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A STUDY ON THE INVENTORY CONTROL SYSTEM WITH REFERENCE TO ORCHID CHEMICALS LTD, CHENNAI

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COIMBATORE

DEPARTMENT OF MANAGEMENT STUDIES

KUMARAGURU COLLEGE OF TECHNOLOGY

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BONAFIDE CERTIFICATE

Certified that this project report titled **"A STUDY ON THE INVENTORY CONTROL SYSTEM WITH REFERENCE TO ORCHID CHEMICALS LIMITED, CHENNAI"** is the bonafide work of **Ms. H.FAHMEEDHA PARVEEN BABI (71206631014)** who carried out the research under my supervision. Certified further, that to the best of my knowledge the work reported herein does not form part of any other project report or dissertation on the basis of which a degree or award was conferred on an earlier occasion on this or any other candidate.

Faculty Guide

Director

Evaluated and vice-voce conducted on 03.07.2008

Examiner I

3/7/2008

Examiner II

DECLARATION

I, hereby declare that this project report entitled as "A Study on the inventory control system followed with reference to Orchid Chemicals Ltd. Chennai", has been undertaken for academic purpose submitted to Anna University in partial fulfillment of requirement for the award of the degree of Master of Business Administration. The project report is the record of the original work done by me under the guidance of Prof. A. Senthil kumar during the academic year 2007-2008.

I, also declare hereby, that the information given in this report is correct to the best of my knowledge and belief.

Place: Coimbatore

Date: 03.07.2008

H. Fahmeedha

(H.FAHMEEDHA PARVEEN BABI)

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Tuesday, April 29, 2008

The HOD / MBA,
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Dear Sir,

We wish to inform you that Ms.H.Fahmeedha Parveen Babi(06MBA14) who is studying II Year – M.B.A in your college has completed Project work in our Organisation from 10-01-2008 to 24-04-08.

This is for your information please.

With regards,

S.KRISHNAN
CFO

ACKNOWLEDGEMENT

It is inevitable that thoughts and ideas of other people tend to drift into the subconscious when one feels to acknowledge helping derived from others. I acknowledge to all those who have helped me in the preparation of this project work.

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Lastly I thank all the employees in the organization who were involved knowingly or unknowingly to make this project work successful.

EXECUTIVE SUMMARY

Inventories are assets of the firms, and as such they represent an investment. Every organization should maintain inventories at the optimum level, if they become too large, the firm losses the opportunity to employ those funds more effectively. Similarly, if they are too small, the firm may lose sales. Thus, maintaining the inventories at their optimal level is a key to cost efficiency.

An effective and efficient system of inventory control reaps a lot of benefits to the organization in the form of lesser investment, minimized duplication, Zero stockout situations, adequacy in the supply of raw materials whenever and wherever needed.
Several techniques are used to have a control on inventory and it depends on the convenience of the firm to adopt any of the techniques.

In the present study fixing up of the safety stock level at Orchid Chemicals Ltd has been taken as a problem to be resolved and this is done using the statistical model of standard deviation of a normal distribution.
Studying the existing inventory management practices followed in Orchid Chemicals Ltd, Chennai being the primary objective the secondary objective includes classifying the inventory according to its usage, identifying the relationship between receipts and issues of materials and fixing up the safety stock level.
The study is taken through based on the existing data available in the company financial statements, stores ledger and inventory records. ABC analysis, ratio analysis and correlation are the tools used to analyze the effectiveness of inventory control system followed at Orchid Chemicals Ltd, Chennai.

The study reveals that there is proper and effective control over the inventory at Orchid Chemicals Ltd, Chennai. The company is efficient and has put the inventory assets to effective use. There is no blocking of capital in the inventory and the capital used in the inventory is found to be optimum.

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1.1 INTRODUCTION

Inventory control, otherwise known as stock control, is used to show how much stock a company has at any one time, and how it is tracked. Efficient stock control allows having the right amount of stock in the right place at the right time. It ensures that capital is not tied up unnecessarily, and protects production if problems arise with the supply chain.

Inventory management is a **financial trade-off between inventory costs and stock-out costs.** The more stock, the more working capital is needed and the more stock depreciation you get. In the other hand if you do not have enough stock, you get inventory stock-outs, missing potential sales, possibility interrupting the whole production process.

Inventory stock depends essentially of two factors

- Demand: the amount of items that will be consumed or bought.
- Lead time: the delay between reorder decision and renewed availability.

Yet those two factors are subject to uncertainties

- Demand variations: customer behaviors can evolve in rather unpredictable ways.
- Lead time variations: suppliers or transporters may be faced with unplanned difficulties.

OBJECTIVE OF INVENTORY:

The purpose of inventory is to reduce materials holding cost that is inventory carrying cost and the ordering cost. This helps the company's to save their cost of capital and utilize their resources for a better investment opportunity.

