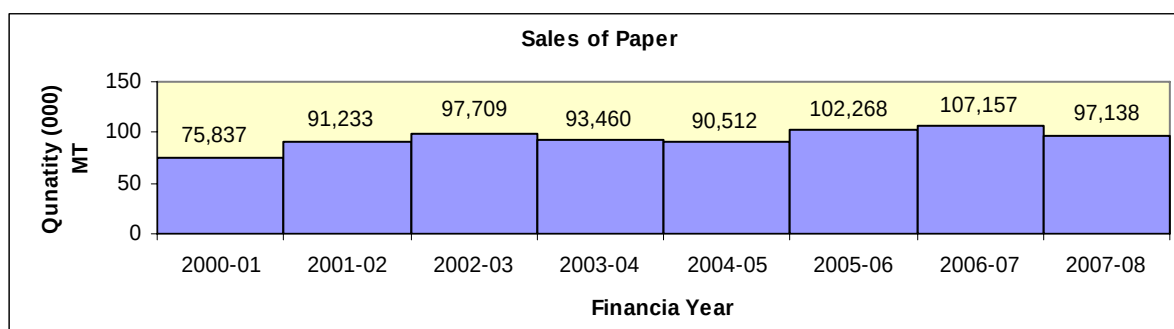
Table 3.1: Annual sales of CPM in 2000-01 to 2007-08

Financial Year	Sales in MT
2000-01	75,837
2001-02	91,233
2002-03	97,709
2003-04	93,460
2004-05	90,512
2005-06	102,268
2006-07	107,157
2007-08	97,138

Source: Chairman's Massage, 2008.

From the above figure 3.1 it is observed that the sales of CPM paper has been increasing throughout the years. The sales figure was highest during the financial year 2006-07. It can be visualised at a glance from the graph drawn below.

Figure 3.1: Annual sales of CPM in 2000-01 to 2007-08



Source: Table 3.1.

The performance of CPM has been improving in the last few years. This can be understood from the financial figures given below.

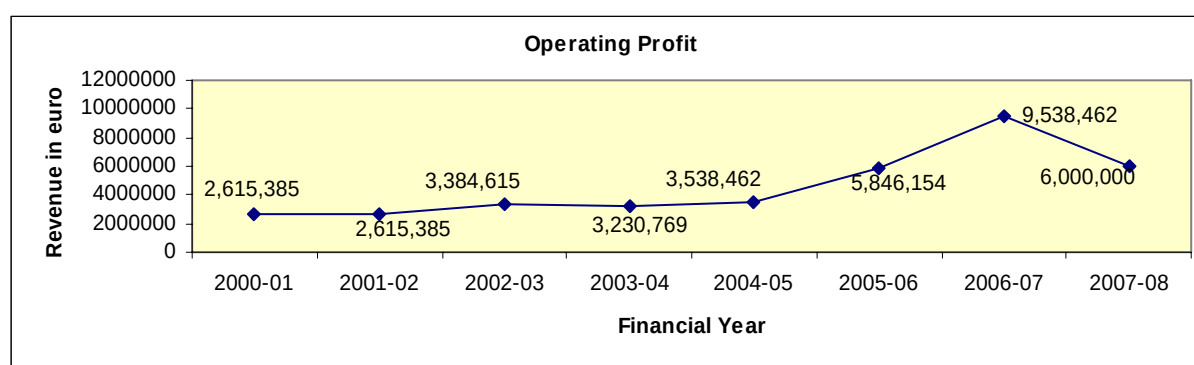
Table 3.2: Annual operating profit of CPM in 2000-01 to 2007-08

Financial Year	Operating Profit (euro) (1 euro = 65 rupees approx.)
2000-01	2,615,385
2001-02	2,615,385
2002-03	3,384,615
2003-04	3,230,769
2004-05	3,538,462
2005-06	5,846,154
2006-07	9,538,462
2007-08	6,000,000

Source: Chairman's Message, 2008.

From the table 3.1 it is seen that the operating profit of CPM was increasing through out the years. It was at maximum during the year 2006-07. The representation of the trend can be viewed as given below.

Figure 3.2: Annual operating profit of CPM in 2000-01 to 2007-08



Source: Table 3.2.

From the figure 3.2 it is observed that from 2000-01 till 2006-07 the operating profit of CPM was steadily increasing. But during 2007-08 the operating profit fell as compared to 2006-07 financial year.

3.4 The system of procurement of raw material from tendering to receipt of material

Sustainable development in all respect of management functions covering communication, collaboration, integration, mediations etc. can be effectively performed through various organizational arrangements and procedures (Pandey, Prakash, Pandey, 2007, p.4). To know the procurement process of the raw material bamboo and coal etc. one has to go through the technicality of placing an indent to order finalization. The various steps involved in raising an indent to actual receipt of material is a long process. One has to plan atleast a year in advance

for material requirement so that the material is available on time. The procurement manual of HPC gives the guidelines of the procurement process of HPC.

The primary objective of the manual are (Purchase manual, HPC):

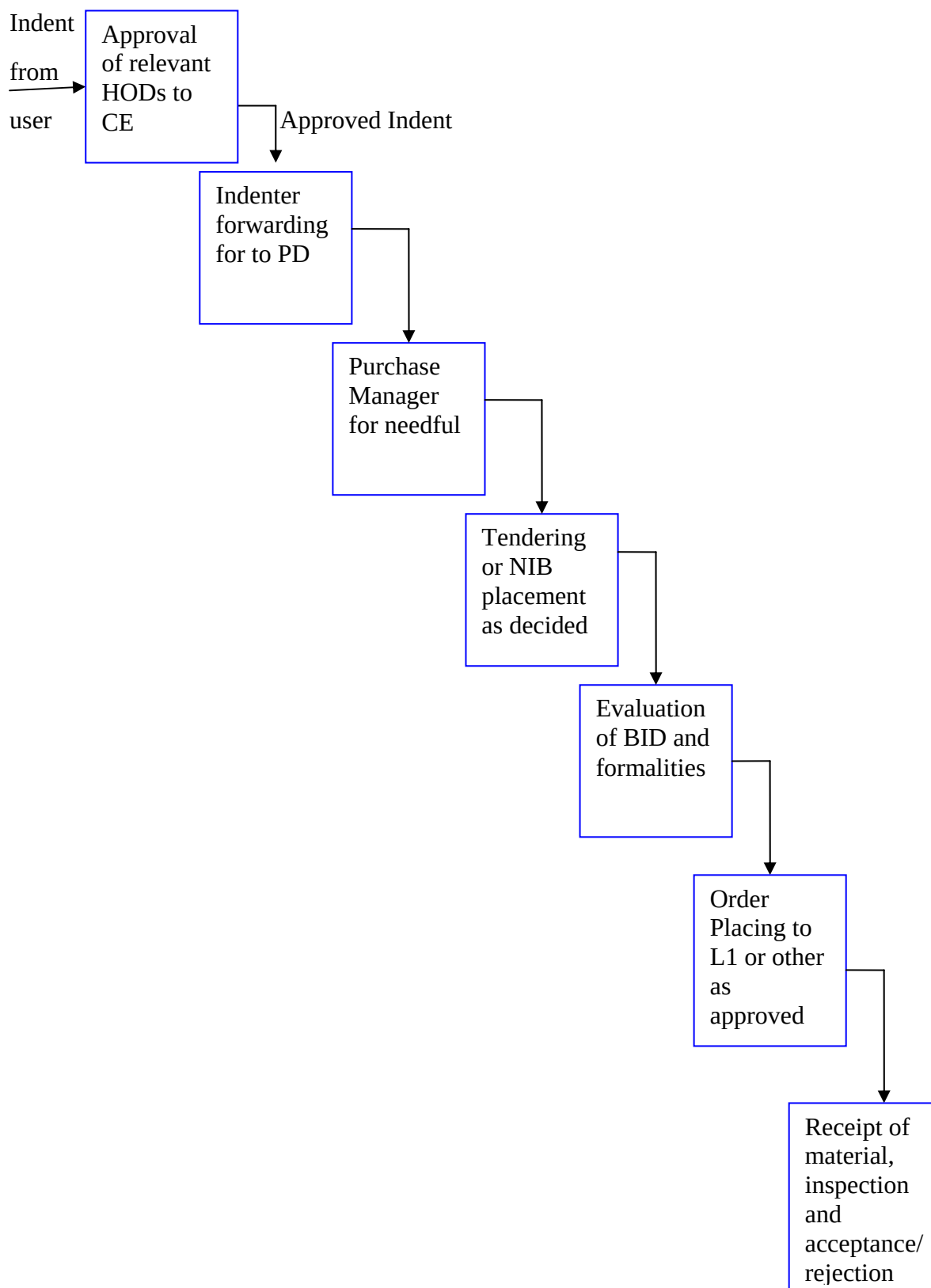
- To provide procedure with clarity and without ambiguity, to the extent possible, to be followed by the fluctuations of Commercial/Forestry/EMCC departments of HPC mills, subsidiaries and officers for enabling them to achieve economy in procurement.
- To ensure that guidelines issued by HPC management, controlling ministry, Central Vigilance Commission and other government authorities from time to time, are followed in letter and spirit. In addition it also facilitates procurement without prejudice, seeking to obtain maximum ultimate value for each rupee (Indian currency) of expenditure for enabling them to achieve economy in procurement.
- To provide guidelines in performing procurement functions for materials, services/job contracts. To follow best business practices, considering first the total interest of the organization in all transactions.
- To define procurement functions and various activities involved in arranging supply of inputs, consumables, plant and machinery, spares and jobs/services of right quality, in the right quantity, at the right prices and from the right sources on sustained basis required for uninterrupted operation and production in the mills etc.

Although there are many instructions given in the manual for procurement of various materials from raw materials, to spare parts of equipments, some instructions are to be followed strictly. Unlike private sectors, where procurement of material can sometimes be done bypassing the normal procedure, in public sector it is not possible. The procurement process here is time consuming as many procedures are to be followed. The procedure for raising indent or indenting discipline as guided by the purchase manual of HPC, is as follows:

- Indents for procurement of materials are raised by the user/consuming department or designated cells (Inventory Control Cell or EMCC) in the prescribed format indicating the budget approval.
- Indents are to be serially numbered indicating the financial year to facilitate easy traceability and cross reference. All the columns of indent are to be filled indicating the past year's consumption, stock available with indenter/stores and probable/recommended sources, quantity required, shelf life of item indented if applicable and time period by which the delivery is desired and so on.
- For regular production inputs formal indent should be raised and procurement may be initiated considering the annual requirement of particular input as per consumption norms and production target during the financial year and as per MOFAP.
- While indenting for any equipment/capital equipment, it should be ensured that equipment conforms to the latest specifications and technology available in the market to take care of the factor of obsolescence etc.

The general steps in raising an indent in CPM are as follows:

Figure 3.3: General steps of raising an indent to receipt of material



Source: own.

While an indent is raised by any user department, the steps normally followed are depicted in figure 3.3 above. First the indent is approved by head of section and then it goes to head of the department. After approval by departmental head it is to be approved by General Manager (Works), if the value of the indent is high above a specific limit as per purchase manual. After approval from General Manager (Works) it is to be approved by Finance Department. Finance Department checks the budget provisions and financial allocation for the specific material. If everything is correct finance manager or head of the department approves the indent. Finally it is to be approved by Chief executive/Executive Director of the mill. And for bulk purchases it is further to be approved by Director Operation stationed in CHQ, Kolkata. After approval of the indent the approved indent is forwarded to Purchase Department for procurement activity. There are various processes that the Purchase Department can follow in inviting a bid. In the following section the specific modes of tendering as followed by HPC are described in brief.

Tendering is the most widely accepted and practised tool for arriving at a most competitive or lowest or right price for any material or service/job. But, at times this tool also may fail in arriving at the right price for the material or service/job owing to comparable or unequivalent functional values. The following modes of tendering are being followed by HPC at present:

1. Limited notice inviting bid (LNIB);
2. Open NIB (ONIB, through press and website);
3. Global NIB (GNIB, through press and website);
4. Single NIB for proprietary items/spares;
5. Short NIB/Spot NIB;

Only two of the above processes namely open NIB and short NIB/spot NIB procedure are described below. These have been selected for detailed description as they are closely associated with supply mangement of raw materials.

Open NIB: Primary objective of open NIB (press/web) is to generate adequate competition from wider vendor-base and not merely to meet the procedural/mandatory requirement above certain financial value. Bid documents are to be sent in advance to all known/prospective source by UCP/hand/fax/courier/email recording particulars of despatch/transmission in the file. Open NIB through press and website should be floated for any material with estimated value per indent above euro 38,641 (1 euro = 65 rupees approx.). All the open NIBs shall be in two part system (Part I: Techno-commercial Bid and Part II: Price Bid). The news papers in which open NIBs are published shall be decided by Commercial Department. Even if estimated value of an indent is less than euro 38,641 (1 euro = 65 rupees approx.) or less, open NIB may be resorted to in case adequate number of registered/enlisted sources are not there for a particular item.

Short NIB or spot NIB: Short or spot NIBs are floated through advertisement in the notice boards or through advertisement in local daily newspapers or collection of offers by spot

purchase committee comprises of representatives of finance, commercial and user departments with the approval of CE/ED in the mills or D(O) at CHQ.

Before inviting open bids, Commercial, Forestry Department or Contract Cell should determine/record the pre-qualification (PQ) criteria of the bidder which may include:

- Required experience and past performance in similar type of supply;
- In case of bulk inputs, minimum quantity to be offered by any bidder for consideration should be fixed at 10% to 20% of total NIB quantity;
- Financial position/soundness;
- Earnest money/security deposit in the form of Bank Draft/Bank Guarantee (along with validity period) and so on;

After the completion of inviting tender, the evaluation of bid follows. The Commercial /Contract Cell determines/records relevant factors in addition to the price to be considered in bid evaluation and the manner in which they will be applied for the purpose of determining the Lowest Evaluated Bid. These factors other than the price, are to be used for determining the lowest determinable bidder. The bidder is given relative weightage in the evaluation provisions in the bid document. In the bid document under general terms and conditions, it should be clearly specified that order on one or more than one parties is to be placed on the basis of L1 bid and, if required, negotiations will be held with L1 bidder only. However, all the bidders may be required to explain/justify his/her quoted price as and when asked for. There should be a stipulation in the bid documents under general terms and conditions that if a bidder quotes unworkable rates and is considered for placement of order, the party may be asked to justify his quoted price. Also he/she has to furnish performance guarantee bond (in addition to the security deposit) in the form of bank draft/bank guarantee. Earnest Money Deposit (EMD) is aimed at protecting the organization against irresponsible, non-serious frivolous bidders. But it should not be so high as to discourage bidders. The amount of EMD is to be specified in the bid document. For bulk production materials/major inputs EMD is stipulated as given below. In case of procurement of bamboo by mill Forest departments, presently EMD about euro 0.30 per MT of offered quantity is followed. In case of coal from Meghalaya, EMD of euro 7692 is followed.

If the order is to be placed on more than one bidder as specified in the indent/bid document and the L1 price is within the approved estimates, then other techno-commercially acceptable bidders are asked to confirm acceptance of L1 rate for allocation of the item to be ordered. The splitting of orders are considered desirable for major/vital inputs where dependence on single or few parties is considered unsafe or unwise. In case approval is to be taken from the competent authority, purchase committee is to give sufficient reasons for seeking the same. However capability, capacity, quantity offered and past performance has to be kept in view for allocation of quantity to multiple sources. The negotiations and decisions for placement of order must be completed within validity period of the offers. Whenever necessary the validity period should be extended by the parties concerned.

Presently HPC follows various types of purchase order for procuring materials. The types of orders followed by HPC are given below:

- Regular purchase order;
- Trial/development order;
- Repeat order;
- Import substitute order;
- Proprietary item order;
- Rate contract order;
- Petty purchase requisition;
- Gate purchase;

The definitions of some of the above processes are given below. For procurement of raw material and other spare parts these are important. Also the various processes give the different ways in which to act in different circumstances. For example, in a critical situation of non availability of raw material like bamboo what alternatives are available other than normal purchase procedures.

Regular purchase order: Regular purchase order would be a normal purchase order issued based on the technically acceptable lowest price basis.

Trial purchase/work orders: The total quantity to be ordered on trial basis on new/untried parties should be determined at the time of proposal for finalization of regular orders. If the L1 bidder(s) happen(s) to be new, it would be risky to place bulk orders on such bidder(s). So in such cases trial orders should be placed. Trial orders are also placed on potential sources for development. The total quantity to be ordered under the trial order shall also be specified and approved by the competent authority. Trial orders' value should not be more than euro 7,692. However, on successful completion of quantity ordered in view of delivery schedule and quality the vendor can be adjudged for regular orders with the recommendation of Purchase Committee and sanction of Competent Authority in the mills/CHQ. With regard to trial order of bulk inputs for the purpose of exploring in the new supply sources a maximum of 20% of the total requirement for such bulk inputs can be kept for the development /exploration of new parties. In the case of unsuccessful supplies of the trial order, the required quantity will be offloaded to regular suppliers.

Repeat orders: Repeat orders are to be placed within a period not exceeding one year for a quantity not exceeding original order quantity provided there is no downward trend in the market price of the particular item(s). Repeat orders would be on the same rate, terms & conditions.

Rate contract: Rate contracts may be firmed up on annual or biennial basis or any period considered appropriate depending upon seasonal nature of material/periodical price

fluctuations, availability and other peculiar characteristics of the item/volatile nature of market.

Petty purchase requisition (PPR): No purchase order is to be issued for petty purchases through PPR for value greater than or equal to euro 31 per PPR. Payment is to be made on certification of bill/expenditure satisfying reasonableness of price considering LPP, MRP, list price, market information etc.

Gate purchase: For gate purchase of raw material like bamboo and bulk inputs like coal etc, Gate Purchase Scheme (GPS) is continued, to supplement the procurement through regular POs/RCs. Rates for procurement of such material under Gate Purchase Scheme are usually fixed lower as compared to those against regular POs/RCs for the same item. This is done as there would be no commitment for quantity and no provision of EMDs/SDs and payment terms are more liberal.