BENEFITS OF INVENTORY CONTROL:

1. Keeps down investment
2. Eliminates duplication
3. Better utilization of available stock
4. Minimizes stock out situations
5. Re-sale of obsolete inventory
6. Adequate supply of materials

METHODS OF INVENTORY CONTROL

Several techniques of inventory control are in use and it depends on the convenience of the firm to adopt any of the techniques. What should be stressed, however, is the need to cover all items of inventory and all stages, i.e., from the stage of receipt from suppliers to the stage of their use. The techniques most commonly used are the following.

Always better control (ABC) classification
Vital essential and desirable (VED) classification
Scarce, difficult and easy to obtain (SDE)
Fast moving, slow moving and non-moving (FSN)
Economic Ordering Quantity decision making (EOQ)

Inventory levels

Two Bin systems

GOLF analysis

Material requirement planning (MRP)

Just-in time (JIT)

Physical verification of stock

Inventory turnover ratio

ABC ANALYSIS

One of the widely used techniques for control of inventories is the ABC (Always Better Control) analysis. The objective of ABC control is to vary the expenses associated with maintaining appropriate control according to potential savings associated with a proper level of such control.

Once inventory is classified, we have a base for deciding where we will put our effort. Logically, we expect to maintain strong control over the 'A', items taking whatever special action needed to maintain availability of these items and hold stocks at the lowest possible levels consistent with meeting demands. At the other end of the scale, we cannot afford the expense of rigid controls, frequent ordering and expediting because of low amount in this area. Thus with the 'C' group, we may maintain somewhat higher safety stocks, order more months of supply, expect lower levels of customer service, or all the three. It is for this selective approach, that ABC analysis is often called Selective Inventory Control Method (SIM).

Extending Pareto's principle to inventory, it is always possible and necessary to separate 'vital few 'from 'trivial many' of the stock items for there effective control. Separating vital few from trivial many is what is precisely done in ABC analysis.

Value of consumption of items (value in Rs).	No. Of items	Grade
70% of consp.	10% of no. Of items	A
20% of consp.	15% of no. Of items	B
10% of consp.	75% of no. Of items	C

VED Analysis:-

Vital, essential and desirable (VED) analysis is done mainly for control of spare parts keeping in view the criticality to production. Vital refers to items of inventory the stock-out of which even for a short time will stop production for quite some time. The stock-out cost of vital items is very high. Essential are items the absence of which cannot be tolerated for more than a few hours or a day and the cost of lost production is high. Such items of stock are essential for the production to continue. The desirable category includes items are, which are needed, but their absence for even a week or so will not lead to stoppage of production. Some papers though, negligible in value may be vital for the production to continue and require constant attention. Such items of stock may not receive the attention they deserve if they are maintained under ABC analysis method because their consumption value is small.

SDE CLASSIFICATION:-

The SDE (Scarce, Difficult, Easy) analysis is based on the availability of items and is very useful in the context of scarcity of supply. In this analysis, 'S' refers to scarce items, generally imported and those which are in short supply. 'D' refers to difficulty items, which are available indigenously but are difficult to procure. Items which have to come from distant places or for which reliable suppliers are not available fall in to 'D' category. 'E' refers to items which are easy to acquire and which are available in local markets.

The SDE classification based on problems faced in procurement is vital to the lead time analysis and in deciding the purchasing strategies.

FSN Analysis:-

FSN stands for Fast moving, Slow moving and Non-moving, here classification is based on the pattern of issues from stores and it is useful in controlling obsolescence.

To carry out FSN analysis, the date of receipt or the date of issue, whichever is later, is taken to determine the number of months, which have lapsed since the last transaction. The items are usually grouped into a period of 12 months.

FSN analysis is helpful in identifying active items which need to be reviewed regularly and surplus items which have to be examined further. Non-moving items may be examined further and their disposal can be considered.

ECONOMIC-ORDER-QUANTITY DECISION MODEL:-

The first major decision in managing goods for sale is deciding how much of a given product to order. The EOQ is a decision model that calculated the optimal quantity of inventory to order under a restrictive set of assumption. The simplest version of this model incorporates only ordering costs and carrying costs into the calculations. It assumes the following...

1. A fixed quantity is ordered at reorder point.

2. Demand, ordering costs and carrying costs are known with certainty. The **purchase-order lead time-** the time between placing an order and its delivery is also known with certainty.

3. Purchasing cost per unit are unaffected by the quantity ordered, this assumption makes purchasing cost irrelevant in determining EOQ, because purchasing costs of all units acquired will be the same regardless of the order size in which the units are ordered.

4. No stock outs occur. One justification for this assumption is that the costs of a stock out can be prohibitively high. We assume that to avoid these potential costs, manager always maintain adequate inventory so that no stock out cost occur.

5. In deciding the size of the purchase order managers consider the costs of quality only to the extent that these costs affect ordering cost or carrying cost.

The formula for EOQ model is:-

EOQ= $\sqrt{2AB/C}$

A=demand in units for a specified time period

B= relevant ordering costs per purchase order

C=relevant carrying costs of one unit in stock for the time period used

GOLF Analysis:

This analysis is similar to SDE analysis and is based upon nature of suppliers and type of market from where the purchases are made, because they determine that they supply, the lead-time, the payment terms consistency and continuity of service and administrative procedures. Therefore it becomes necessary to identify separately different group of suppliers having these variations and accordingly the suppliers can be classified into four groups namely,

G for government suppliers

O for ordinary or non government suppliers

L for local suppliers

F for foreign suppliers

MATERIALS REQUIREMENT PLANNING (MRP) is a "push-through" System that manufactures finished goods for inventory on the basis of demand forecasts. MRP uses.