1. Gate purchase for bamboo: Gate Purchase Scheme (GPS) for bamboo has been introduced to tap smaller sources and to encourage petty farmers, growers, who can supply small piecemeal quantities and cannot compete in usual tenders. The scheme supports the foresters who have taken seedlings under Social Forestry Scheme. However, price fixation, mode of payment and other terms are to be firmed up transparently with the recommendation of Tender Committee and approval of CE/ED of the mills. Prices fixed for bamboo under GPS are reviewed on yearly basis or as and when considered necessary.

2. Gate purchase for other input such as coal etc.: Gate Purchase Scheme for other bulk inputs like coal etc. is introduced as and when required. However, price fixation, mode of payment and other terms are firmed up transparently with the recommendation of Tender Committee and approval of CE/ED of the mills.

Very often the mills face problem in procurement of adequate quantity of raw materials like bamboo, coal etc. against published tenders in view of the prevailing local disadvantages. To ensure availability of such vital inputs to maintain uninterrupted production the following procedure are followed:

1. In case supply offer is less than 50% of the tendered quantity then the following procedures are adopted:

a. Offer can be given to the vendors who have been selected as per tender procedure, for supply of higher quantity (with concurrence of finance).

b. The tenderers who are not technically qualified against the tender should not be considered.

2. In case tender response is more than 50% and less than 80% of the quantity published in the tender the following procedure is adopted:

Additional quantity is ordered to the bidders who are willing to supply higher quantity as a repeat order. The repeat order is restricted upto 100% of the original order issued to the vendor(s) as a special case (with concurrence of finance). Or purchase is made at L1 price

from the vendors who had not originally quoted in the tender but are ready/offer to supply (with concurrence of finance).

The Chief Executive of the mill can order for procurement of bamboo, coal etc. in extraordinary circumstances. This can be done for a requirement of upto one month production where there is no scope of repeat orders in any tender whatsoever. In cases where the same has been already exhausted or in a condition where there is no other alternative available, the Chief Executive may issue repeat orders with the concurrence of finance. The reasons are to be recorded and action should be taken for the tender to get supply of the material from available sources.

Another important factor in purchasing procedure is price negotiation. Price negotiation is held only with the L1 bidder, if considered necessary. Negotiation is a tool widely practised for arriving at a competitive price and to supplement the usual tendering process. However, the tool of negotiation should be used selectively. Imprudent and unimaginative application of this tool might send a wrong signal to the market resulting in cartel formation etc. by bidders defeating the very purpose of negotiation. If any material is to be sourced from more than one bidder and the L1 price of technically acceptable bid is within the approved range of estimated price, all other technically acceptable bidders are asked to confirm acceptance of L1 rate for apportioning of order. Number of bidders is pre-decided during proposal stage. Those who agree to supply at L1 price are considered for placement of orders. However when it is essential to procure any material, especially vital production inputs, from multiple sources it would be risky to depend on single or few source(s). Order(s) is to be considered on L2, L3... etc. bidders and efforts should be made to bring down the prices to the L1 level. If in the event, L2, L3 etc. bidders do not agree to supply at L1 price, negotiations with such bidders may be conducted with the approval of competent authority to bring down the prices to a level as close as possible to L1.

Financial Concurrence (FC) shall precede all approvals for placement of orders. Availability of budget provision is the pre-requisite for all concurrence as well as approvals. The objective of empowerment/delegation is to facilitate faster administration and execution.

For procurement of materials normally tender committee is formed in HPC as per guidelines of purchase manual. Tender committees are constituted as per the following procedure, for Individual units:

- a. 1st tier tender committee which comprises of HOSs (Head of Sections) of Commercial /Forestry/EMCC/CC, Indenting/User/Consuming Department and Finance Department.
- b. 2nd tier tender committee comprises of HODs (Head of Department) Commercial /Forestry Department, Indenting/Consuming Department and Finance Department and GM(W). The tender committee acts as permanent committee.

The main functions and roles of tender committee are to ensure procurement of right material etc. at most competitive price ensuring best ultimate value for expenditure complying with the laid down procedure transparently. Another important role is to ensure adherence to all

relevant guidelines issued by DPE, administrative Ministry, CVC while undertaking procurement of goods etc.

If any supplier is not fulfilling the supply terms then cancellation of order cannot be done at will. There is a laid down procedure which is to be followed in cancelling an order. Also the supplier can approach the court of justice for reviewing of the decision. The process can thus get delayed even though the supplier is a non-performer. When it is intended to cancel any purchase order which has been kept alive after expiry of delivery period by the conduct of vendors, it is necessary to issue a notice to the vendor concerned. This is done before actual cancellation giving a period of 15 days or such period considered reasonable for completion of supply, without prejudice to purchaser's other rights to recover LD as per terms of the order. Where the order is kept alive beyond delivery period, cancellation is issued by the Commercial Department/Contract Cell immediately after expiry of the delivery period stating that quantities incomplete on the due date are cancelled. Risk purchase is made in terms of the relevant article and the conditions of the order. Risk purchase is not applied only in case of failure, but is applied owing to Force Majeure conditions. Whenever necessary, the Legal Department is also consulted to protect the interest of the mill.

Hence purchasing process in CPM has to follow many procedures and further details are given in appendix. Although ERP implementation has reduced the time required in internal processing of indent, but external communication is still done through traditional ways. ERP should be extended to suppliers as well to reduce external processing time of indent. The purchasing process is used to identify user requirements, evaluate the need effectively and efficiently, identify suppliers, ensure payments, ascertain that need is effectively met, and drive continuous improvement. Purchasing must be responsive to the materials and must support needs of the user departments. There are many technical aspects which are to be followed in the whole process starting from raising of an indent to the receipt of material. For award of any contract L1 bidder is most important for supply of any material like bamboo, coal, etc. in CPM. Also due to importance of the input material multi-party indents are raised for such material to have continuous flow of material. The objective of purchasing process can be summarised as:

1. To select suppliers that meet purchase and performance requirements;
2. To purchase materials and services that comply with specified quality standards;
3. To promote buyer-seller relations and to encourage supplier contribution;
4. To treat all suppliers fairly and ethically;
5. To work closely with other departments;
6. To support all corporate objectives and policies;

The buyer seller relation is another important part of purchasing process and is essential for economic success of both the involved parties. Those suppliers who work to improve quality, delivery, cost, or other performance criteria should be supported and developed for a better

future of CPM. Also purchasing involves negotiating agreements or contracts with the suppliers. Negotiation is an ideal way to implement the supply management strategies and plans that a business unit develops. After identifying a potential supplier through competitive bidding, the buyer may need to negotiate with preferred supplier to resolve price as well as non-price issues affecting the sourcing agreement. CPM should evaluate suppliers' performance which is important to measure, manage and analyse performance of its supplier base. The supplier measurement is a critical part of sourcing process. Also the payment should be prompt after acceptance of material to encourage supply activity. CPM should implement open communication channel with supplier and they should be given chance to submit innovative ideas with joint sharing of benefit. But at the same time the organization must be cautious about liabilities associated with accepting and using ideas provided by supplier's own interest in doing business.

3.5 Issues of logistics and infrastructure in the procurement of raw material

The location of the mills of HPC is in Assam, a part of Northeast India. North Eastern India, is referred to commonly as Seven Sister States, a symbol of its relative isolation from the rest of India. It comprises of the states of Arunachal Pradesh, Assam, Meghalaya, Manipur, Mizoram, Nagaland, and Tripura. The population of the region was 39 million in 2001, which was about 3.8 percent of India's total (Zadeng, 2008, P.5). The world may be becoming more interconnected in terms of technology and economic interdependence, but the core issues that can divide people and nations have not been abated. There are striking disparities across the states and regions, with some poorer states trapped in flat or negative growth in GDP per capita and less developed in infrastructure in India. In developing economies infrastructure is weaker and possesses several newer type of challenges. It may even cause successfully tested strategies to fail (Swaminathan, 2006, P.137). The North East region (NER) is lagging behind in progress as compared to other industrial states of India in development and infrastructure. The mills are located in Assam and are also facing logistic problems particularly related to transportation. CPM is the worst affected of the two units. The dilapidated road conditions have adversely affected transportation of raw material i.e. inputs. CPM is still connected by a 105 year old meter gauge rail network from Lumding to rest of India. During monsoons, natural calamities like landslides are common and the rail and road networks are disrupted for days together. Due to the old meter gauge line the railway network comes across frequent breakdowns. This happens some times due to technical faults and sometimes due to increasing insurgency activities. When there is any disruption the railway department gives preference to PDS supplies through the route connected to CPM. Then the wagons for carrying raw material to CPM are temporarily withdrawn. The meter gauge line is being converted to broad gauge line. The project has been going on for the last 10 years under NF Railway. Due to various reasons better known to the NF Railways, the progress is very slow and still completion target has been fixed at 2012 by Railway Ministry, government of India. The

Vision 2020 document on 'Peace, Progress, and Prosperity in the North Eastern Region' prepared by the National Institute of Public Finance and Policy under the auspices of the North Eastern Council (NEC) puts forth a strategy for inclusive development in NER.

Bamboo is collected by various contractors from reserve forest areas of respective state governments or lease lands. To add to the woes of the suppliers the road from the jungle to the main road is also to be constructed by them at times. And due to road conditions and railway's own preference it is a difficult job on CPM's part to maintain smooth flow of raw materials.

Supply of coal is also facing similar transportation problems as only one road connects Meghalaya with Barak Valley of Assam where the mill is situated. The hilly road is also faced by landslides, particularly during monsoon. In one particular place namely Sonapur almost every year landslide occurs disrupting the smooth flow of coal. Also transportation from other part is costly and have similar logistic problems. Only one railway line and one National Highway (NH) is connected to Barak Valley from the rest of India apart from air service, making CPM dependent on many external factors.

The cabinet committee on economic affairs in New Delhi has proposed an alternative road from Guwahati to Silchar. This will add as an alternative road of the current National Highway (NH) 44. The Prime Minister of India is also concerned with the problems associated with frequent landslides in NH 44 leading to disruption of communication in the region, including south Assam, Tripura, Mizoram and western part of Manipur, during monsoon in particular. The proposed road will be through Assam's NC Hills district. The new road would help lessen the distance between Silchar and Guwahati. There would be a few terrains throughout the proposed stretch. Therefore fear of landslides and allied possibilities of disruption would be minimised. It would help to maintain the region's connectivity with the rest of the country in an uninterrupted fashion throughout the year. The meeting gave financial approval for construction of a total of 994-km new stretch of national highway for the North East as per news report (United News of India, October 2, 2007). This includes the Guwahati-Silchar alternative road, a new 40-km road from Jiribam to Badarpur, in parallel with NH 53, another 40-km road from Silchar to Lala in parallel with NH 54 which are in the proximity of CPM. When all these roads will be completed the road transport in the vicinity of the mill from various bamboo sources will be easier.

Though the North Eastern region faces some socio-economic problems, it is considered as a high growth region. There are various investment opportunities in the state. As per the 'North Eastern Industrial and Investment Promotion Policy (NEIIPP) – 2007' by Ministry of Commerce and Industry, the whole of 'North Eastern' region has been declared as SEZ (Special Economic Zone). This region is believed to be rich in various minerals such as natural gas, oil, coal etc. The exploration of these minerals has not taken a boost because of the lack of infrastructure. With an improvement in the infrastructure facilities, exploration of ores and minerals is also expected to take place at a mammoth scale. The central government has provided various incentives towards the investment in the North Eastern region of India.

The various schemes for attracting the investments are as under (Executive summary, Investment potential in Northeastern States of India, p.18):

- Central Transport Subsidy of 90% of transport cost of raw material brought from outside the North Eastern region as well as the finished goods sent from the North Eastern region to other parts of the country is given. The transport cost between Siliguri (the entry point to the North East) and the factory site only is considered for subsidy calculations.
- In addition, subsidy is also available of 90% of transport cost on movement of raw materials and of 50% of transport cost on movement of finished goods from one state to another within the North Eastern region.
- Growth Centres & IIDCs (Industrial Infrastructure Development Centres) are to be converted into total tax free zones for next 10 years. All industrial activity in these zones would be free from income tax, excise, for a period of 10 years from the commencement of production. Similar benefits will also be provided to units located outside the specified locations, if they belong to the specified industries listed in Annex A of the GOI circular.
- Capital Investment Subsidy (CIS) of 15% of investment in plant and machinery, subject to a maximum ceiling of euro 46,158 (1 euro = 65 rupees approx.) would be given. Eligibility conditions will be same as in case of tax benefits.

3.6 The issues of supply of critical raw material particularly bamboo and coal in CPM

Procurement of raw materials, particularly bamboo, for production of paper is vital. Coal is another important raw material used in the captive power plant for providing steam and electricity. In the following section each of these two raw material's procurement problems are described.

3.6.1 Bamboo crisis

HPC's units in the North East region were conceived with the expectation that the locational disadvantages and infrastructural inadequacies would be neutralized by the advantage of abundant and cheap cellulosic fiber raw material in the form of bamboo. Prior to commencement of mill operation, long term agreements were drawn with North Cachar Hills Autonomous Council (NCHAC) and Karbi Anglong Autonomous Council (KAAC) for supply of stipulated quantum of bamboo to Cachar Paper Mill (CPM) and Nagaon Paper Mill (NPM) respectively. CPM has been under pressure by NCHAC's blatant violation of commitments starting with leasing out HPC's lease areas to private parties. Then halting HPC's bamboo extraction operations on the pretext of violation of silvicultural rules. After prolonged negotiations NCHAC agreed to supply bamboo departmentally and a supplementary agreement was entered with NCHAC in October, 2006 for supply of bamboo

both by road and rail to the mills. But as yet, NCHAC has not supplied any bamboo by road to CPM. Further, the supply by rail has been much below the committed quantity. This can be attributed to collapse of railway bridge, diversion of rail wagons for PDS supplies and increasing insurgency in various occasions. N F Railways was forced to withdraw workmen and their families from 27 railway stations in the Badarpur-Lumding hill section in the month of May 2008 after the brutal killing of railway personnels. Insurgency threats have become a misery for the local tribal population of Karbi Anglong areas who were dependant on bamboo extraction activities for their livelihood and for their major avenue of income generation. The progression continues for the fourth year in a row despite HPC's all-out efforts to resolve this hindrance. The lowering down of supplies from these major sources has led to procurement of bamboo from far flung areas which has resulted in a whopping increase in the landed cost of raw material thereby eliminating the only major advantage of the mills of that location.

The area around the mill i.e. around Barak Valley (BV), as well as other major sources of bamboo for CPM like Mizoram, Tripura and Manipur are characterized by dense bamboo forests of 'Muli' (*Melocanna baccifera*) species. The bamboo of these regions had started flowering about a year back or so. Bamboos, unlike other plants, flower only once in its life time and thereafter dies after the growth of a seedling. The flowering can be random wherein some bamboo culms flower at various areas or there is gregarious flowering. In which cases large stretches of bamboo of same species flower together. The gregarious flowering of Muli bamboo which started in 2005 in the NE region has led to the death of large regions of bamboo forests especially in the state of Mizoram, which is one of the major sources of bamboo for CPM. The affected areas will naturally regenerate only after a period of 4 to 6 years. Since bamboo is anemophilous- wind pollinated, it must have many flowers at anthesis at the same time for successful spread of the pollen (www.hindpaper.in). The most likely reason as to why bamboos die after flowering is that the seedlings would receive the water, nutrients, room and sunshine that would otherwise be used by the mother. The seedlings are manured by the debris of the dying parent. The mechanism for the timing of flowering and dying is a phenomenon not yet understood.

From the month of September 2007 Cachar Paper Mill has been facing shortage of Bamboo and production has been affected very much. In the year 2007-08, CPM could produce only 96,621 MT of paper against the capacity of 100,000 MT because of the reasons stated above. The problem shooted up and CPM could produce only 65,012 MT in the year ending 31 March 2009.

The main sources of bamboo supply for CPM are North Cachar Hills, Mizoram, Tripura, Barak Valley and Meghalaya. The main reasons for shortage of bamboo from these sources are listed below.

- In earlier years CPM used to get sufficient bamboo from Mizoram and Tripura and also some amount from NC Hills. A major percentage of available bamboo in the forests of Mizoram and Tripura died because of the phenomena called Bamboo Flowering which happens nearly once in 50 years. To get back to its original form a great amount of

regeneration should take place. It is expected that by the year 2011 the regeneration will take place and bamboo supply will be normalized.

- In Tripura, the State Government has restricted cutting of bamboo as it has not reached sufficient maturity after regeneration. Hence flow of bamboo got affected from these areas.
- HPC was having some leased land in NC Hills where from CPM used to get bamboo. But the lease got cancelled for the above mentioned reason and the agency who was supplying bamboo also could not supply according to the demand.
- HPC had also arranged a new contract with NC Hill Autonomous Council in the month of November 2008, so that around 15,000 MT of bamboo via rail and 10,000 MT via road would be supplied per month to CPM.
- Since the road condition from NC Hills is not allowing transportation of more than 1500 MT of bamboo via road, the flow as expected has not increased.
- Railway also could not provide sufficient wagons for the movement of bamboo from NC Hills to supply 15,000 MT per month as expected. However from the month of January 2009 to March 2009 railway could provide around 40 wagons in total, Hence CPM could get around 20,000 MT bamboo via rail from NC Hills.
- Quite a lot of bamboo was brought via the river from Mizoram hills, but due to lack of rain mainly in winter which is the prime season for collection of bamboo and as the level of water was low, the route could not be exploited effectively.