1. Demand forecasts for the final products.

2. A bill of materials, components and subassemblies for each final product.

3. The quantity of materials, components, finished products and product inventories to pre determine the necessary output at each stage of production.

Taking in to account the lead-time required to purchase materials and to manufacture components and finished products, a master production schedule specifies the quantity and timing of each item to be produced. Once scheduled production starts the output of each department is pushed through the production line whether it is needed or not. The result is often an accumulation of inventory as work station that receives work they are not yet ready to process.

Inventory management is a key challenge in an MRP system. The management account can play several important roles in meeting this challenge. A key role in maintaining accurate and timely information pertaining to materials, work-in-process and finished goods inventories. The change enabled national to move products from plant to customers in 4 days rather than 45 days, And to reduce distribution costs from 2.6% to 1.9% of revenues. These benefits subsequently led national to outsource all its logistics to federal express, including shipments between its own plants in the United States, Scotland and Malaysia.

JUST-IN TIME PURCHASING:-

Just-in-time (JIT) purchasing of materials is such that a delivery immediately precedes demand or use. JIT purchasing requires organizations to restructure their relationships with suppliers and place smaller and more frequent purchase orders. JIT purchasing can be implemented in manufacturing sectors of the economy consider JIT purchasing for Hewlett Packers (H P's) manufacture of Kayak work station production line HP has long term agreements with suppliers who provide the major components for this product line. Each supplier required to deliver components such that HP's final assembly plans meet their own production schedule and it have minimal inventory of the various components on hand.

PHYSICAL VERIFICATION OF STOCK:-

Checking of stock by physical verification is an essential feature of stock control such checking may be periodic or continuous. Under periodic stock verification system, all the items of the stock are to be verified once in a year at the time of preparing annual accounts resulting in the following difficulties.

1. Loss of stoppage of production for stock taking.

2. Shortage of experienced stock-verifiers, if all items of stores are to be verified at a time.

3. Thus, quality of verification suffers.

4. Discrepancies reveled during verification are rectified only at the end of the year.

5. Element of "surprise check" which helps to detect irregularities are absent.

Periodic verification is, therefore, carried out in those areas, which are not covered under continuous stock verification, such as, work in progress, stock on shop floor, laboratory, canteen, etc.

1.2 REVIEW OF LITERATURE

H. T. Lee [1] Observed that Inventory control plays an important role in supply chain management. Properly controlled inventory can satisfy customers' demands, smooth the production plans, and reduce the operation costs; yet failing to budget the inventory expenses may lead to serious consequences. The bullwhip effect, observed in many supply chain management cases, causes excessive inventory due to information distortion, i.e. the order amount is exaggerated while a minor demand variation occurs, and the information amplified dramatically as the supply chain moves to the upstream. In this paper, one of the main causes of bullwhip effect, order batching, is considered. A simplified two-echelon supply chain system, with one supplier and one retailer that can choose different replenishment policies, is used as a demonstration. Two types of inventory replenishment methods are considered: the traditional methods (the event-triggered and the time-triggered ordering policies), and the statistical process control (SPC) based replenishment method. The results show that the latter out-performs the traditional method in the categories of inventory variation, and in the number of backlog when the fill-rate of the prior model is set to be 99%. This research provides a different approach to inventory cost-down other than the common methods like: information sharing, order batch cutting, and lead time reduction. By choosing a suitable replenishment policy, the number of backorder and the cost of inventory can be reduced.

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[1] H. T. Lee, A study on inventory replenishment policies in a two-echelon supply chain system, Computers and Industrial Engineering, Volume 51, Issue 2 (October 2006), PP: 257 - 263

Pawan Kumar[2] conducted a detailed analysis of inventory management functions in the PSEB and observed that

1. Existing purchase system of the Board was observed. In which organisation structure of procurement deptt., purchase policies, record relating to purchases were analysed
2 .Existing system of inventory control adopted by the board was studied
3. Treatment given to wastages, spoilage and dead inventory by the stores were taken.
4. New Inventory control technique applied to improve the efficiency of material management department and to reduce cost of inventory.

Pal R; Ghosh BN[3] conducted an analysis of the existing system of Inventory Control and Material Management Systems in a regional Central Government Medical Store and found that only 12 percent of drugs purchased accounted for 89.5 percent of the total purchase cost. Out of 1302 items of drugs purchased, vital life saving drugs were only 19 and accounted for 2.3 percent of the total annual purchase cost. The forecasting system followed (arithmetic average) was found to be grossly inaccurate, resulting in stockout position of 62.1 percent of items and surplus stock of 37.9 percent of items. Nearly half (56.8 percent) of the supply orders were placed (internal lead time) within 12 weeks and the supply received (53.5 percent) within an external lead time of 8 weeks.

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[2] Pawan Kumar, Analytical Study of Inventory Management in Punjab State Electricity Board, FINANCE INDIA, Vol. X No. 2, June 1996, PP. 412-415

[3] Pal R; Ghosh BN, **A study on the existing system of inventory control and material management in a central medical store,** *Indian Journal of Community Medicine. 1991 Jul-Sep; 16(3), PP. 130-5*

Lt Col R Gupta [4]et Al conducted an ABC and VED Analysis in Medical Stores Inventory Control based on ABC-VED matrix, economic analysis of drug expenditure of priced vocabulary of medical stores (PVMS)
section 01 for the year 2003 of a 190 bedded service hospital the result was:
Out of 493 drugs in PVMS section 01, only 325 drugs were being used in the reference hospital. The total cost of drugs used
was Rupees 55,23,503. Of these 325 drugs, 47(14.4%) drugs were Category A , consuming 70% of total expenditure, 73 (22.46 %)
drugs Category B consuming 20% and rest 205 drugs (63.7%) Category C drugs cost only 10% of expenditure. VED categorization
done by consensus opinion of medical officers, found 24 (7.3%) drugs vital, 160 (49.3%) essential and rest 141 (43.3 %) desirable.
Conclusion: On coupling the two techniques ABC-VED matrix was made and drugs were classified in to Category I
(AV+BV+CV+AE+AD) comprising 68 drugs, Category II (BE + CE +BD) 159 and Category III (CD) 98 drugs. The management of
Category I drugs was monitored by top management resulting in better control on the annual expenses and at the same time
mking available the vital Category II by middle and Category III at lower mangerial level.

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[4] Lt Col R Gupta*, Col KK Gupta (Retd)+, Brig BR Jain (Retd)#, Maj Gen RK Garg, ABC and VED Analysis in Medical Stores Inventory Control, *MJAFI, Vol. 63, No. 4, 2007,* PP. 325-327

L. Joseph Rosenberg and David P. Campbell[5] marketing managers began adopting the Economic Order Quantity (EOQ) method of inventory control from the manufacturing industry almost thirty years ago. A new approach, "Just-In-Time" inventory, pioneered by Japanese firms, should be considered. This approach consists of at least two significant phases: one, technical, based on instantaneous communication flow and the computer; and secondly, behavioral, emphasizing improved cooperation between members of the channel system.

Christian Larsen, Claus Hoe Seiding and Christian Teller[6] Developed a framework to compute the optimal inventory policy for a large spare parts distribution centre operation in the refrigeration and air conditioning (RA) division of the Danfoss Group in Denmark. The RA division distributes spare parts worldwide for cooling and air-conditioning systems. The warehouse logistics operation is highly automated. However, the procedures for estimating demands and the policies for the inventory control system that were in use at the beginning of the project did not fully match the sophisticated technological standard of the physical system. During the initial phase of the project development, we focussed on the fitting of suitable demand distributions for spare parts and on the estimation of demand parameters. Demand distributions were chosen from a class of compound renewal distributions. In the next phase, we designed models and algorithmic procedures for determining suitable inventory control variables based on the fitted demand distributions and a service-level requirement stated in terms of an order fill rate. Finally, we validated the results of our models against the procedures that had been in use in the

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[5] L. Joseph Rosenberg and David P. Campbell, Just-in-time inventory control: A subset of channel management, Journal of the Academy of Marketing Science,

Volume 13, Number 3 / June, 1985, PP.124-133

[6] Christian Larsen, Claus Hoe Seiding and Christian Teller, An inventory control project in a major Danish company using compound renewal demand models, IMA Journal of Management Mathematics Advance Access, December 6, 2007

company. It was concluded that the new procedures provided a better fit with the actual demand processes and were more consistent with the stated objectives for the distribution centre. We also initiated the implementation and integration of the new procedures into the company's inventory management system

This thesis[7] analyzes the financial impact of applying a single inventory requirements model to three separate classes of inventory at the Defense Logistics Agency's (DLA) Defense Supply Center-Columbus (DSCC) commodity management facility. DLA' 5 blanket application of its variation of the Economic Order Quantity (EOQ) requirements model may not be appropriate for all levels of demand, possibly suboptimizing DLA's desire to minimize inventory costs while still providing an appropriate level of customer service. Simulation analyses of the DLA EOQ requirements model, the Silver-Meal heuristic, and Periodic Order Quantity models were conducted to examine which dynamic lot-sizing model is more effective in minimizing inventory costs and levels for different levels of item demand. The Periodic Order Quantity model provided lower inventory levels and total variable costs than the DLA EOQ and the Silver-Meal models for the medium demand category. The DLA EOQ requirements model was found to provide lower inventory levels and total variable costs than either the POQ or the Silver-Meal models in the low and high demand categories.