The reasons behind railways not being able to supply the required number of wagons are:

- Due to cancellation of train services from May 2008 to November 2008, railway could not provide the wagons.
- Night running of trains was suspended upto first week of January because of the law and order problems in the NC Hills. From January 2009 only one train was allowed to ply at night with security.
- Railway drivers demanded bullet proof engines for the hill section due to law and order problems. Hence railway had to convert 16 engines to bullet proof engines stage by stage. By February 2009 they converted 16 engines to bullet proof engines.
- Because of the pressure from the state government of Mizoram and Tripura, railway had to give preference to the food grains and POL above bamboo through the same route.
- Only with 5 trains including one passenger train at one direction during day time, railways could not even fulfill the target of food grains and so could not provide wagon for other service.
- Shortage of wagons fitted with EC couplings (Enhanced Capacity coupling) with NF Railway for operation in hill sections lead to its shortage for the free movement of goods. Only EC wagons are allowed in hill sections so the problem continues.

All the above problems had a negative effect in transportation of bamboo as per target to CPM. From the first week of March 2009 some non EC wagons have been sanctioned for transportation of bamboo and the flow increased only marginally. To meet the crisis of raw materials, CPM procured 535 MT of bleached pulp from Andhra Pradesh Paper Mills with a landed cost of euro 508 per MT (1 euro = 65 rupees approx.) and the same was used in the last week of March 2009 to continue the production in the financial year end.

The prevailing scenario of supply of bamboo to CPM can be understood from the data available in the tables (table 3.4, 3.5, onwards till 3.8). In these tables some of the supply contract with CPM are cited. The tables given below show the deficiency in supply of bamboo as opposed to the demand at the various supply sectors.

N C Hills (lease) bamboo supply through rail is given in table 3.4. From the table it is seen that the supply of bamboo is poor from the source. The contract is given for supplying 100,000 MT and only 14,318 MT was supplied till June 2009.

Table 3.4: N C Hills (lease) bamboo 2008-09 new contract (1 euro = 65 rupees approx.)

Order quantity (2008-09) MTG	Price (euro) per MTG	Quantity supplied in MTG	Balance in MTG	Period of supply
100,000	26.92	14,318	85,682	Nov. 2008 to Oct. 2009

Source: CPM Forest Department, internal data.

The reasons for slow supply are due to the slow pace in which collection and sizing in railway station is done. It is also because of the present law and order situation of NC Hills. The insurgency problem has affected smooth supply of bamboo by rail. NCHAC has been asked to commence supply through other railway stations besides the existing Langting station. NF Railway has also restricted movement of all rails since 14.04.09.

Another source, Mizoram is also affected by bamboo flowering. And the available materials are also not being supplied by the contractor as required.

Table 3.5: Mizoram bamboo by road (2007-08-09)

Order quantity MTG	Price per MTG (euro)	Quantity supplied MTG	Balance MTG	Period of supply	Work order issued on
300,000	25.98	84,669	215,331	Oct. 2007 to Nov 2008	23.11.2007

Source: CPM Forest Department, internal data.

The above supplier of CPM had been issued termination letter on 9th April 2009 with fifteen days notice period. But the supplier has submitted a representation against the letter dated 9th April 2009 which is under study with Legal Department of CPM. So it can be observed that even though CPM wants to eliminate some inefficient supplier, due to various formalities to be followed in the system one can linger the process of action.

Tripura as a source of bamboo to CPM is also having problem in supplying adequate quantity as per the contract. The following table indicates the actual supply scenario.

Table 3.6: Tripura bamboo by road (2008-09)

Order quantity MTG	Mode of supply	Quantity supplied MTG	Balance MTG	Period of supply
25,000	road	10,755	14,255	July 2008 to July 2009

Source: CPM Forest Department, internal data.

Work order has been issued to five different suppliers for 5,000 MTG each. Supply has started, but not satisfactorily. From one of the forest reserve area named Kanchanpur, the District Forest Officer (DFO) has not given clearance for extraction of bamboo. From some other areas clearance has been received.

Another source of bamboo collection is Barak Valley (home grown). Here also serious lacking in actual supply has been observed. The supplier, although multi party, still the collection of bamboo is poor. The following table gives the figure of quantity ordered and actual supply of material.

Table 3.7: Barak Valley (home grown) bamboo 2008-09

Tendered quantity MTG	Work order issued MTG	Quantity supplied MTG	Balance quantity MTG	Procurement period
38,200	32,174	11,529	20,645	upto May 2009

Source: CPM Forest Department, internal data.

Work orders were issued with respect to 12 (twelve) parties for operating in 12 (twelve) different places called coupes. Supply is in progress. However due to gregarious flowering of the muli species bamboo in Barak Valley, which is the dominant species, procurement has been adversely affected. Material is not readily available in majority of the coupes due to new generation of bamboo.

The contract supply shown in the following table corresponds to Meghalaya which is another collection place of bamboo for CPM.

Table 3.8 Meghalaya bamboo (2008-09)

Quantity ordered MTG	Quantity supplied MTG	Balance MTG	Period of supply
10,000	3,836	6,164	Dec. 2008 to Sept. 2009

Source: CPM Forest Department, internal data.

The Forest Development Corporation of Meghalaya (FDCM) has been requested to extend their supply period, and this is under consideration. Although there is collection of bamboo here but the flow is not high due to reasons better known to FDCM.

From the above tables it can be concluded that there is serious lack in the supply of bamboo from the sources available for CPM. The main causes being nonavailability of mature bamboo due to flowering, insurgency problems in NC Hills which leads to disruption in transportation facilities and other related issues like fragile road conditions etc.

3.6.2 Coal supply issues

The coal source for CPM is mainly Meghalaya. Also coal is centrally procured by CHQ, Kolkata from Coal India Limited (CIL) for both the mills in Assam. North East Coalfields Limited (NECL), a subsidiary of CIL hiked coal prices by 15% during December, 2007 and subsequently 50% during March, 2008. The increased coal prices has been a setback. Consequent to this increase in price there has been a shift in demand and supply at Meghalaya, which is a prime source for CPM. Coal mining in Meghalaya being an unorganized sector, availability and prices vary widely on demand and supply basis. At present there is a steep increase in demand of coal from the Meghalaya belt. The result is that there has been an enormous increase in its price due to the high demand. The vendors are failing to supply on contract price basis as per HPC's terms of order. In order to contain production cost and stay in competition managing the ever-increasing energy cost has become a terrible challenge for energy intensive industries like paper.

The reasons for the shortage of coal in CPM may be cited as below:

- The Meghalaya coal owners are extracting less amount of coal to disbalance demand and supply and consequently to raise the price of coal;
- The Meghalaya coal owners are expanding market to other states of India with high rate per MT and reducing the coal supply to the CPM site due to lower rate contract price;
- Hike in the prices of NECL coal and also general transportation problem related to CPM;

Mining in Meghalaya started with Captain Lister, a British political agent, who first discovered coal in the Khasi hills in 1840. Coal mining has since continued in a fitful manner. But the recent steep hike in the demand and price of coal has spurred extraction

intolerably from 39,000 tonnes in 1970 to 1.7 million tonnes in 1989 (Shanker, 1994). An important factor affecting this runaway mining is that most of the coal land is in private hands. Coal mining is far more rewarding financially and less labour intensive than agriculture. For the landholders coal mining is an important economic activity and justifiable for them in terms of revenue and employment. Another factor which accelerated the extraction rate is market demand and a continuing hike in coal prices. Also, an often ignored factor that provides stimulus to more extraction is the Indian industry's dependence on coal for energy. Since coal is a non-renewable resource, the push to replace it with renewable energy sources has to come from technological development.

The Department of Coal is responsible for development and exploitation of coal and lignite reserves in India. Coal India Limited (CIL) is a public sector undertaking in India formed in 1975 (Annual Report, 2006-07, Ministry of Coal, government of India). It is the largest coal mining company in India and in the world. It is owned entirely by the union government, under the administrative control of the Ministry of Coal. It is involved in coal mining and production industry. CIL alone contributes to 84% of entire coal production of India and meets 46% of nation's primary energy demand. Under the Coal Mines (Nationalisation) Act, 1973 coal mining was mostly reserved for the public sector prior to that these were in private hands. Coal contributes to 55% of commercial energy in India annually compared to 27% world average. More than 65% electricity generation is coal based in India. CIL is supplying coal to its core sector consumers at a competitive price per energy unit of consumption. In 1993 Coal Mines (Nationalization) act was amended to allow private operators in captive mining. Under Coal Mines (Nationalization) Amendment Bill (Colliery Control Order 2000) pricing and distribution were fully deregulated. The coal in India is high in ash content and low in calorific value. India has low reserve of coking coal. Transportation cost accounts for 44% on an average due to consumption point and deposit mismatch. Working group on coal (WG) has detailed demand/production scenario upto the terminal year of 12th five year plan of India as:

- For 2011-12 the projected demand is 731 million tonnes that is expected to rise to 1125 million tonnes in 2016-17;
- All India production during 2011-12 and 2016-17 is expected to be 680 million tonnes and 1055 million tonnes, leaving a gap of 51 and 70 million tonnes respectively;

The North Eastern Coalfields Limited (NECL), with its headquarters at Margherita, is a unit directly controlled by CIL and is responsible for development and production of coal in the North Eastern region (Annual Report, 2006-07, Ministry of Coal, Government of India). Even though active coal mining is confined presently within the state of Assam, the coal reserves of Arunachal Pradesh, Meghalaya and Nagaland are planned to be exploited in future for the proposed supply to the coal liquefaction project being jointly explored by the task force comprising of Oil India Limited and Coal India Limited. In the North Eastern region, there are

coalfields in the states of Assam, Arunachal Pradesh, Meghalaya and Nagaland. However, CIL has its mining activities mainly in Makum coalfield of Assam. Production in NECL, had depleted gradually from 1.201 million tonnes in 1993-94 to 0.628 million tonnes in 2004-05. It had again started improving from 2005-06 onwards. The production during 2005-06 was 1.101 million tonnes. Market of NECL has been improving constantly from 1973-74 till 1995-96. Thereafter, it declined till 2004-05. There has again been improvement from 2005-06 onward. There are hardly any linked consumers for NECL coal in non-core sector. Apart from some tea gardens, bricks & small coke plants of the region, BRK industries of Punjab & Haryana are other big consumers outside the region who have been presently taking coal through e-marketing. NER has no major coal-based Industry excepting Hindustan Paper Corporation's Jagiroad & Panchgram Paper Mills and Cement Corporation of India's Bokajan factory. National Thermal Power Corporation would now be a big consumer of NECL coal for their plants outside the region. They are planning to take over the Bongaigaon Thermal Power Station (BTPS) of Assam State Electricity Board at Salakati, Assam for which CIL has committed to supply the total requirement of around 2.5 million tonnes of coal per annum by expanding its mining activities in the region.

The coal situation in India can be further assessed by the following details. At the time of formulation of the 10th Five Year Plan (2002-07) the Planning Commission of India assessed the all India coal demand at 460.50 million tonnes (plus 5.24 million tonnes middling). They projected an indigenous coal production of 405.00 million tonnes (CIL equals 350.00 million tonnes, SCCL equals 36.13 million tonnes, and others equals 18.87 million tonnes including Meghalaya coal) for the same period annually. However, during the Mid-Term Appraisal (MTA), the all India coal demand was revised to 473.18 million tonnes and indigenous coal production was assessed at 431.50 million tonnes by the Planning Commission. The all India coal demand assessed for the year 2006-07 (revised) was 474.18 million tonnes. Total domestic availability was 434.79. Thus there was a gap of 39.39 million tonnes between demand and supply during 2006-07. This was met through import mainly by steel, power and cement sectors. During 2007-08 the demand for coal in India was 492.50 million tonnes. The supply of coal was 461.89. There was a gap of 30.61 million tonnes and this was met through imports. The current system of linkages feeding the power sector may be replaced with formal long term Fuel Supply and Transport Agreements that include the railways. The regulation of coal price has to be differentiated from the pricing of coal for power generation since it consumes 80% of the domestic production. Because of the quality of coal it consumes, it is not easily saleable to the steel and cement sectors. E-auction had been introduced in CIL during the year 2005-06. Important modes of transport of coal in CIL are railways, road, the rail-cum-sea route etc. Railways constitute the major system of coal transportation in India. This can be ascertained from the fact that 56% of the coal is transported by railways. It is the largest single commodity transported by the railways. The despatch of coal by rail is governed by the Preferential Traffic Schedule of the Indian Railways. Under this the programme of movement is to be sponsored by the various sponsoring authorities and accepted by the coal companies. In case of deregulated coal, railways have allowed coal companies to sponsor the

movement of coal. Non-core sector comprises linked industrial consumers, brick manufacturing units and other seasonal consumers. The non-core sector units used to be granted linkage by CIL till recently. The system of linkage to non-core sector consumers was introduced by CIL in 1978 with a view to rationalise coal demand vis-a-vis availability. This system of coal supply to non-core consumers has since been replaced by the introduction of New Coal Sales Policy in January, 2003 for sale of coal to non-core consumers. In this Policy, the arrangement of Fuel Supply Agreement (FSA) between the coal company and non-core consumers was introduced. As per the present import policy, coal can be freely imported (under Open General License) by the consumers themselves considering their needs based on their commercial prudence. Coking coal is being imported by Steel Authority of India Limited (SAIL) and other steel manufacturing units mainly to bridge the gap between the requirement and indigenous availability and to improve the quality. Coast based power plants, cement plants, captive power plants, sponge iron plants, industrial consumers and coal traders are importing non-coking coal. Coal mining for commercial sales is out of bounds for private players. The government decides the price and quantities to be offered to consumer industries from state-owned monopoly Coal India's production. Coal mining is affected by seasonal factors also. Pithead stocks build up during the winter months. Production drops during the monsoon period. The period is between June-September each year. Part of the requirement of the consumers is met by drawing down stocks from the pitheads during this period.

From the above, it can be concluded that there is a mismatch between the demand and supply of coal in India. Demand is generally higher than supply as coal is one of the major raw material for power generation and other core industries. For CPM also the main impact from coal has been because of the increasing price during the last few years. There was a steep increase in the operating cost during the last few years particularly during 2008-09. Another difficulty is that CPM cannot change the supply contracts with the suppliers at will. The procedures described in section page 32 describes it in detail. So in procurement of coal the other options available like NECL and places outside Assam can be explored. Coal India Limited is selling 20% of its coal through e-marketing, so there is urgent need for CPM to explore e-procurement. There are also many other benefits given to North Eastern states by central government. The transport subsidy given in transportation of raw material can be availed of if coal is procured from places outside Assam. The only problem with coal transportation through railway is that there is a necessity of transshipment from broad gauge to meter gauge in Lumding. So the cooperation with NF railway is the prime requirement in this regard. Another important point is to reduce wastage and reuse resources. CPM is installing AFBC boiler's where fly ash, unburnt coal, effluent sludge and coal fines generated during screening will be used as raw material. It will reduce dependence on fresh raw materials. So technological upgradation is also improving in CPM, as needed. Finally if imported coal of high quality can be procured coal requirement will reduce from present level per MT of paper production. And cost benefit analysis can be done for imported coal. The benefits reaped by SAIL and other public sectors who are importing coal to bridge the gap

between demand and supply at competitive price can be treated as a measuring tape in this regard.

3.7 Coordination among various departments/elements for supply management of raw material

CPM should have a strategic approach in supply management to have a competitive advantage. In order to contribute to corporate strategy, supply management must be able to translate corporate objectives into specific supply management goals. Supply management serves as the driver for both strategic supply management processes and commodity specific action plans that dictate as to how goals are to be achieved through relationship with suppliers. As there are resource and other constraints, various HPC/CPM management heads must work together to define their functional strategies. These strategies are a set of short term and long-term plans that will support the enterprise strategies. Reducing the cost of services and other workable areas should be an important enterprise objective when there is an increasing tendency of increase in raw material price. There should be supply based rationalisation and optimisation which results in real improvement in cost, quality, delivery and information sharing between buyer and supplier. Suppliers of CPM should be selected carefully and close and collaborative working relationship should be developed with fewer suppliers to minimise supplier risk. Supplier risk includes poor supplier quality, poor delivery performance, overpaying for items due to noncompetitive sourcing situation etc. Apart from this supplier with multiple capabilities reduce supply disruption. Another important step for improvement is that CPM should not rely solely on its current supplier base and should be always open to new suppliers if their use makes good business sense. Supply base rationalisation and optimisation constitutes a critical first step towards the effective management and development of supply base. When a contract is signed with a supplier, CPM should continuously monitor the performance of the supplier on predetermined criteria such as quality, delivery performance, etc. Regular reviews must be held to determine whether the strategy is successful or whether it requires any modification. For CPM, the requirement is for collaborative planning between supplier, state government/department /external third party, (like railways etc.) if involved, and CPM management for seamless supply of raw material from sources to mill premises.

The organizational policy of HPC is that the main critical inputs are procured centrally by CHQ, Commercial Department in Kolkata, for both the mills. The main raw material for paper making i.e. bamboo, is procured by Forestry Department of CPM through Commercial Department of CPM.

An indent as mentioned in section 3.4, is raised normally by the user department giving the required specifications. The Forest Department raises the indent for requirement of bamboo with necessary specifications. The indent after being approved by the competent authority

goes to the Purchase Department. The Purchase Department along with tender committee or Contract Cell, as per requirement, finalises the contract and order is placed accordingly. All these activities require coordination among all internal departments including Finance Department for approval of finance and checking of budget allocation etc. Gate purchase of bamboo and coal is done in unavoidable circumstances and payments are made according to prevailing norms. This also requires coordination among various departments. Before acceptance of any material, laboratory tests are carried out for bamboo as well as for coal to check for the conformance with specifications as per indent. The supplied material is also checked by the indenting department for final acceptance.

For external activities outside mill premises and coordination wherever required specific department/persons are engaged. For example if in any forest area where HPC persons are required for smooth coordination between supplier, forest official of the respective state etc. forest employees are engaged. Similarly in extreme cases or in situations of crisis committees are formed to coordinate with various procurement activities particularly for bamboo and coal.

For logistic activities, mainly transportation of raw material, the Transport Department plays an active role. The requisition of railway wagons and coordination with NF Railway personnels is mainly done by the Transport Department. The railway plays an important role in carrying raw materials to CPM. But due to various reasons cited in page 45, the wagons are not given by railways as committed. So the coordination between railways and CPM personnels is very much required. Along with this, coordination with suppliers is also necessary for smooth transportation of raw materials, particularly bamboo.