[7] A Study of Defense Logistics Agency Inventory Classifications: Application of Inventory Control Methods to Reduce Total Variable Cost and Stockage Levels

Ahmet Satir, Dilek Cengiz [8]present a stochastic, periodic-review model used to control the medicine inventories in a university health centre. Features and formulation of the model are discussed in terms of the stockout objective and the budgetary constraint. Demand and cost data used for the three medicine groups are provided. Findings of the study are analysed within the framework of sensitivity analysis, where the expected shortage levels for the medicine groups studied are taken as the performance criteria. The inventory control is exercised on three groups of medicine in the centre namely

- Pain
- Catarrhs
- Ache

Abuhilal, Laith[9] carried out a Comparison Among JIT, MRP, and MRP With Information Sharing

primary consideration of supply chain management (SCM) is the flow of goods from the source of raw materials to the ultimate end consumer. Inventory management is one of the cornerstones of SCM and inventory is a key cost-contributor in any supply chain (SC).

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[8] Ahmet Satir, Dilek Cengiz, Medicinal Inventory Control in a University Health Centre, *The Journal of the Operational Research Society*, Vol. 38, No. 5 (May, 1987), PP. 387-395

[9] Abuhilal, Laith,Supply Chain Inventory Control: A Comparison Among JIT, MRP, and MRP With Information Sharing, Engineering Management Journal, volume 21, Thursday, June 1 2006

Among the major methodological approaches to inventory management with which engineering managers are familiar are material requirements planning (MRP) and just-in-time (JIT) manufacturing. Choosing the "best" inventory management system depends on numerous parameters, among the most important of which are supply chain-related parameters, such as the demand pattern, the demand level, and the inventory costs. In this article, we present a methodology of how to carry out a comparison between these two inventory management systems in order to select the better one.

Westerkamp, Thomas A [10] Identified common stockroom stumbling blocks is essential in ensuring productivity and efficiency

Maintenance and engineering managers specifying shelving and storage systems for maintenance and engineer ing departmeets have a broad spectrum of products to choose from, depending on the needs of their

.

Unfortunately, each organization has its own set of organizational and production selection challenges when it comes to making sure that front-line technicians have access to needed parts and equipment.

By identifying the biggest storage and inventory challenges maintenance departments face and taking a closer look at products and systems designed to meet these challenges, managers will have a better chance of removing roadblocks to efficiency.

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[10] Westerkamp, Thomas A, Inventory: Management: Five challenges, Maintenance Solutions, volume 18, Friday, June 1 2001

Lloyd J. Taylor III [11]explored and compared the potential benefits of three work-in-process (WIP) inventory drive systems and their associated inventory buffer characteristics. The three inventory drives are a push, a pull and a hybrid push/pull system. While these systems have some aspects in common, their buffer management systems vary. The statistical analysis associated with the study was based on data gathered from three computer simulated flow-shop assembly line environments. Hypotheses concerning the financial performance measurements were established. The independent variables were controlled and manipulated for each of the models. From the statistical analysis, a conclusion was drawn as to which system would afford the operation optimum results. While inventory has traditionally been considered and is currently being shown as an asset from an accounting point of view, it is obvious from the findings of this study, that excess WIP inventory, above the minimal requirements for production, will have a negative effect on the financial measurements evaluated in this study.

1.3 STATEMENT OF THE PROBLEM

In Orchid pharmaceuticals Limited, the system of inventory control and management is carried out without fixing up the inventory level. Fixing up the stock level is a key factor for effective inventory management. Hence, the creation of such stock level is taken as a problem to be resolved.

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[11] **Lloyd J. Taylor III** , A simulation study of WIP inventory drive systems and their effect on financial measurements, Integrated Manufacturing Systems, 1999, volume 10, Issue 5, **PP.** 306 - 315

1.4 OBJECTIVES OF THE STUDY

PRIMARY OBJECTIVE

- To study the existing inventory management practices followed in the organization.

SECONDARY OBJECTIVE

- To classify the inventory according to its usage.
- To identify the relationship between the receipts and issues of materials.
- To fix up the safety stock level.

1.5. SCOPE OF STUDY

The study on inventory control system followed in orchid chemicals is based on the data available in the company's balance sheet, profit and loss account, stores ledger. The performance of the present inventory control system, inventory control technique used by the company is analyzed. The project is confined to the analysis of data available for the past five years (2003-2008)

1.6. RESEARCH METHODOLOGY

1.6.1. RESEARCH DESIGN:

Research can either be exploratory or descriptive. Exploratory research seeks to extend the boundaries of knowledge in a given area and with no necessary immediate application to existing problem. Descriptive research on the other hand, attempts to use existing knowledge as an aid to the solution of some give problem/set of problems.

The research design used in this study has been descriptive in nature. The study and analysis is confined to the existing facts and figures in respect of the inventory control techniques and tools followed by the company.

1.6.2. METHOD OF DATA COLLECTION:

Data used in researches can be of two types primary and secondary data.

Primary Data:

Information that has been collected at first hand. It involves measurement of some sort, whether by taking readings off instruments, sketching, counting, or conducting interviews (using questionnaires).

Secondary Data:

Secondary Data refers to information that has previously been gathered by someone other than the researcher and/or for some other purpose than the research project at hand.

The present study involves secondary data collected from the company annual reports, manuals, stores ledger, and financial statements for a period of five years from 2002 to 2007.

1.6.3. TOOLS FOR ANALYSIS:

The following tools have been used to study the inventory control system of the company

1.6.3.i ABC analysis

1.6.3.ii Inventory Levels

1.6.3.iii Statistical model of *Standard Deviations* of a *Normal Distribution*

1.6.3. iv Inventory Ratios

1.6.3.V Correlation Analysis

1.6.3.i ABC analysis:

Application of Pareto's Law, or the 80/20 rule. ABC analysis is a determination of the relative ratios between the number of items and the value of items purchased repetitively for stock.

Typically 5-10 percent of the items (A items) account for 75-80 percent of the investment, 20-25 percent of the items (B items) account for 15-20 percent of the investment, and 70-75 percent of the items (C items)
account for 5-10 percent of the investment.

A-items someone at senior level must be made responsible to regularly review the consumption of overseas items up to date and accurate records should be maintained for these items. The inventory of this item must be minimum and the orders for these items should be staggered. So that timely arrival of these items is insured attempt must be made to reduce internal and external lead-time of these items. Safety stocks of these items should be minimum because frequency of ordering this items are kept high, price discount for this items should not be avail because physical ordering is very frequent.

B-items-this items should be kept under normal control and goods report keeping must be maintain. Safety stock of these items can be moderate. Price discount can be avail and physical stocktaking can also be moderate.

C-items-little control is required for c-items and the job of controlling should be left to lower level people such as those in charge of store. Large quantity or inventories can be maintain these stock because they are cheap, so as to avoid stock out situation these items should not kept under lock and key and must be kept at convenient places open to all for uses safety. Stock of these items can be sufficient to avoid probability. Price discount can be avail to purchase in bulk quantity because they are cheap. Physical checking of the stock can be done rarely once in six months.

1.6.3.ii INVENTORY LEVELS

The stock levels used in inventory control systems for both accounting and physical measures are minimum stock, maximum stock, re-order level and the re-order quantity or economic order quantity.

Minimum stock level

'The lowest level to which stocks should normally be allowed to fall, and is held as buffer stock to be made available in situations of non-delivery by a supplier'. It takes into account the re-order level and average consumption in the average delivery period.

Maximum stock level

'The highest level to which stock should normally be allowed to rise, otherwise too much working capital is tied up, thus sacrificing liquidity, and there is a risk of loss through deterioration and obsolescence'. It takes account of the re-order level, the re-order quantity and the minimum consumption in the minimum delivery period.

Re-order level

'This is the level at which an order would normally be raised'. It takes into account the maximum usage in the maximum delivery period.

Economic order quantity

'This is the quantity which is most economical to order as it minimises the costs of ordering and the carrying costs such as storage, insurance and interest on capital'.

Once the re-order quantity has been determined, the other control levels can be determined by the following formulae:

Minimum stock level = Re-order level - (average usage in average delivery period).

Maximum stock level = Re-order level + re-order quantity - (minimum usage in minimum delivery period).

Re-order level = maximum usage x maximum delivery period

1.6.3.iii RATIO ANALYSIS

The term ratio refers to the numerical or quantitative relationship between two items/variables. Ratio analysis makes the related information comparable. It is a quantitative tool enabling the analysts to find out the profitability, liquidity, solvency position of a firm. In this study two ratios relevant to inventory control are used.

Inventory turnover ratio

This ratio shows how many times in one accounting period the company turns over its inventory. It is valuable for spotting under-stockings, overstocking and obsolescence. Faster turnover of inventory shows positive trend and a negative trend is when inventory is obsolete. Inventory turnover shows increase in cash flow by keeping a track of sales over the year. Inventory turnover reduces warehousing and other related costs.

Inventory Turnover Ratio= Cost of Sales / Average Inventory

Inventory turnover period

This refers to the time taken for the conversion of inventory into cash. Inventory turnover period is calculated by dividing the no of days in a year by the inventory turnover ratio. With the help of the inventory turnover period the inventory can be classified into fast moving and slow moving

Number of Days Inventory = 365 days / inventory turnover ratio.

Inventory to Net Working Capital

This is the ratio between the inventory and the firms net working capital.Net working capital refers to the difference between the current assets and current liabilities. This ratio tells how much of a company's funds are tied up in inventory.

It also indicates if too high a proportion of current working capital is in inventory. Because inventory is a less liquid resource than cash, too high a level of inventory can indicate the inability to turn working capital into cash to meet short-term obligations.

Inventory to net working capital = Inventory / Net working capital

1.6.3 iv STATISTICAL MODEL OF *STANDARD DEVIATIONS* OF A *NORMAL DISTRIBUTION*[12]

One of the most widely accepted methods of calculating safety stock uses the statistical model of *Standard Deviations* of a *Normal Distribution* of numbers to determine probability. This statistical tool has proven to be very effective in determining optimal safety stock levels in a variety of environments.