Also for coal transportation various suppliers and Meghalaya coal owners as well as CPM requires to have cooperation among them for smooth operation. From indenting to payment of money various departments, internal as well as involved external sources, need to cooperate for smooth functioning of production activity.

Another step should be the effective use of information technology. HPC has established ERP system to help procurement and inventory management and also to ensure instant information flow. E-procurement is the field using which HPC can be benefited in the moments of crisis. The benefits of e-procurement are many. It increases speed, accuracy, transparency with wider competition and economy in procurement. It facilitates speedy tendering, communication, online pre/post contract management including bidding, contracting, ordering and payment with online participation. It eliminates delays of processing tender manually thus reducing transaction cost. It enhances better monitoring of tenders and contract and also works for better vendor relationship. It also facilitates reduced cycle time for participating in tender and overall process. These communications should comply with the IT Act 2000. E-procurement gives a wide market and through reverse auction prices also can be lowered by competitive bidding of raw material. So in situations where cost of raw material is going high, using e-procurement solution should help CPM at least partially to reduce the cost to a certain extent.

3.8 Recycling technology and plantation of forest based raw material as an alternative way

In the wake of such serious raw material problems particularly forest based and also scarce resources like coal it is time to think of other alternative ways to look ahead. When the forest based raw material is so scarce one can think of reusing the materials which can be recycled. Also the organizations can think of farm forestry to compensate for the shortages in supply. In the following section the process of recycling and plantation of forest based raw materials has been described in detail.

3.8.1 Recycling

Many organizations are designing products that can be recycled completely when their operational life is over. Government regulations to protect the environment also affect supply chain decisions. India still lacks systems for collection, sorting, grading of waste for proper utilisation. In India only 20% of waste paper is currently being recovered (FAO advisory committee, 2006, p.22).

Paper recycling is the process of recovering waste paper and remaking it into new paper products. There are three categories of paper that can be used as feed stocks for making recycled paper: mill broke pre-consumer waste, and post-consumer waste (www.wikipedia.org). Mill broke is paper trimmings and other paper scrap from the manufacture of paper, and is recycled internally in a paper mill. Pre-consumer waste is material that was discarded before it was ready for consumer use. Post-consumer waste is material discarded after consumer use such as old magazines, old telephone directories, and residential mixed paper. Paper suitable for recycling is called "scrap paper". Sometimes the pulp must undergo a "pulp laundering" operation called de-inking to remove printing ink and "stickies" (sticky materials like glue residue and adhesives). Paper makers often use a combination of two de-inking processes. Small particles of ink are rinsed from the pulp with water in a process called washing. Larger particles and stickies are removed with air bubbles in another process called floatation. In India waste paper is not recycled in higher quantity to make paper unlike in countries like Japan where 60 to 70 percent of the paper is recycled (Krishna, 2003). Instead India imports waste paper for its pulp and paper industries. Recycling of one tonne of waste paper saves 17 trees as per one study. It develops a new industry with employment opportunity not only in remote areas but also in cities. Recycling paper also reduces air and water pollution generated in paper manufacturing. Recycled paper can be directly substituted by paper made of 'virgin' fiber. By using recycled paper one's dependence on forest based raw material is also reduced. In HPC's unit particularly in CPM, one small de-inking plant can be installed so that at least 20% of the raw material can be used from recycled paper.

HPC mills are also utilising the scrap paper or quality deficient paper by recycling. In HNL de-inking plant has been established and one third of fiber (raw material) is received from the process. The 3 R's (Recycle, Reduce and Reuse) should be key words in daily operation of the

company. The objective should be to minimize consumption, maximize recycled content, sourcing fiber responsibly and employing cleaner production methods. As an initiative to reduce dependence on fresh raw material HPC has gone for AFBC boilers. The 50 tph AFBC (Atmospheric Fluidised Bed Combustion) boilers being installed in NPM and CPM will generate energy from present day wastes generated during the mill operations (www.hindpaper.in). Coal fines which are generated from screening of coal, unburnt coal in fly ash and effluent sludge will be used as fuel for these boilers. The Lime Sludge Re-burning Plant being set up at both the mills in Assam will not only restrict the discharge of lime mud but also recycle the same to generate lime for reuse in the production process. To eliminate the production of dioxins as by-product when chlorine is used as bleaching agent for the pulp, Elemental Chlorine Free (ECF) bleaching system is envisaged under the MTUP programme for both the mills by HPC management.

3.8.2 Plantation of forest based raw material

Regarding the use of raw materials in India, one can categorise paper mills into three types of mills: forest based mills, agro waste/residue based mills, and recycled fibre based mills. In 1992, forest based raw materials accounted for about 49% of total raw material inputs for paper, paper board and newsprint production, while share of agricultural residues and wastepaper amounted to 29% and 22% respectively (Schumacher and Sathye, 1999, p.7). The consumption share of forest-based materials has been declining over time and is expected to decrease in future. The share of agricultural residues shows a steadily increasing trend from 1980 and is expected to further rise in future. At the same time waste paper use has risen to 13% in 1985 and will approximately hold its share in future. The small paper mills set up in the early seventies almost exclusively use agro waste/residues as raw materials for paper production. Large mills, so far, have mainly been based on forest material for paper production. This include bamboo, hardwood and eucalyptus. While agro waste/residues such as rice straw, wheat straw and bagasse are relatively short cycled regenerative and abundant, the availability of forest based raw material is rather limited. With the implementation of central and state government policy towards forest protection and afforestation, pulp and paper mills have to take responsibility for reduction of forest material consumption and afforestation efforts. The government is encouraging the industry to create plantation on degraded forest and waste land (dedicated forest program) (Schumacher and Sathaye, 1999, p.8). With the growing shortage of forest-based cellulosic raw materials, HPC has been making untiring efforts for finding alternative sources of supply. HPC and HNL have launched massive community and farm forestry programmes through the medium of Non Government Organizations (NGO). HNL has distributed 20,500,000 number seedlings since its inception in 1998 and had plans to distribute 4,200,000 number seedlings during 2005. With the help of NGOs, the scheme has assumed the dimension of a social movement. HNL has also undertaken captive plantation over degraded forest land. Work at NPM and CPM are in progress. The Farm Forestry Scheme has evoked positive response from the villagers. Over 5,139,000 number seedlings have been distributed to NGOs during 2002-03 to 2004-05

(www.hindpaper.in). Hindustan Newsprint Limited (HNL), has been engaged in Captive Plantation in an area of about 5600 hectare of land since 1993-94.

HPC has submitted a plan for utilization of the degraded forest land or waste-land for raising captive plantations. For making quality planting material available for bamboo and other pulpwood species, a tissue culture laboratory is being established at NPM with a production capacity of 2,000,000 numbers per annum in cooperation with National Mission of Bamboo Applications (NMBA). The main activity of the Tissue Culture Laboratory (TCL) is to ensure availability of large scale disease resistant and superior propagules of the desired species of bamboo for supplementing the bamboo resources. With the assistance of NMBA, a project of Bamboo Dust Gasification has also been undertaken which shall utilize the solid waste, viz. bamboo dust for producing producer gas, which will conserve furnace oil of equivalent heat value. This would help in solid waste management and would also be an energy saver.

4. TREND ANALYSIS OF BAMBOO AND COAL AS MAJOR RAW MATERIAL

In the following section the production of paper in CPM for last few years along with its cost of production has been analyzed. This has been done with respect to capacity production etc. Next the procurement of bamboo with cost and coal with cost are analyzed with respect to requirement. Finally the inventory system of bamboo and coal are analyzed. In the end SWOT analysis is done with respect to raw materials in CPM.

4.1 Total production trend analysis of final paper

The world demand for paper and paperboard is forecast to grow by 2.1% annually in the long run, reaching an estimated 490 million tonnes by the year 2020, according to a recent paper on demand and supply study. The study, published by the global consulting group Poyry, says demand growth prospects will vary considerably between regions with a fairly modest outlook for North America, Western Europe and Japan, while there is significant growth potential for Asia and Eastern Europe, India, China and Russia in particular. In terms of volume, China, India and Russia will account for 35-70% of global incremental demand in 2004-2020, depending on the product area (Paper Age, Nov./Dec., 2006). World paper and paperboard demand has grown rapidly over three consecutive years, reaching a record level of 359 million tonnes in 2004. And despite the slackness in traditional markets, the global market has performed reasonably well, because of the rapid growth of the Asia-Pacific and Eastern European markets. Historically, the average paper and paperboard demand growth in the world was around 5-6% per year during the 1950s and 1960s, but this slowed down to just over 3% annually during the 1970s, 1980s and 1990s, and to 2.4% per year in 2000-2004. However, in terms of volume, the annual average growth has accelerated from about 3 million

TPA in the 1950s to nearly 9 million TPA in the 1990s. Since 2000, the average volume growth has been over 8 million TPA. The shift in growth from west to east and from north to south has been particularly dramatic in 2001-2004, with Asia accounting for 64% of the global demand growth, while North America and Western Europe contributed only 11% and 10%, respectively. Considering its relatively small share of only 4% of global markets, Eastern Europe has been another rapidly growing market with 9% of the global demand growth during 2001-2004. Long-term prospects in the West and Japan are at best moderate, while Eastern Europe and Asia, China in particular are now acquiring key importance in the world's paper industry. Suppliers operating primarily in mature paper market areas will face challenges mainly at two frontlines: 1. competition against electronic media/online applications, and 2. relocation of industrial packaging/printing customers from high-cost markets to emerging low-cost regions. The growth of paper and paperboard production is gradually shifting outside the traditional supply areas. The share of North America and Western Europe of the world's paper and paperboard production is forecast to decline from the current 55-56% to 44% by 2020. At the same time, Asia's share is expected to grow from the present 34% to 42%. Asia will be responsible for over 60% of the global incremental production during 2004-2020. Within Asia, China and India will be the most rapidly growing production areas, accounting for 39% and 8% of the world's incremental production through 2020.

Demand for paper, including writing, printing, industrial and newsprint varieties, is growing at around six per cent in India as compared to a global average of about three per cent, Yash Papers Ltd said in its annual report of 2005-06 (The Hindu Business Line, 8th July, 2006). Demand for paper in India is projected to grow at a compounded annual growth rate of 6.10 per cent from 2004-05 to an estimated 7.4 million tonnes in 2008-09. One of the demand drivers is the government's commitment to education and increased total outlay to that effect. A reduction in excise duty on printing, writing and packaging papers from 16 per cent to 12 per cent, robust GDP growth, increasing export thrust and the presence of large modern retail formats and convenience stores also will drive demand. The Indian paper use is to double to 14 million tonnes by 2015, according to Indian Paper Manufacturer's Association.

The actual demand forecast of paper produced in CPM is hard to estimate in advance. The installed capacity of the mill is 100,000 MT which can even exceed due to maximum capacity which is higher than installed capacity. The production target as fixed by HPC management from 2006-07 financial year onwards has been 100,000 MT plus. The total production trend of CPM during last financial years, that is, from 2000-01 to 2008-09 shows that the production had been increasing throughout the years till 2006-07. From the sales figure given in table 3.1, p. 31 it is observed that there is demand for paper in the market. Whatever is produced almost all were sold in the market. So the production of CPM is not a demand constrained system rather it is a capacity constrained system. From the table 4.1 below, it is observed that the installed capacity was reached during 2005-06 and 2006-07. It was more than 100% capacity utilization. But after that during 2007-08 it reduced to 96.62%. During 2008-09 it fell down to merely 65,012 MT. So there was nearly 35% unutilized capacity of the mill during that year. In a continuous running mill (24/7) like CPM, demand for its products in the markets is necessary so that there is no stock overload. At the same time the

availability of the resources of production should also be there. If the factors of production like raw material, power, finance, manpower etc. are available in sufficient amount then one can look for improvements in existing facilities. Improvements can be done by minimizing waste, improving quality, introduction of new product vis-à-vis new market. But when there are constraints like non availability of major raw material or production element, the impact on the performance is unrecoverable. During 2007-08 and 2008-09 the lower production was caused by non availability of the major raw material bamboo. Another raw material, coal, also affected the cost of production due to its increased price. The production of paper in CPM is given below to view the performance and impact of raw material on it.

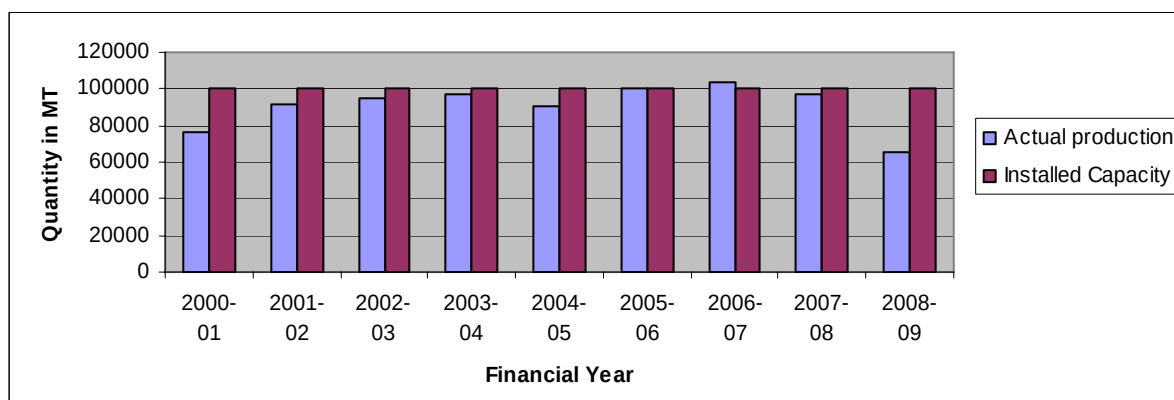
Table 4.1: Annual production and installed capacity in CPM in 2000-01 to 2008-09

Financial Year	Total Production (MT)	Installed Capacity
2000-01	76,722	100,000
2001-02	92,065	100,000
2002-03	94,702	100,000
2003-04	97,376	100,000
2004-05	91,012	100,000
2005-06	100,631	100,000
2006-07	103,155	100,000
2007-08	96,621	100,000
2008-09	65,012	100,000

Source: MIS Cell CPM, internal data.

The above table 4.1 shows the financial year-wise production of paper in CPM. From the above table it can be seen that the production during 2008-09 has been severely affected. We can see that production is much lower as compared to capacity, which is 100,000 MT. The following diagram illustrates a better picture of the production figures to installed capacity in the form of graph.

Figure 4.1: Annual production and installed capacity in CPM in 2000-01 to 2008-09



Source: Table 4.1.

From the above figure it is observed that the total production of CPM was above 90,000 MT from 2001-02 till 2007-08. Production of 100,000 MT in a financial year means 100% capacity utilization of the plant. The total production crossed 100% capacity utilization for two consecutive years, which are 2005-06 and 2006-07. Again during 2007-08 the total production came down by 6.1% approximately compared to previous year. This was mainly because of non availability of sufficient bamboo in the later part of that financial year. But during 2008-09 paper production fell to an all time low among the analyzed years to merely 65,012 MT. This means that the capacity utilization of the mill fell to 65% only. This is due to severe crisis faced in the supply of bamboo.

The cost of production from the financial year 2000-01 to 2008-09 gives a glimpse of the situation as to how the production cost increased in the period. The figures are tabulated below.

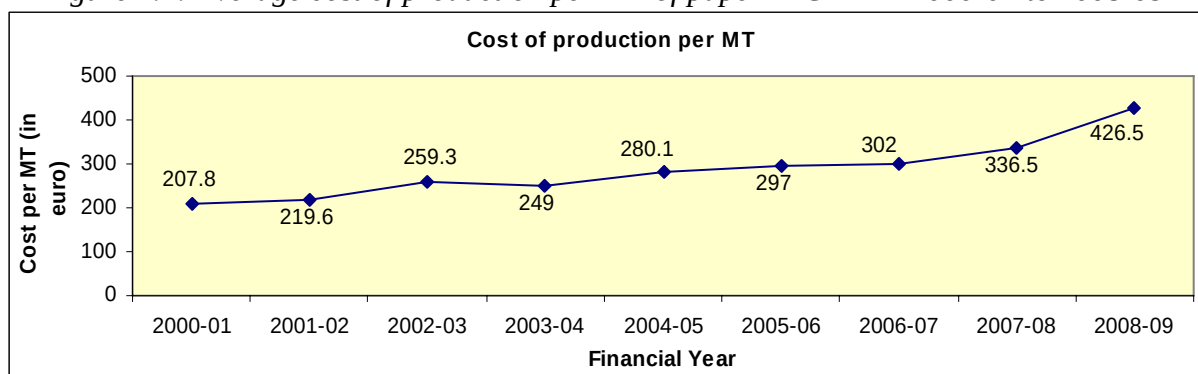
Table 4.2: Average cost of production per MT of paper in CPM in 2000-01 to 2008-09

Financial Year	Cost per MT of Paper (in euro) (1 euro = 65 rupees approx.)
2000-01	207.8
2001-02	219.6
2002-03	259.3
2003-04	249.0
2004-05	280.1
2005-06	297.0
2006-07	302.0
2007-08	336.5
2008-09	426.5

Source: Finance Department CPM, internal data.

From the above table it is observed that the cost of production was increasing throughout the years and last year i.e. 2008-09 it reached a new height although production was low. The trend can be better viewed if graph is drawn from the table.

Figure 4.2: Average cost of production per MT of paper in CPM in 2000-01 to 2008-09



Source: Table 4.2.

From the figure it is clear that the cost of production has been increasing throughout the years even though there had been fluctuations in the total production during the years. The cost of production has been increasing for almost all the years. It reached a new height during 2008-09. From 2000-01 to 2008-09 it increased by more than 100% per MT as compared to 2000-01. During the financial year 2008-09 it increased by 26.7% per MT compared to 2007-08 although the total production was decreased by a significant value. All these were mainly due to higher cost of raw material, and frequent start and stop of the mill due to non availability of raw material particularly bamboo.