The statistical model uses the standard deviation calculation to describe the probability of a number occurring in reference to the mean in a normal distribution. A table is then used to determine a multiplier to use along with the standard deviation to determine ranges of numbers which would account for a specified percentage of the occurrences. The multiplier is referred to as the *number of standard deviations* required to meet the percentage. The theory states that zero standard deviations added to the mean will result in a number in which 50% of the occurrences will occur below, one standard deviation added to the mean will result in a number in which 84% of the occurrences will occur below, 2 standard deviations added to the mean will result in a number in which 98% of the occurrences will occur below, and 3 standard deviations added to the mean will result in a number in which 99.85% of the occurrences will occur below.

In the safety stock calculation multiplier is referred to as the service factor and demand history is used to calculate standard deviation. In its simplest form this would yield a safety stock calculation of *safety stock = (standard deviation) * (service factor)*. If the

[12] source: http://www.inventoryops.com/safety_stock.htm

lead time, order cycle time, and forecast period were all the same and the forecast was the same for each period and equaled the mean of the actual demand for those periods, this formula would give accurate result.

FORMULA FOR CALCULATING SAFETY STOCK[13]

Safety stock = (Standard deviation) * (Service factor)

Standard deviation: MAD(mean absolute deviation)

MAD: ∑(deviation of actual usage and demand forecasted)/no of periods(n)

Service factor. Factor used as a multiplier with the Standard Deviation to calculate a specific quantity to meet the specified service level

Service level: It measures the probability that all customer orders arriving within a given time interval will be completely delivered from stock on hand, i.e. without delay.

[13] source: http://www.inventoryops.com/safety_stock.htm

1.7. LIMITATIONS OF THE STUDY

The project has been done using the tools which have their own inherent limitations and these form the limitations to the study undertaken.

- Position in the interim period is not revealed by data gathered from the reports, moreover they give no clue to the future.
- Impact of inflation: Financial statements are prepared using historical cost and the values are not adjusted for price level changes. .
- The data collected for computation has been in quantitative terms rather than qualitative as it involves cost aspect.

1.8. CHAPTER SCHEME

CHAPTER 1

This chapter deals with introduction. Objectives, scope, research methodology, research design, limitations pertaining to the study are covered under this chapter

CHAPTER 2

This chapter conveys the history of ORCHID CHEMICALS LTD. This chapter highlights the origin, development, objectives, product profile, market potential, management and future plans of the company.

CHAPTER 3

This chapter gives the macro and microanalysis of foundry industry with respect to ORCHID CHEMICALS LTD.

CHAPTER 4

This chapter depicts the data analysis and interpretation.

CHAPTER 5

This chapter gives summary of findings from the study undertaken, the suggestions given and the conclusion.

CHAPTER 2

2.1 HISTORY OF THE ORGANISATON

Orchid Chemicals & Pharmaceuticals Ltd (Orchid) was established in 1992 as a 100% Export Oriented Unit (EOU). Commencing operations in 1994, Orchid has achieved amazing and consistent growth, quantitatively and qualitatively to emerge among the Top-15 companies in the Indian pharmaceutical industry in a short span of fourteen years of operations. Orchid employs over 3700 people, of which over 600 are scientists, technologists and other professionals.

Orchid is today a globally recognized, integrated pharmaceutical company with core competencies in the development and manufacture of Active Pharmaceutical Ingredients (APIs) and Finished Dosage Forms as well as in drug discovery. From the very inception, Orchid has been investing aggressively for establishing modern research and manufacturing facilities aimed at global markets, thus emerging as a world-class pharmaceutical company covering the entire value chain from "Discovery to Delivery".

Orchid has two manufacturing sites for APIs (at Alathur near Chennai and at Aurangabad, near Mumbai) and three manufacturing sites for Dosage forms (at Irungattukottai and Alathur in Chennai), besides two R&D centres (at Sholinganallur and Irungattukottai, Chennai). Orchid's facilities are state-of-the-art and have several international regulatory approvals, including the US FDA and UK MHRA. Orchid's API facilities are ISO certified for their quality, environmental management and operational health and safety systems. Orchid has a Joint Venture in China for manufacturing sterile APIs.

Orchid's scientific and technical strengths have made it a partner of choice for several multinational corporations. Orchid has long-term exclusive marketing alliances with reputed global companies such as Apotex, Actavis, Dava and Hospira for distribution of

Orchid's products in the advanced markets of US and Europe.

Orchid has an established end-to-end connected infrastructure for drug discovery and development which are channeled through its two subsidiaries, Orchid Research Laboratories in Chennai and Bexel Pharmaceuticals in the US. Through superior infrastructure and by adopting

a judicious blend of structure-based drug design approach, Orchid has been able to simultaneously work on six therapeutic programs with several lead compounds in advanced stages of trials.

Orchid is a leader in the use of environment friendly technologies. Orchid has invested substantially in zero-discharge manufacturing processes at its facilities and is considered a national show-case in environmental friendliness.

2.2 MANAGEMENT

The Orchid family comprises of professionals handpicked from different faculties handling an array of diverse operations ranging from R&D, process development, production and quality maintenance to effluent treatment, utilities, maintenance, safety, health & environment

Similarly, experienced professionals steer crucial operational domains like marketing, accounts & finance and human resources together with engineering and other operational areas.