From the above analysis it can be concluded that the demand of paper for the next few years will be there not only in India, but also in abroad. Among the various hurdles faced by CPM constrained supply of bamboo in particular is the main and the biggest one. The main problem faced in bamboo collection is bamboo flowering in the main sources of bamboo namely Mizoram, Barak Valley etc. In Mizoram bamboo flowering has restricted the collection as the plant dies after flowering. It requires 4/6 years for new bamboo plant to get matured in those areas. Another area of bamboo supply is NC Hills which is affected mainly by insurgency related problems. The NF Railway which is the transportation medium had to cancel many trains in past few years due to mainly insurgency activity. Some disruption in past years were due to its own maintenance problem also as the train line is very old (for example one bridge broke and took nearly 6 months to reconstruct). Apart from this NF Railway gives priority to other essential services during restart rather than to raw material for CPM. The overall effect of all these factors are low bamboo collection and low production. Another raw material is coal and this is also crucial for CPM. It is used for captive power generation as well as steam required in many processing activities. During past few years its main impact has been because of its increased price per MT. The NECL which is one source of coal hiked price by 50%. Also the price for Meghalaya coal which is another primary source of coal for CPM was hiked. The Meghalaya coal is unorganised so when demand increased, they increased the price. They are reluctant to supply coal to CPM at previous agreed price and suppliers failed to supply required quantity. In the following sections detailed analysis of procurement trend of bamboo with respect to required quantity is placed. Other aspects like payment made for bamboo collection is also put forth with some suggestions for improvement. Then coal procurement with respect to requirement along with cost factor are analysed. And some suggestions for improvement of the present situation is given. Afterwards the inventory of bamboo and coal in CPM and its impact are analyzed.

4.2 The procurement trend analysis of bamboo and coal

The procurement trend of bamboo is important as it reflects the final production of paper. The actual demand of paper is hard to estimate. As mentioned earlier the installed capacity of the mill is 100,000 MT which can even exceed due to maximum capacity which is higher than installed capacity. The raw material required in the form of bamboo for producing 350 MT of

finished paper is 1313 MTG. The average requirement of bamboo in MTG per MT of paper is 3.75 MTG (approx.). This may vary slightly as per yield of fiber from various bamboo species. So for production of 100,000 MT of paper the average bamboo requirement is 375,000 MTG (approx.). The actual procurement scenario of bamboo is given below.

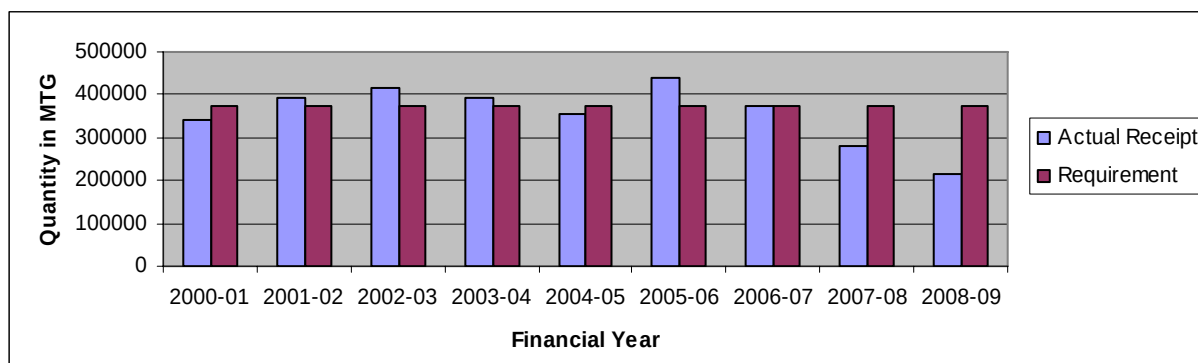
Table 4.3: Annual receipt of bamboo and requirement in CPM in 2000-01 to 2008-09

Financial Year	Quantity in MTG	Requirement (approx.) MTG
2000-01	339,482	375,000
2001-02	391,274	375,000
2002-03	413,582	375,000
2003-04	394,317	375,000
2004-05	356,799	375,000
2005-06	440,263	375,000
2006-07	374,096	375,000
2007-08	280,456	375,000
2008-09	213,043	375,000

Source: Purchase Department CPM, internal data.

For the analysis of the trend of bamboo procurement I have collected data from the CPM's Purchase Department. The analysis is done as follows: for the collected data graph is drawn to see the various years' position to visualize the trend. The years of analysis are taken from financial year 2000-01 (one financial year is from April 2000 to March 2001) to financial year 2008-09. During 2006-07 CPM produced 103,155 MT, but next year i.e. 2007-08 it came down to 96,621 MT. During 2008-09 it reduced to only 65,012 MT which is only because of the effect of shortage of bamboo. From the figure 4.3 shown below, it can be observed that the receipt of bamboo has been reducing from financial year 2006-07 till 2008-09. The reasons are as mentioned in chapter 3 page 44.

Figure 4.3: Annual receipt of bamboo and requirement in CPM in 2000-01 to 2008-09



Source: table 4.3.

From the above figure 4.3, it can be seen that the quantity of bamboo received is showing a downward trend starting from financial year 2005-06 during which CPM received highest quantity of bamboo. The downward trend continues till the last financial year that is 2008-09.

It severely affects all aspects of the mill as it is the major input for production of paper. All other material as well as production depends on this raw material. Also if production goes down all other components of an organization goes down namely profitability etc. The Indian paper use is to double to 14 million tonnes by 2015, according to Indian Paper Manufacturer's Association so demand seems to increase in future.

The amount of money involved in the procurement of bamboo for CPM can also be observed. Payment made to the suppliers for procurement of bamboo is a major portion of the cost of production. As there is huge requirement of bamboo and the supply is done from various sources the costs involved are also different. The landed cost of bamboo from different sources is also depending on the transportation mode for example by road, by rail or by river route. The prices of each mode are different and also price depends on the particular species of the bamboo being transported. Due to crisis of bamboo the pulp which is the product of processed fiber, has been also procured during 2008-09 from distant mills to enhance production. The cost of pulp is also high adding to the operating cost of paper production. The payments made to the suppliers during last few years in CPM are given in table 4.4 below.

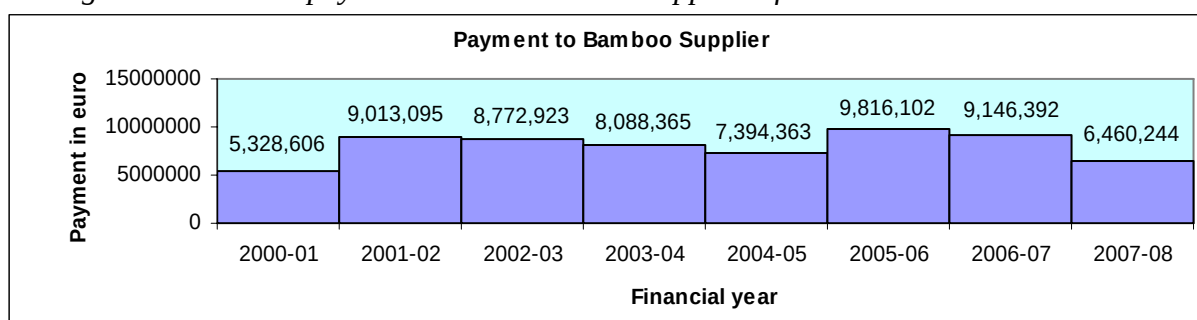
Table 4.4: Annual payment made to bamboo supplier of CPM in 2000-01 to 2007-08

Financial Year	Payment (in euro) (1 euro = 65 rupees approx.)
2000-01	5,328,606
2001-02	9,013,095
2002-03	8,772,923
2003-04	8,088,365
2004-05	7,394,363
2005-06	9,816,102
2006-07	9,146,392
2007-08	6,460,244

Source: Finance Department CPM, internal data.

The payment made to the supplier for procurement of bamboo for the last few financial years can be shown with the help of a graph to have a better view.

Figure 4.4: Annual payment made to bamboo supplier of CPM in 2000-01 to 2007-08



Source: Table 4.4.

From the above figure 4.2, it is seen that the payment made against bamboo was high although it decreased during 2007-08. This indicates fall of bamboo supply during the year and probably that the prices also went up.

The following table gives the source wise collection of bamboo from various supply points. The collection of bamboo from the sources is given from year 2000-01 to 2007-08, which is approximately the total flow of the raw material, bamboo, to CPM. This is excluding gate purchase and small collections which were sometimes done to fulfill requirements. The bamboo for CPM is mainly collected from the given sources via different transportation modes. The table gives a clear picture of the situation of the supply from various sources. Later in this section the least collected sources are analyzed further with trends by showing graph and probable improvements are suggested in the end.

Table 4.5: Source and annual raw material collection (bamboo in MT) in CPM

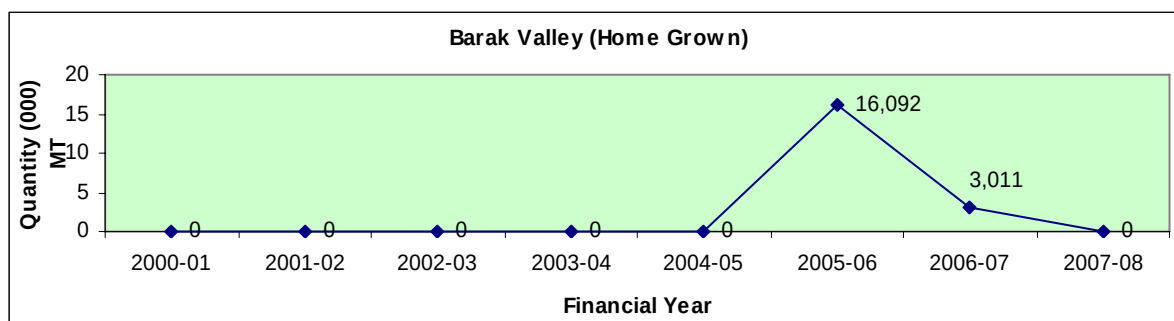
Year Source	2000-01	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08
BV(Lease)	96,376	64,109	86,795	81,335	58,284	37,468	70,803	64,329
BV (HG)	0	0	0	0	0	16,092	3,011	0
Mizo (road)	758	56,783	70,769	73,434	114,614	180,786	179,521	28,171
Mizo (river)	75,853	90,208	97,968	65,328	83,754	76,809	26,151	55,361
Mizo (rail)	304	2,601	5,038	467	1,293	845	0	0
Meghalaya	11,741	5,587	5,901	4,931	102	0	0	0
Tripura(road)	26,634	8,979	14,819	60,013	19,626	37,995	28,507	20,991
Tripura (rail)	0	0	19,864	6,307	1,251	153	0	0
NC Hills (road)	7,893	0	7309	8,956	2,383	0	10,688	0
NC Hills (rail)	44,691	29,051	26,426	52,269	41,385	26,611	33,872	31,066
Manipur	22,261	27,481	4,611	0	3,859	4,873	7,296	754

Source: CPM Forest Department, intenal data.

From the above table 4.5, it is seen that the procurement of bamboo from various sources has been fluctuating over the years. From Barak Valley (lease) the collection of bamboo during 2007-08 was a little less compared to previous year. From Mizoram (river) the collection of bamboo during 2007-08 was higher compared to previous year i.e. 2006-07. Collection of bamboo from Tripura (by road) was less during 2007-08 but only slightly compared to 2006-07. The collection of bamboo from NC Hills (rail) was slightly less during 2007-08 compared to 2006-07. From other sources the collection was very poor. The trend analysis from these sources of poor collections is given below to have a better picture of the situation in graphical form. In the x-axis the financial year starting from 2000-01 to 2008-09 are shown. The collection of bamboo in each interval is represented by the height of a point located above the middle of the interval in y-axis.

The Barak Valley (home grown) source has shown more depressing trend as it is nil in many years. The graph for the same is shown below which gives a better view.

Figure 4.5: Annual collection of bamboo from Barak Valley (H G) in 2000-01 to 2007-08

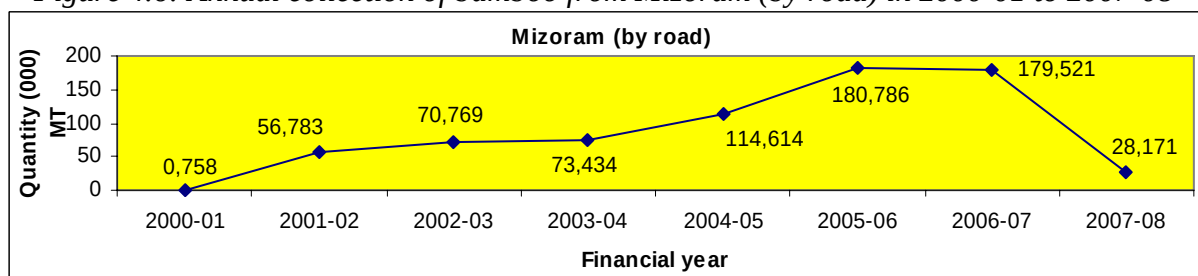


Source: Table 4.5.

From the above figure 4.5, it is evident that the collection of bamboo was very poor from Barak Valley (home grown) source. This is mainly due to it being an unorganized sector. Also bamboo is used for household work in villages. Bamboo flowering was also there and this led to the destruction of many bamboo plants.

Collection of bamboo from Mizoram (road) although satisfactory, during middle of the financial years taken, has also shown major decline. The representation of the collection of bamboo is shown below.

Figure 4.6: Annual collection of bamboo from Mizoram (by road) in 2000-01 to 2007-08



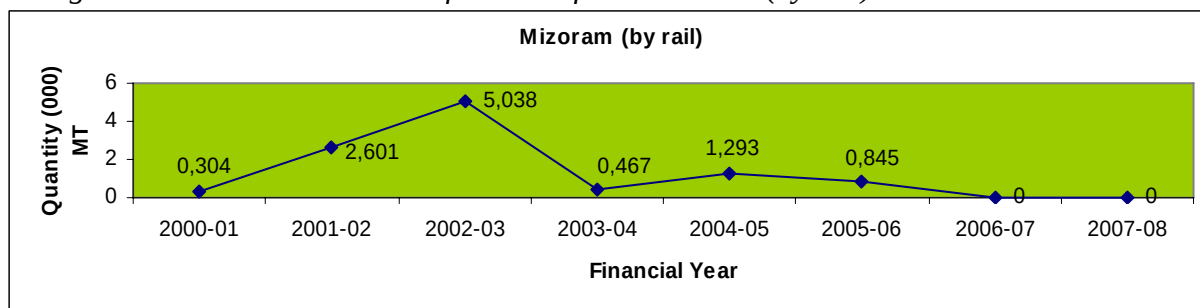
Source: table 4.5.

From the figure 4.6, it is seen that during financial year 2005-06 and 2006-07, the collection by Mizoram (by road) was at maximum. There was a fall during financial year 2007-08. This is mainly because of massive bamboo flowering in the area. There was also only one

contractor who got the supply contract for supply of bamboo from that source. The road conditions of the actual sources being very bad aggravated the problem.

Mizoram (by rail) showed an increasing trend during the earlier years. But for the last few years it was decreasing and collection of bamboo was very poor. The graph below gives a better view of the trend.

Figure 4.7: Annual collection of bamboo from Mizoram (by rail) in 2000-01 to 2007-08

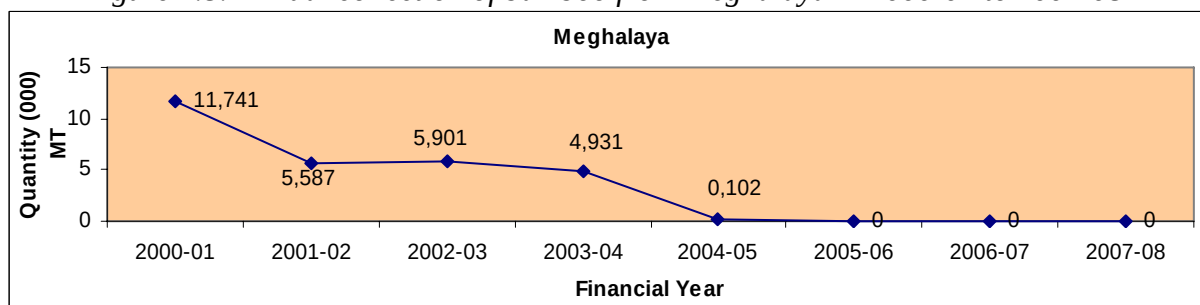


Source: Table 4.5.

From the above figure 4.7, it is seen that during 2006-07 and 2007-08 i.e. in recent past years there was no collection at all from the Mizoram (by rail) source. The rail services were frequently stopped in the last few years due to insurgency activity in NC Hills. There was shortage of railway wagons for delivering raw material. Also the bamboo collection was low due to bamboo flowering in that area.

Meghalaya as a source of bamboo was better in earlier years. But during the last few years there has been no collection of bamboo at all. The graph drawn below gives a clear picture of the bamboo source.

Figure 4.8: Annual collection of bamboo from Meghalaya in 2000-01 to 2007-08



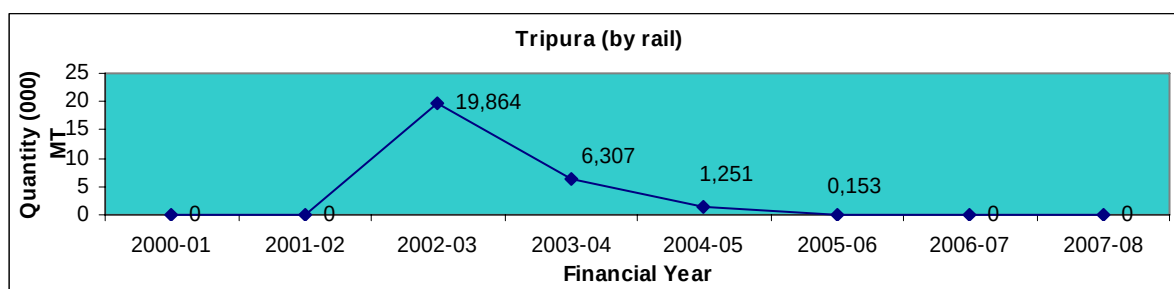
Source: Table 4.5.

From the above figure 4.8, it is seen that the amount of bamboo collected from Meghalaya was quite less and the trend is decreasing. It ultimately became nil in the last few years. There was collection of bamboo till 2003-04 to some amount then it decreased sharply. During last few years particularly in 2005-06, 2006-07 and 2007-08 there was no collection of bamboo at all from that source. Meghalaya as a source of bamboo was not explored effectively. Meghalaya also has other forest based raw material for paper production like eucalyptus. As the forest area of Meghalaya is huge so there is scope for collection of raw material. The problem is the road as it is hilly all the way to the Assam border. During rainy seasons there is

landslide and also the movement of loaded vehicles is very slow due to the topography of the region.

From Tripura (by rail), there was some flow of bamboo during 2002-03 but it has subsequently reduced and in the last few years the flow was nil.

Figure 4.9: Annual collection of bamboo from Tripura (by rail) in 2000-01 to 2007-08

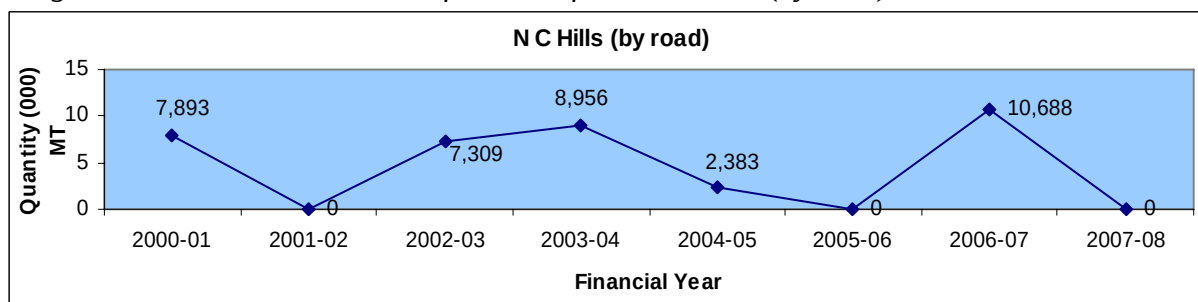


Source: Table 4.5.

From the above figure 4.9, it is seen that in the year 2002-03 there was some collection of bamboo from this source. But during 2003-04 it reduced by more than half of previous quantity collected. During 2006-07 and 2007-08 there was no collection at all of bamboo. The railway services were frequently stopped due to NC Hills problem and also there was non availability of sufficient wagon to supply raw material. Another reason was that the railway line went up to only few kilometers inside Tripura. But the railway department expanded the track to capital of Tripura recently. So there is possibility of collection and supply via railway from far off places which can be collected from various places. Finally bamboo can be dispatched via railway wagons to CPM site.

N C Hills (road) has also not been showing satisfactory collection of bamboo during the past years. The diagram given below shows that it is also not an encouraging collection source of bamboo. The main reason for this was condition of the road not being good enough, as it is not a highway and in many places, it is fragmented. There was also increasing activity of insurgency in the valley. So the suppliers are also reluctant to supply through the route due to safety reasons.

Figure 4.10: Annual collection of bamboo from N C Hills (by road) in 2000-01 to 2007-08



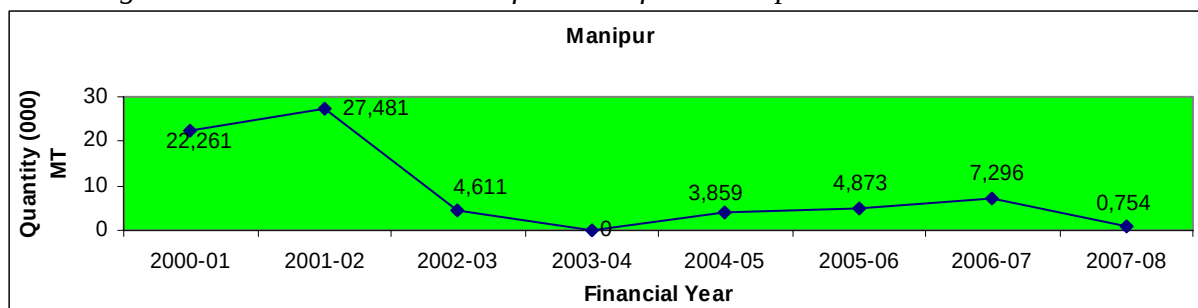
Source: Table 4.5.

From the above figure 4.10, it is seen that there was an increasing trend during 2002-03 and 2003-04, but it again fell down to become zero during 2005-06. During 2006-07 it rose to

maximum collection as compared to the previous collections. Again during 2007-08 there was no collection of bamboo at all from the source. From the above figure it is seen that NC Hills (by road) was not a consistent source of bamboo collection during previous years.

Lastly from another source, Manipur, although bamboo collection was done to some extent in early years of analysis, but lately there was very poor collection from the source.

Figure 4.11: Annual collection of bamboo from Manipur in 2000-01 to 2007-08



Source: Table 4.5.

From the above figure 4.11, it is clear that there was good flow of bamboo during 2001-02. Afterwards there was decreasing trend till it became nil during financial year 2003-04. Again there was some collection of bamboo with increasing trend till 2006-07. But it fell sharply during the financial year 2007-08. From the above diagram it is seen that although bamboo had been collected from Manipur source in recent past, the scenario is quite discouraging. Manipur as a source is also having similar problems like bad road condition and hilly terrain. There was also some incidence of bamboo flowering.

The sources from which bamboo collection was low in the past few years are: Barak Valley (home grown), Mizoram (by road), Mizoram (by rail), Meghalaya, Tripura (by rail), NC Hills (road) and Manipur. Out of these sources Meghalaya and Manipur yielded the least quantity of bamboo. Meghalaya can be explored as it is also a source of wood based raw materials. Agreement can be drawn up between the concerned department of the government of Meghalaya and HPC so that bamboo as well as wood is supplied in increased quantity without disturbing the ecological balance. Also collection from Manipur can be increased as it was good during the start of the 21st century. Tripura (by rail) is another source where from collection can be increased as the connection points via rail have been increased due to expansion of railways. NC Hills via rail and road require constant monitoring and coordination as many different departments/government officials/councils are involved. Sometimes bamboo is collected and stored near the stations and due to railway department's ignorance of giving wagon there is delay in supply. So the cooperation with Indian railways is also important for secured supply of bamboo. Mizoram has been affected by bamboo flowering so the supply has been reduced and regeneration will take time. But this is also a good source of bamboo and forest wood, so HPC can try to get some wood or bamboo from some other part of the state. Although it has a cost impact it can be tried out on a temporary basis till the crisis ends. Mizoram (by river) route also cannot be effectively used due to reduced water level in the river. But if the water level permits then bamboo can be collected

from far away places and transported via river to a place from where there is road transport to the mill. Arunachal Pradesh, of the North Eastern Himalayan (NEH) region is another source of various bamboo species and pulp wood. These species also play very important roles in the lives of the tribal folk who live there, particularly as a provision of materials for various day-to-day needs, as well as for paper-pulp industries. Many of the species are cultivated every year on commercial purpose. So CPM can also approach these sources. It can also approach the state forest department for supply of bamboo at least during this point of crisis. Transportation is one issue which is to be addressed properly. One possible solution to the transportation problem can be a combination of road and railway from the state due to its distance from CPM. The material can be collected from the sources of bamboo to the nearest railway point by road and the rest of the transportation can be done by rail. There will be transshipment in the Lumding station, from broad gauge to meter gauge. So coordination with NF Railways has to be increased. Another solution can be to import pulp or pulp wood. The global average wood fiber price is a volume-weighted average of delivered wood fiber prices for the pulp industry in 17 regions tracked by the publication, Wood Resource Quarterly (WRQ), (Press release, March 4, 2009, Seattle, USA). These regions together account for 85-90% of the world's wood-based pulp production capacity. As wood cost accounts for 40-50% of the total pulp production costs, it is often the predominant factor determining a company's or a region's competitiveness. The average softwood fiber price fell by 12% to \$97.32/odmt (oven dry metric tonne) in the fourth quarter 2008. Wood fiber costs in Western US have fallen by 22% in just six months. The average hardwood fiber cost fell by 11 percent in the fourth quarter 2008 to US\$ 98.38/odmt, the lowest level since the second quarter 2007. Eucalyptus pulplog prices in Chile have fallen almost 40% in 12 months (in US dollar terms) reaching their lowest levels in over four years. Pulpwood costs in Chile continue to be the lowest in all regions tracked by the WRQ. With reduced competition for wood fiber, it can be expected that wood fiber costs may continue to slide in 2009. The benchmark NBSK (Northern Bleached Softwood Kraft) market pulp price has fallen from US\$ 906/tonne in May 2008 to US\$ 615/tonne in January 2009, and 32% fall in eight months, and there are currently no indications that the pulp market will turn around anytime soon. Although the supply of residual chips has declined this fall, it has not really been a problem with fiber receipts for the pulp sector because wood fiber consumption has fallen as well. This situation may be accelerated in 2009 when it is expected that wood fiber consumption will fall faster than the availability of chips from the sawmilling sector. This will create higher wood fiber inventories and the greater opportunity for many pulp mills to reduce their usage of expensive round wood and also to negotiate for lower prices of wood chips. In smaller countries, such as Vietnam, the manufacturing of wood products is vital to their economic development strategy and wood consumption. As some Asian countries like Thailand, Indonesia, Vietnam etc. have wood resource so wood chips or pulp wood can be imported at competitive price especially in the crisis situation. To bridge the gap between demand and supply it is necessary for CPM to take some bold steps at least for short run to import chips or pulp from global market at affordable cost. Lastly, the government has taken several steps to make of raw materials and infrastructure development available to overcome the shortage of raw materials. Duty on pulp

waste paper, wood logs/chips has been reduced. The Indian paper and newsprint industry has already urged the government to amend the laws for immediate revision of forest policy so that plantation can be done to make use of the degraded land for raising plantations for better quality of pulp. Improvement is to be made in modes of communication e.g. rail, road, port which will help the entire industrial sector. Social forestry scheme should be introduced to small and marginal farmers to promote sapling and know-how for raising plantations of fast growing trees with an assurance of a buy-back policy at a remunerative price. There should be new policies/projects to overcome the acute shortage of raw materials and infrastructure development. There is also a large potential in increased specialized forest management in general for increased future supply. To develop alternative sources to ensure sustainable supply of bamboo CPM during 2001-02 had started Farm Forestry Scheme and Tissue Culture, through the participation of Non Government Organisations (NGOs). However, the scheme was not successful due to weak controls, poor survey, poor survival rate and non-percolation of the pecuniary benefit to the farmers through NGOs. The Bamboo Resource Development Project launched by the company in April 2004 at a cost of euro 689,230 (approx.) with the help of the government of Assam scheduled to be completed in 2009-10 also did not progress due to non-settlement of the issues relating to compensation with the government of Assam (Report, 2008, Ministry of Heavy Industries and Public Enterprise). This should be also settled so that CPM get benefited from it in the long term. CPM should take follow up actions to improve the monitoring of the Farms Forestry Scheme. The company should establish proper arrangements to sustain its coordination and interaction with the state governments, concerned departments and NGOs to develop sources for supply of bamboo and paper pulp. It should try out alternate schemes to encourage bamboo cultivation and provide direct financial benefit to bamboo growers. In short for long term fiber security CPM should implement farm forestry in an effective way, to get optimum benefit from it.

The procurement trend of coal

The procurement trend of coal, which is required for captive power plant for electricity and steam, which is used in producing paper, is discussed here. It is another major input in the entire process as a utility service. It also has a huge impact on the final cost of producing paper. Although coal is mainly collected from Meghalaya, a nearby state, its procurement from the state has also shown supply problems due to the various reasons cited in chapter 3, page 48 above. The specific coal consumption of MT of coal per MT of paper for last few years is given below in a detailed financial year-wise breakup.

Table 4.6: Average specific coal consumption in CPM in 2002-03 to 2006-07

Financial Year	Specific Coal Consumption (MT/ MT of Paper)
2002-03	1.96
2003-04	1.91
2004-05	1.84
2005-06	1.75
2006-07	1.94

Source: MIS Cell CPM, internal data.

From the above table 4.6, the requirement of coal during 2006-07 can be calculated. The paper production was 103,155 MT, so coal required was 200,120.7 MT. The annual target production capacity is 100,000 MT, so the requirement of coal is huge. Shortage in its supply affects the power supply as well as steam supply which are also important elements in production of paper. The actual requirement may vary slightly due to calorific value of the coal. The overall demand for coal is around 188,000 MT for 100,000 MT of paper production. The deficiency in the supply of coal affects mainly the operating cost which has an impact on the profitability as well as viability of running the mill. The procurement vs. requirement of coal from financial year 2000-01 to 2008-09 is given in the following table.

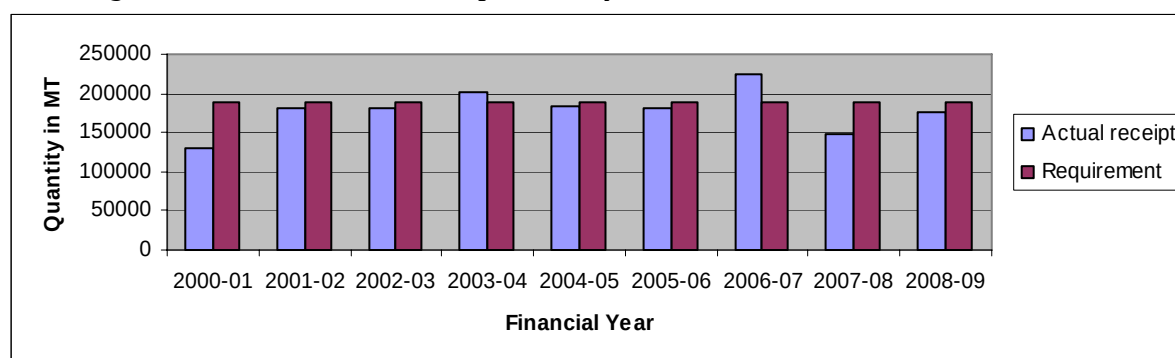
Table 4.7: Annual coal receipt and requirement in CPM in 2000-01 to 2008-09

Financial Year	Quantity in MT	Requirement (approx.)
2000-01	131,027	188,000
2001-02	180,074	188,000
2002-03	181,868	188,000
2003-04	201,008	188,000
2004-05	183,543	188,000
2005-06	180,359	188,000
2006-07	225,281	188,000
2007-08	147,667	188,000
2008-09	176,212	188,000

Source: Purchase Department CPM, internal data.

The collection of coal and requirement can be better viewed in the graph drawn below.

Figure 4.12: Annual coal receipt and requirement in CPM in 2000-01 to 2008-09



Source: Table 4.7.

From the above figure 4.12, it is seen that the coal supply is also not consistent. During crisis of coal supply CPM has to purchase power from ASEB. The rate per KWH as offered by ASEB is high as compared to captive generation. Power supply is also not consistent due to generation problems of ASEB. So supply of coal is crucial as far as production of paper is concerned. The diagram shows that the supply has been fluctuating slightly over years. The collection of coal was almost consistent from financial year 2001-02 to 2006-07. But there was a fall in its supply during 2007-08. It again rose during 2008-09. At the same time the

cost of coal per tonne is also to be considered. It is also an important factor for collection of coal and cost of production of paper. The price per MT of coal for the last few years has been increased. The following table gives the figure of coal price per MT from 2000-01 to 2008-09.

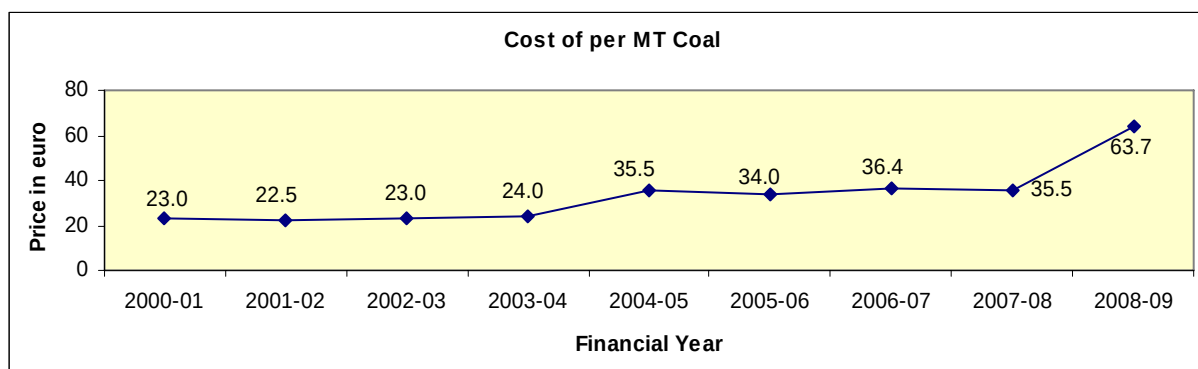
Table 4.8: Average cost of coal per MT in procurement for CPM in 2000-01 to 2008-09

Financial Year	Price (euro) (1 euro = 65 rupees approx.)
2000-01	23.0
2001-02	22.5
2002-03	23.0
2003-04	24.0
2004-05	35.5
2005-06	34.0
2006-07	36.4
2007-08	35.5
2008-09	63.7

Source: Finance Department CPM, internal data.

The trend change of the cost per metric tonne of coal procurement for CPM can be better visualized with the help of the graph drawn below.

Figure 4.13: Average cost of coal per MT in procurement for CPM in 2000-01 to 2008-09



Source: Table 4.8.

From the above figure 4.13, it is observed that the price of coal per MT was almost steady from financial year 2000-01 to 2003-04. It rose by more than 49% in 2004-05 as compared to financial year 2003-04. Again it slightly came down during financial year 2005-06 in comparison with that of 2004-05. It remained almost steady till financial year 2007-08 with little fluctuation. But during financial year 2008-09 it rose by more than 79% per MT of coal as compared to financial year 2007-08. So it can be observed that the price of coal has a direct impact on the cost of production of final paper in CPM which was euro 426.5 (approx.) during financial year 2008-09 (refer table 4.2, p.54). It rose by 26.7% per MT of paper

production compared to 2007-08. It is thus necessary to look for alternative sources as well as for better technology to optimize coal procurement and consumption.

Coal mining in Meghalaya being in an unorganized sector, availability and prices vary widely on demand and supply basis. The coal owners of Meghalaya can be directly contacted for supply of coal and negotiations can be done so as to optimize the price as well as supply from them. Maximum effort should be given to acquire Meghalaya coal as the cost of transporting coal from Meghalaya is lower as compared to other sources. The North Eastern Coalfields Limited, is a unit directly controlled by CIL and is responsible for development and production of coal in the North Eastern region. North East region has no major coal-based industry excepting Hindustan Paper Corporation's Jagiroad & Panchgram paper mills and Cement Corporation of India's Bokajan factory. National Thermal Power Corporation would now be a big consumer of NECL Coal for their plants outside the region. They are planning to take over Bongaigaon Thermal Power Station (BTPS) of Assam State Electricity Board at Salakati, Assam for which CIL has committed to supply the total requirement of around 2.5 million tonnes of coal per annum by expanding its mining activities in the region. NECL should also be contacted for supply of coal at least 40%/50% of the requirement. Efforts can also be made to negotiate the price as both are public sectors. Also other coal producers outside Assam other than CIL can be contacted for supply of coal, at reasonable price. The coals in India are high in ash content and have low calorific value and are low reserve of coking coal. There is a mismatch in the demand and supply of coal. During 2007-08 the demand for coal in India was 492.50 million tonnes. The supply of coal was 461.89. There was a gap of 30.61 million tonnes and this was met through imports. As per the present Import policy, coal can be freely imported (under Open General Licence) by the consumers themselves considering their needs based on their commercial prudence. Coking coal is being imported by Steel Authority of India Limited (SAIL) and other steel manufacturing units mainly to bridge the gap between the requirement and indigenous availability and to improve the quality. HPC can also try import of high calorific value, coal in case of extreme emergency to bridge the gap between domestic supply of coal and the demand for it. This will reduce the per MT requirement of coal and hence overall demand will be reduced. In all the above supply processes coordination with railway departments is of extreme importance. Railways constitute the major system for coal transportation in India as about 56% of the coal is transported by it. Only the coal from Meghalaya is transported by means of road transport. Finally, it is necessary to look for alternative sources as well as technology to optimize coal procurement and consumption. As an initiative to reduce dependence on fresh raw material HPC has gone for AFBC boilers. The 50 tph AFBC (Atmospheric Fluidised Bed Combustion) boilers being installed in NPM and CPM are designed to generate energy from present day wastes generated during the mill operations (www.hindpaper.in). Coal fines which are generated from screening of coal, unburnt coal in fly ash and effluent sludge will be used as fuel for these boilers. The commissioning of the AFBC boiler should be expedited so that it can start working at the earliest. Also the wastage should be minimised and all these requires human effort and consciousness.

4.3 The inventory trend analysis of bamboo and coal at the end of financial year

Inventory is maintained to take care of fluctuations in demand and lead time as well as to maintain a safety level to take care of fluctuations. In some cases it is maintained to take care of the increasing price tendency of raw material or rebate offered in bulk purchasing. Inventory can serve as a valuable part if a firm's supplies fluctuate, extra inventory may be necessary to separate the production process from suppliers (Heizer and Render, 2008, p.484). Sometimes it is necessary to carry materials inventory to take advantage of quantity discount in bulk purchasing which reduces the cost of goods or their delivery. It helps in material requirement planning, production and operations planning etc. It is used to cope up with mismatch of market demand and supply. But inventory is also blocked capital of an organization which reduces the working capital. So there should be proper analysis as to how much inventory is to be maintained by an organization to ensure continuity of production and meet company's strategic goals. Inventory stocks of raw materials at the end of financial year are important for next financial year's production of paper in CPM. It also helps in material requirement planning of CPM. To meet the target production and problems in the supply of bamboo and coal almost every year it is compulsory for CPM to maintain a healthy stock of raw materials.

4.3.1 Inventory stock of bamboo at the end of financial year

The growth and maturity of bamboo is seasonal. The bamboo plant leaves appear during the wetter months (April, May, June, mainly) of the years so it grows during the period depending on different species. The leaves start falling after 6-8 months with peak falling in February, March (Nath et al., 2008, P.86). So mainly in winter the bamboo collection is convenient and more. During winter road conditions are a bit better due to mainly for the dry climate. So due to the vary nature of bamboo and associated problems of transportation and logistics etc., every year there is requirement for a constant need of raw material stock of bamboo to continue the production operation. The closing stock as on 31st of March and the opening stock as on 1st of April in the financial document of the company is considered here as inventory stock. The stock of bamboo is given in the following table at the end of year.

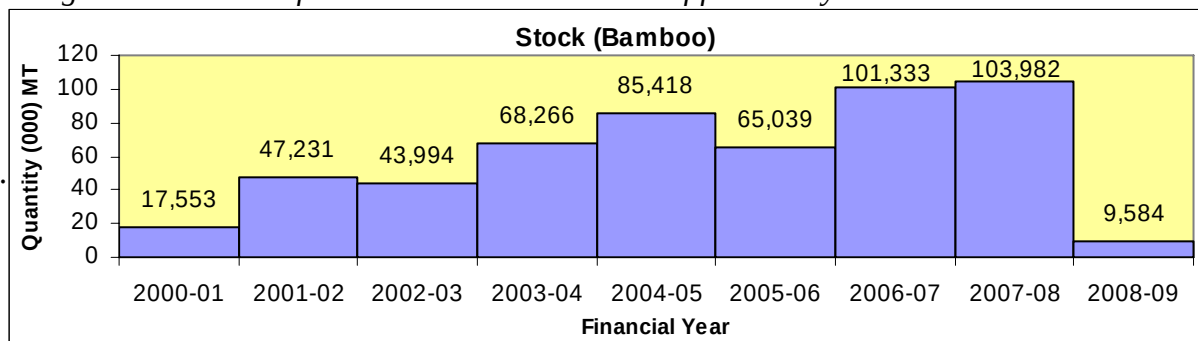
Table 4.9: Stock of bamboo in CPM at the end of financial year in 2000-01 to 2008-09

Financial Year	Quantity (MT)
2000-01	17,553
2001-02	47,213
2002-03	43,994
2003-04	68,266
2004-05	85,418
2005-06	65,039
2006-07	101,333
2007-08	103,982
2008-09	9,584

Source: Commercial Department CPM, internal data.

The above figures are drawn in graphical form below, which if analyzed, the situation is better understood.

Figure 4.14: Stock of bamboo in CPM at the end of financial year in 2000-01 to 2008-09



Source: Table 4.9.

From the above figure 4.14, it is seen that stock of bamboo at the end of financial year was quite good from financial year 2003-04 till 2007-08. It is observed that from financial year 2002-03 till financial year 2004-05 there was an increasing trend of stock of bamboo. During financial year 2005-06 the stock of year end was reduced as compared to the increasing trend of previous years. And during financial year 2006-07 and 2007-08 it again rose, crossing all previous figures. But during 2008-09 it again reduced drastically, lowering all previous figures to merely 9,584 MT. This indicates poor collection of bamboo during previous year 2007-08. The consequence of the poor inventory stock, followed by poor bamboo collection during 2008-09 resulted in poor production which was only 65012 MT.

Stock of bamboo has a strong implication on the total production of paper. Further, it is not possible to collect bamboo due to silviculture norms only as felling is not allowed from May to September. So supply during that period is very lean. To run the mill during that period bamboo stock from previous year/months requires a speculative motive. The sources of bamboo as well as pulp wood are also getting depleted. There is a need to build up stock mainly during October to April. During the lean period of supply of bamboo, CPM should go for sourcing pulp or pulp wood/chips as a precautionary measure. The sources can be from other parts of India for supplying chips or pulp for paper making. There is also scope of sourcing wood chips or imported pulp from other countries. As the cost of imported chips or pulp is now quite low due to the present market condition at least on a temporary basis this can be tried out. Before the price goes up the stock can be built up so that production can be maintained as targeted. The lead time of procurement is also high. It is necessary to plan in advance which in inventory terms is called transaction motive, in order to build up stock. This is to be done so that the time of indenting to actual receipt can be maintained without any delay in production. Another point to be kept in mind is the cost involved in inventory carrying. There is a high cost involved in inventory carrying, storage and also wastage is high with high inventory. So it is important to have optimum inventory of bamboo. Also as there is severe bamboo flowering in the traditional sources of bamboo, new sources are to be explored

at least for the time being. Chips or wood pulps should be collected from other sources to reduce the demand and supply gap.

4.3.2 Inventory stock of coal at the end of financial year

To take care of a firm's fluctuation in demand and supply, inventory is required. In CPM the coal supply reduces during the rainy season due to less extraction of coal from the sources. The road transportation of the coal is also disrupted sometimes due to landslides during that period. Moreover, the price of coal as observed in the table 4.8 page 63 is showing an increasing tendency. So CPM has to maintain sufficient stock of coal to maintain production without unplanned stoppage. As mentioned earlier the closing stock on 31st March is the reflection of raw material collected in previous financial year. The inventory stock of coal in CPM is given in the following table at the end of financial year.

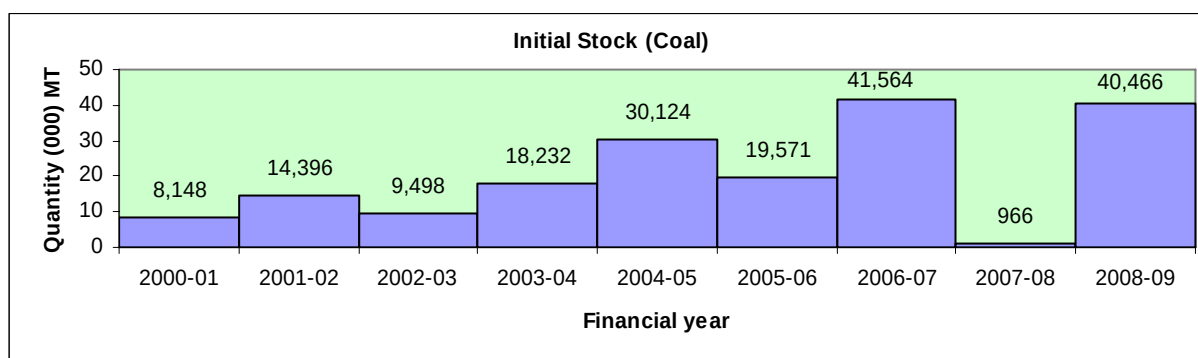
Table 4.10: Stock of coal in CPM at the end of financial year in 2000-01 to 2008-09

Financial Year	Quantity (MT)
2000-01	8,148
2001-02	14,396
2002-03	9,498
2003-04	18,232
2004-05	30,124
2005-06	19,570
2006-07	41,564
2007-08	966
2008-09	40,466

Source: Commercial Department CPM, internal data.

From the above table if a graph is drawn the situation can be better visualized.

Figure 4.15: Stock of coal in CPM at the end of financial year in 2000-01 to 2008-09



Source: table 4.10.

From the above figure it can be seen that the stock of coal at the end of financial year was fluctuating in last few years. The inventory stock carried forward from previous year was drastically low in financial year 2007-08. The above figure 4.15 shows that there was

increasing trend of stock of coal in CPM from financial year 2002-03 till 2004-05. The stock slightly reduced in financial year 2005-06 about 35% compared to 2004-05. It again rose in financial year 2006-07 by more than 100% as compared to financial year 2005-06. But in financial year 2007-08 it reduced by approximately 97.67% due to poor collection of coal during financial year 2006-07. Again during financial year 2008-09 it rose by more than 41-times the stock in 2007-08. But at the same time it is to be noted that the price of coal during 2008-09 rose by more than 79% compared to previous year (refer figure 4.13, p.64). This increase in coal price also affected the operating cost of paper production. So it is seen that the stock of coal at the end of financial year was widely varying during the last few years.

Coal mining is affected by seasonal factors also. Pithead stocks build up during the winter months. Production drops during monsoon period. During rainy seasons the extraction of coal is lowered in Meghalaya. Also the road transport from Meghalaya to CPM site is disrupted during that period due to landslide problems in the highway. During the period from June-September each year, part of the requirement of the consumers is met by drawing down stocks from the pitheads. So it is required to build stock for at least the lean supply months of coal. Secondly, the price of coal has been increasing in the last few years. It increased by 79% (approx.) particularly during 2008-09 as compared to 2007-08. NECL a subsidiary of Coal India Limited operating in Assam also hiked the price in 2008 by 50%. So whenever an opportunity arises coal should be stocked in sufficient quantity if speculation of increasing cost is there in the market. Thirdly, the lead time of procurement is also high. Advanced planning is required to collect sufficient coal so that production is not affected. So as a transaction motive it is required to build up stock of coal whenever possible. Finally through e-marketing supply of coal can be tried, as there is scope of meeting different suppliers and price can be also negotiated. The sourcing can be done from any where around the world mainly from low cost countries. The issues related to the cost involved in transportation to the mill site should be addressed properly so that the landed cost is reasonable.

4.4 SWOT analysis of procurement of raw material in CPM

In the SWOT analysis I am summarizing the findings. In addition some conclusions are also given with respect to supply management in CPM. Although SWOT is a complete analysis, of the organization, here only those points are discussed which have impact on raw material of CPM. SWOT analysis is a strategic planning method used to evaluate the Strengths, Weaknesses, Opportunities and Threats involved in a project or a business venture or an organization. It involves the objective of the organization or business venture or a project. It identifies the internal and external factors that are favorable or unfavorable to achieving the objective. In this approach the internal strengths and weaknesses of the organization are scanned. The external opportunities and threats of the business environment are also analyzed. The SWOT analysis provides information that is helpful in matching firm's resources and capabilities to the competitive environment in which it operates.

Strengths

- HPC is a mass production mill and have units located in different places and enjoys economies of scale;
- HPC is a vertically integrated multi divisional organization;
- CPM has separate forest departments to look after forest based raw material;
- CPM as a unit has separate commercial department to look after all purchasing activity and indents raised by different departments. The raw material requirement are maintained through stores department, a part of commercial department;
- CPM has separate transportation department to look after logistics activities;
- The skilled and unskilled manpower required to carry out day to day activities in the various departments of CPM is sufficient;
- ERP system has been introduced few years back in HPC to carry out procurement process, which reduced the internal lead time of processing of paper to a great extent;
- CPM's captive power has generated electricity and steam required in manufacturing of paper. It is being upgraded by installing new AFBC boiler to reduce the coal as raw material;
- CPM has also installed bamboo dust gasification plant and lime reburning plant to reduce direct dependence on few major raw materials like furnace oil, lime;
- Its unused CPM township and mill area can be used for farm forestry;
- For last few years HPC is showing profitability. So it has shown good track record in DPE;

Weaknesses

- HPC's large dependence on outside supplier particularly for huge raw material required to carry out production activities;
- The bamboo, coal lime etc. required in huge quantity and its scarcity effects all functions from production to profitability of CPM;
- HPC's labour productivity is low as compared to private sectors in the same industry; CPM has got huge employment directly or indirectly for collecting and carrying out production activity from collection of bamboo to final paper production;
- As a large organization and having separate independent departments from production, purchase, finance, forestry etc., the priorities of each department are safeguarded by individuals of that department. It demands inter-departmental coordination to a great extent;
- For supply of raw material from different sources to CPM, it has to depend on railway wagons. The railway is a separate department of government of India and has its own priorities;

- CPM is connected with only one National Highway and also meter gauge rail to other parts of India which makes transportation cost higher and situation dependent;
- Due to huge requirement of raw material in CPM for producing paper, wastage is also high which increases the requirement of new raw material;

Opportunities

- The location of CPM is such that within about 300 kilometer range it has got two major raw material namely bamboo and coal;
- There is opportunity to have latest technology-based equipment for optimum utilization of resources and to reduce operating cost;
- Soft wood or paper making wood can be used as an alternative raw material for bamboo, from neighboring states/forest lands by taking due permission;
- The surrounding areas of CPM are sparsely populated and HPC's farm forestry programme can be utilized effectively to have independence in forest based raw material in future;
- HPC is under Department of Heavy Industries of government of India and also Railway Ministry is under the same government, so it can request the central government to speed up the process of gauge conversion from Lumding to Silchar line so that raw material can be supplied to CPM directly from any part of India without hassles;
- Government of India's special policy to develop North East India's infrastructure through NEC should help transportation;
- As a member country of WTO the trade barriers are becoming faint and HPC can get raw material from outside or sell its product outside without much obstacles as compared to previous years;
- Government of India has given more autonomy to public sectors and freedom and can be capitalized by HPC;
- The demand for paper in India will be increased in next few years due to education policy of government of India, so HPC can avail the opportunity;
- CPM can utilize e-procurement which reduces the intermediate states and reduces cost also in procurement process from other parts of India or outside;
- Reuse and recycling of used paper by introducing de-inking plant to reduce dependence on fresh raw material;

Threats

- The bamboo flowering in almost all the major supply sources of CPM;
- The long term lease contract for supply of bamboo from NC Hills between NCHAC and CPM was broken;

- The supply of bamboo from NC Hills is dependent on railway wagons and situation there. And due to increasing insurgency activity in NC Hills and frequent cancellation of railway services raw material supply to CPM is also threatened;
- The ever increasing coal price also adds to the operating cost thus reducing profitability of CPM;
- The increasing lobbying of raw material suppliers to increase price, particularly that of coal, has increased dependence on them;
- The poor infrastructure, mainly the road conditions from and to the sources of raw material especially bamboo, is adding to the problem and landslide during rainy seasons also disrupts the road or rail communication to CPM;
- Fluctuations of international pulp price for importing pulp to compensate poor domestic supply;
- Poor capacity utilization due to non availability of raw material may reduce the longevity of plant and equipments due to non uniform start and stop of machineries;
- Government of India's environmental policy to reduce forest based raw materials;
- Stiff competition from private and other paper making company;
- Attrition or retirement of trained manpower also sometimes affects the functioning;

From the SWOT analysis, it is observed that the opportunity of having abundance of main raw materials for producing paper i.e. bamboo and for power generation i.e. coal availability near the mill is reducing as an advantage. The external threats of skyrocketing increase in price of coal, the bamboo flowering (which kills the bamboo plant), increasing disturbance due to insurgency in raw material sources particularly NC hills have great impact on CPM. The erratic rail transportation of bamboo, poor infrastructure in the vicinity of the mill is adding to the threats. Although CPM has got the advantage of making high quality paper which sells at a high price thus generating more revenue, but there is stiff competition from private paper makers in this field. The government of India's environmental policy to reduce forest based raw material is also restricting the use of pulp wood as a substitute for bamboo. In short the strengths and opportunities of CPM have been slowly overpowered by the weaknesses and threats.

RECOMMENDATIONS AND CONCLUSION

From the above discussion it is observed that the production of paper in CPM is covered by many hurdles. It includes the the scarcity of raw materials, external infrastructural bottlenecks, suppliers superiority, natural calamity etc. In this section some recommendations are given for improvement of the present situation and finally conclusion has been drawn.

Recommendations

Bamboo: The various sources of bamboo collection to CPM for last few years are showing an overall decreasing trend due to reasons, such as bamboo flowering, restriction on collection of forest based raw material by forest departments etc. The bamboo flowering is also reducing the availability of bamboo from collected sources. It requires at least 4/6 years for regeneration of the species of bamboo. The sources from which bamboo collection was low in the last few years, are Barak Valley (home grown), Mizoram (by road), Mizoram (by rail), Meghalaya, Tripura (by rail), NC Hills (road) and Manipur. Out of these sources Meghalaya and Manipur are the least collected sources. Meghalaya can be explored as it is also a source of wood based raw material. Agreement can be drawn between government of Meghalaya/respective department and HPC to supply bamboo as well as wood in increased quantity without disturbing the ecological balance. Also collection from Manipur can be increased as it was good during start of this century. Tripura (by rail) is another source where from collection can be increased as the connection points via rail have been increased due to expansion of railways. NC Hills via rail and road require constant monitoring and coordination as many different departments/government officials/council are involved. So the cooperation with Indian railways is also important for secure supply of bamboo. Mizoram is affected by bamboo flowering so the supply is reduced and regeneration will take time. It is also a good source of bamboo and forest wood. So HPC can try to get some wood or bamboo from other parts although it has a cost impact it can be tried till the crisis ends. Mizoram (by river) route also cannot be effectively used due to reduced water level in the river. But if the water level permits then bamboo can be collected from far away places and transported via river to a place where road transport is linked to mill.

Secondly there is an increasing need to explore new sources of supply of bamboo, pulp or pulp wood from other parts. Arunachal Pradesh is another rich source of bamboo and other forests. Bamboo is also commercially grown there by private owners as well as in forest reserves of state government. So CPM can try to get bamboo from private growers or state government forest departments. Negotiations can be done accordingly with private growers or with concerned state department for sourcing as well as transportation. As it is a distant place so transportation can be done through road and rail routes. Bamboo can be collected to the nearest railway station by road transport and transported to Lumding. In Lumding trans-shipment is required from broad gauge to meter gauge. Coordination with railways is important in this regard. From other parts of India pulp or chips can be procured. There are many paper mills and auxiliary service providers in India. CPM should try to collect pulp or chips from any of these sources to overcome this situation of crisis. Another solution is to import pulp or pulp wood as a short term measure. At present the international pulp and wood prices are lower in paper making countries like USA, Chile etc. Also Asian countries like Vietnam, Thailand, and Indonesia etc. which are low cost countries can be tried for import of pulp.

Thirdly, another source of fiber for papermaking is recovered paper collected for recycling. Although HPC recycle in house waste paper and other recoverable fibers and chemicals still it is not using commercially recycled paper except in HNL, Kerala. Instead, India imports waste paper for its pulp and paper industries. Recycling of one tonne of waste paper saves 17 trees as per one study. It develops a new industry with employment opportunity not only in remote areas but also in cities. Recycling paper also reduces air and water pollution that is generated in paper manufacturing. Recycled paper can be directly substituted by paper made of 'virgin' fiber. By using recycled paper one's dependence on forest based raw material is also reduced. In HPC's unit particularly in CPM one small de-inking plant can be installed so that at least 20% of the raw material can be used from recycled paper. HNL as a subsidiary unit got benefited from it. Also to boost the awareness for collection of waste paper government support and mass publication is required.

Fourthly, another important area is farm forestry. The National Commission on Agriculture (NCA) recommended establishment of plantations on wastelands outside forest areas through social forestry programmes. Many industries started Farm Forestry as a growing need and HPC was also not far behind in promoting the schemes. But it requires state government's help in this regard. HPC has established a Tissue Culture Laboratory in NPM for availability of large scale disease resistant and superior propagules of the desired species for supplementing the bamboo resources. The Department of Wasteland Development has recently initiated the Investment Promotion Scheme. It offers a grant covering 25 percent of the cost of plantation establishment to enterprises for rehabilitating wastelands. One of the conditions for the subsidy is that the activity should not adversely effect the livelihoods of poor people. According to reports Indian government is proposing to lease out degraded lands within 100 miles of production facilities to boost resources. So, HPC's, CPM unit can use the scheme of firm forestry in degraded lands from respective state governments. The Bamboo Resource Development Project launched by CPM in April 2004 at a cost of euro 689,230 (approx.) with the help of the government of Assam is scheduled to be completed in 2009-10. But this has also not progressed due to non-settlement of the issues relating to compensation with the government of Assam. This should be settled so that CPM get benefited from it in the long run. CPM should taken actions to improve the monitoring of the Farm Forestry Scheme. The Company should make proper arrangements to sustain its coordination and interaction with the state governments, concerned departments and NGOs to develop sources for supply of bamboo and paper pulp. Alternate schemes are to be developed to encourage bamboo cultivation and for providing direct financial benefit to bamboo growers. In short for long term fiber security CPM should implement farm forestry in an effective way, to get optimum benefit from it. HNL, a subsidiary is annually distributing one million seedlings to growers which is a remarkable step.

Coal: Another raw material which is of concern is coal whose cost has increased drastically in last few years. The price of coal increased by 79% (approx.) during 2008-09 compared to 2007-08. As coal is the major source of energy in India so demand is high. Meghalaya coal is primarily under private owners. The demand for Meghalaya coal is also increasing. As a source for CPM, management can negotiate prices and quantity directly with the coal owners, so that some compromise can be achieved in supply and price.

Northeast Coalfields Limited (NECL), a subsidiary of Coal India Limited (CIL) is another source where from coal is received by HPC's mills CPM and NPM. NECL hiked the coal price by 50% during 2008. As a major customer from the region other than power sectors and cement mills, HPC can also negotiate with them. As both are public sector undertakings under government of India so compromise can be made to supply at a reasonable price to meet at least 40% to 50% of mill requirement. Transportation of coal in India from distant place is normally done through railways so coordination with NF Railway is also important.

There are other coal fields in other parts. Procurement of coal can be tried from other parts of India. As the NE regions are availing many subsidies including subsidy in transportation due to infrastructure problem and underdevelopment CPM can take the opportunity and coal can be procured from distant places. The price and transportation are two areas where negotiations are to be done. There is also requirement of coordination among the involved parties.

In India coal is of high ash content and low calorific value. There is a huge mismatch in the demand and supply of Indian coal. Demand is higher than supply as 55% of energy requirement comes from coal annually whereas world average is 27%. SAIL another public sector undertaking, imports coal to bridge the gap between demand and supply. Similarly HPC can also try to purchase high calorific value coal. It will reduce the per MT consumption of coal in per MT production of paper.

As an initiative to reduce dependence on fresh raw material HPC has gone for AFBC boilers. The 50 tph AFBC (Atmospheric Fluidised Bed Combustion) boilers being installed in NPM and CPM will generate energy from present day wastes generated during the mill operations (www.hindpaper.in). Coal fines which are generated from screening of coal, unburnt coal in fly ash and effluent sludge will be used as fuel for these boilers. The commissioning of the new boiler should be done at the earliest to reduce consumption of fresh coal.

For procurement of any raw material another step should be the effective use of information technology. HPC has established ERP system to help procurement and inventory management and also to ensure instant information flow. E-procurement is the field using which HPC can be benefited in situations of crisis. The benefits of e-procurement are many. It increases speed, accuracy, transparency with wider competition and economy in procurement. It facilitates speedy tendering and communication. Apart from these it facilitates online pre/post contract management including bidding, contracting, ordering and payment with online participation. It eliminates delays of processing tender manually and also reduces transaction cost. It enhances better monitoring of tenders and contracts and also helps to maintain better vendor relationships. It also facilitates reduced cycle time for participation in tender and overall process. These communications should comply with IT Act 2000. E-procurement gives a wide market and through reverse auction prices also can be lowered by competitive bidding of raw material. So in situations where cost of raw material is going high using e-procurement solution this problem can be at least solved partially for CPM with service provider. Coal India Limited is selling 20% of its coal through e-marketing, so there is urgent need for CPM to explore e-procurement. MSTC Ltd. which is a public sector is pioneering in

e-marketing in India and has also starting e-procurement activities. HPC as a public sector can have some understanding with MSTC to procure raw material at competitive price not only within India but also from abroad. E-procurement also reduces processing cost to a great extent. For this only an agreement is be entered into under Information Technology Act, 2000 of government of India.

Another important area is coordination with external agencies for overall infrastructure development. The infrastructure improvement outside the mill area is external to the mill. The external infrastructure development is concerned with government of India along with the state government and related agencies. The making of altenative routes apart from the only National Highway 44 connecting the mill to the other parts of India, can be stressed in various forums. If it comes up than raw material flow can be faciliated via alternative roads. As a result procurement from other parts can be made without much hike in transportation cost. Also for NF Railway, government of Assam and NCHDC should give high priority to conversion of Lumding-Silchar railway line as the project has already crossed above 10 years. As HPC is under the Ministry of Heavy Industries, it can make a request for the completion of the ongoing projects at a faster pace, through the ministry to the other concerned ministries for its benefits.

Finally CPM should be adopting a strategic approach in supply management to have a competitive advantage. As there are resource and other constraints various HPC/CPM management heads should work together to define their functional strategies, which are a set of short term and long-term plans that will support the enterprise strategies. Reducing the cost of services and other workable areas should be an important enterprise objective when there is increasing tendency of raw material price to shoot up. Suppliers of CPM should be selected carefully and close and collaborative working relationship should be developed with them. For CPM, there is a requirement for a collaborative planning between supplier, state government/department/external third party (like railways etc.) if involved and CPM management for seamless supply of raw material from sources to mill premises.

The above mentioned recommendations are only academic specific and implementations of them are solely dependent on HPC's management.

Conclusion

The raw material crisis in CPM particularly bamboo which is the main source of fiber for paper making has forced HPC management to act promptly and reframe strategies. About bamboo flowering CPM cannot do anything but can explore new sources. For coal also CPM should enlarge its supply sources to be able to procure coal at competitive price. About the infrastructure development government of India has proposed many schemes for alternative road from Guwahati to Silchar and other raw material sourcing sites. The project of broad gauge conversion is going on although at slow pace. HPC/CPM management can highlight all these as a follow up measure in the proper forum. This will solve many long term problems of the mill for sourcing raw materials from other parts of India. The Indian paper use is to be doubled to 14 million tonnes by 2015, according to Indian Paper Manufacturer's Association.

The forecast of upswing is a result of improving literacy rates and socio-economic development as well as increased spending by government on education. It is high time for HPC's personnel to act promptly to improve the situation on a collaborative effort. Finally a consciousness should be developed among the employees to minimise wastage at every step of production process, particularly to minimise fiber loss and maximise chemical recovery. In addition technology upgradation if required should be implemented.

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APPENDIX

Some technical aspects of procurement procedure of HPC and CVC guidelines are described below.

Two part tendering: In case of two part tendering, the first part of the tender will consist of 2 sections.

PART-I Section A :- Consisting of technical offer and a check list;

PART-I Section B :- Containing commercial terms and conditions;

PART II :- The second part of the tender shall consist of details of prices only. The price bids are opened for only those tenderers whose offer in Part-I is found to be techno-commercially acceptable.

Three part tendering: Three part tendering is considered in purchase of high technology and high value plant and machinery items with detailed and complex specifications. It is also considered that the vendors shall need to have special expertise in the manufacturing and supply of the equipment.

Limited NIB: Limited tender is issued for the engineering/technical items valuing upto euro 38,641 (1 euro = 65 rupees approx.). Selection of parties are based upon the source from which it was procured earlier and the parties who may be new entrants in the field. The inclusion of new/un-registered firms may be done with recommendation of duly constituted purchase committee with approval of competent authority.

Global NIB: GNIB is floated in the press as well as website for the material to be sourced from indigenous and/or overseas sources.

Single NIB: Single NIB is issued for proprietary items/spares from OEM or authorised dealer. Provision for procurement from PSU: For any preferential treatment to PSU/SSI/NSIC /Ancillary unit as per government directives, each mill/unit shall immediately, on receipt/opening of bids prepare a detailed scheme for placement of order on such unit(s) and get it approved by the competent authority. This scheme should be based on the extant guidelines issued by the state/central government for registration/preferential treatment to SSI/Ancillary units. Thereafter, this scheme should be reviewed in the beginning of each FY with the approval of the competent authority.

Bank Gurantee: In order to safeguard the government interest, it would be appropriate to take reasonable amount of performance Bank Guarantee (BG) valid up to warranty period for due performance of the contract.

Payment terms: The payment terms should be defined unequivocally and should not be changed after award of the contract. As far as possible, the payment terms should be so structured that the payments made to the contractors are linked and are commensurate with the actual progress or supplies/installations/commissioning. It is very important to establish the reasonableness of prices on the basis of estimated rates, prevailing market rates, last purchase prices, economic indices of the raw material/labour, other input costs and intrinsic value etc., before award of the contract.

Opening of tender: The opening of tenders in the presence of trade representatives need to be scrupulously followed. While opening the tenders by the tender opening officer/committee, each tender should be numbered serially, initiated and dated on the first page. Each page of the tender should also be initiated with date and particularly, the prices, important terms and conditions should be encircled and initiated in red ink by the tender opening officer/committee. Alterations in tenders, if any, made by the firms, should be initiated legibly to make it perfectly clear such that such alterations are present on the tenders at the time of opening. Wherever any erasing or cutting is observed, the substituted words should be encircled and initiated and the fact that such erasing/cutting of original entry was present on the tender at the time of opening should be also recorded. The tender opening officer/committee should also prepare 'on the spot statement' giving details of the quotations received and other particulars like prices, taxes, duties and EMD etc. as read out during the opening of the tenders.

Payment system: After giving order to vendor it is expected that the indented material is received on time as per terms and conditions of order. After receipt of material at site same is inspected by the indenting department. If found satisfactory same is accepted. For the supplier the payment of supplied item is most important. The payment system of purchased goods is as follows, final payment is made only after acceptance of the material. 90% payment may be effected against despatch documents/inspection certificate and balance on receipt of material supported by GRV within 30 days of 90% payment. In specific cases full payment is made in advance against proforma invoice which is done with the approval of the appropriate authority competent to approve the placement of order. However advance payment is discouraged as far as possible. But for manufacturing items etc advance payment is made against Bank Guarantee. Before release of final payment in normal cases, the material in quantity, quality and specifications are duly checked and received as stipulated by the purchase order (PO). Then it is stock-charged by the Stores Department, evidenced by GRV or any other specified document/certification. The recoveries if any to be made from the supplier are made before release of final payment and also advance payment if any are also adjusted.

The time period (lead time) is allowed by HPC for submission of bid by bidder as given in the table

Table I: Lead time of bid of HPC

S. L.	Type of bid	Time (weeks)from the date of NIB
1	Open NIB	3 to 6
2	Global NIB	4 to 8
3	LNIB (indigenous)	2 to4
4	NIB(imports)	3 to 6

Source: Purchase manual HPC.

Earnest Money Deposit (EMD) to be given by contractor depending on the value of the contract is given below.

Table II: Ceiling of EMD of HPC for bid value subject to 2% of estimated value

Estimated value	Celing of EMD (euro)(1 euro = 65 rupees appr.)
Upto euro 153,846	3,076
Above euro 153,864 to euro 769,230	7,692
Above euro 769,230 to euro 1,538,461	15,384
Above euro 1,538,461	23,076

Source: Purchase Manual HPC.

The following table gives some compulsory instructions for indenting in HPC from Purchase Manual, HPC.

Table 3.3: Indenting discipline of HPC to follow strictly

Heading	Description
Category	One indent should contain only one category of item
Estimate physical, financial/ LPP	All indents shall invariably contain the estimated annual consumption, estimated value, consumption of previous year(s) and last purchase price (LPP).
MOFAP	For production inputs, MOFAP figures of quantity and price
Sourcing- Single/ Multiple	In case of indents with multiple items of same category if required to be procured from single source for avoiding mismatching etc., it shall be explicitly indicated by the indenter with justification.
Proprietary items/spares	In case of indents for proprietary items/spares, the same shall be explicitly recorded and approved by CE/ED, HOD Engineering/TS at CHQ irrespective of estimated value.
Quantity	Stock with indenter and stores must be recorded. In case indented quantity required is above stock available the same should be recorded with justification.