The core management team responsible for formulating the company's growth strategies comprises of innovative, entrepreneurial, and collaborative senior management members led by the Founder and Managing Director and are responsible for building Orchid from a blue print project to its current global leadership position.Collectively, Orchid's team has built the company into a highly respectable and admired player in the global Pharmaceutical industry.

BOARD OF DIRECTORS

Shri R.Narayanan, Chairman.

Shri K. Raghavendra Rao, Managing Director.

Dr. C. Bhaktavatsala Rao, Deputy Managing Director.

DIRECTORS

Dr. M. R. Girinath.

Dr. I. Seetharam Naidu.

Dr. Anzaghi Piergiorgino.

Dr. Bhiswajit Nag.

Shri Deepak Vaidya.

Shri Subramanian Andi.

Shri Anil Thandani.

Shri Raj Rajkumar.

2.3 PRODUCT PROFILE

- Active Pharmaceutical Ingredients
- Formulations

ACTIVE PHARMACEUTICAL INGREDIENTS

Oral Cephalosporins	
Products	**Pharmacopoeia**
First Generation	
Cefalexin	EP/BP/USP/CP/JP
Cefradine	EP/BP/USP
Cefadroxil	EP/BP/USP
Second Generation	
Cefuroxime Axetil Amorphous	EP/BP/USP
Cefuroxime Axetil Crystalline	USP
Cefprozil	USP
Third Generation	
Cefixime	EP/BP/USP
Cefpodoxime Proxetil	JP/USP
Cefdinir	JP
Ceftibuten	In-House
Cefditoren Pivoxil	JP

Sterile Cephalosporins	
First Generation	
Cefazolin Sodium	EP/BP/USP
Cephalothin Sodium	EP/BP/USP/CP
Second Generation	
Cefuroxime Sodium	EP/BP/USP
Cefoxitin Sodium	EP/BP/USP
Cefotetan Sodium	USP
Cefonicid Sodium	USP
Cefamandole Nafate	USP/EP
Third Generation	
Cefotaxime Sodium	EP/BP/USP
Ceftriaxone Sodium	EP/BP/USP
Cefoperazone Sodium	EP/CP
Ceftazidime	EP/BP/USP
Ceftizoxime Sodium	USP
Fourth Generation	
Cefepime HCl	USP
Cefpirome Sulphate	In-House

Sterile Veterinary Cephalosporins	
First Generation	
Cefalonium	BP
Second Generation	

Ceftiofur Sodium	In-House
Cefquinome	In-House

Non Cephalosporins - Betalactams	
Piperacillin	EP/USP/JP
Tazobactam	In-House
Tazobactam + Piperacillin (1:8)	USP
Meropenem	USP

Speciality Nutraceutical/Food/Dietary Ingredients	
SAMe (S-Adenosyl Methionine)	USP
Resveratrol	In-House
Biotin (Vitamin H)	EP/USP/JP
Co-Enzyme Q10	In-House

BP - British Pharmacopoeia **CP** - Chinese Pharmacopoeia **EP** - European Pharmacopoeia
JP - Japanese Pharmacopoeia **USP** - United States Pharmacopoeia

FORMULATIONS (DOMESTIC)

- Anti-infective
- Anti-inflammatory
- Anti-oxidants
- Anti-ulcerant
- CNS
- CVS
- Nutraceuticals
- Oral Anti diabetic

2.4 COMPETITIVE STRENGTH OF THE COMPANY

- Orchid has reached a topline of nearly Rs1000 crore within only 13 years of going into production , the fastest growth track among Indian Pharmaceutical companies.
- Extended presence to more than 70 countries, establishing one of the widest marketing footprints among Indian Pharmaceutical companies.
- Achieved more than a two-fold increase in turnover and a seven-fold increase in profits over the last five years.
- Achieved an EBIDTA margin of 32% in 2006-07, among the highest in a competitive industry

- Achieved a fast-track growth in its chosen geographies , first in he emerging markets through APIs and now in the US generics market as a dominant antibiotic generics player.
- Emerged as one of the very few pharma companies with end-to-end connected drug discoveries and development capabilities with global expertise.

2.5 AWARDS AND RECOGNITION

Orchid was awarded the Employer-Employee Relation Award in the Large Scale Industry category by the Rotary Club of Madras South West in October 2006.
Orchid was awarded the prestigious 'Partner of Choice for Competitive Excellence' Award by Frost & Sullivan in October 2005
The Environment & Community Service Award 2003-04 was awarded by the Rotary Club of Madras in 2004
The MS Swaminathan Award for Environment Management for world-class environment management systems was conferred in 2003
The Gold Award for Excellence and Business Prestige was awarded at the Quality Summit 2003, New York
The Golden Peacock Award 2003 for the remarkable achievements in the area of environment protection
Leadership & Excellence Award in Safety, Health, Environment & Manufacturing by the CII in 2002
The MMA Award for Managerial Excellence in the Manufacturing sector 2002 by the Hon'ble Governor of Tamilnadu Shri. P S Ramamohan Rao

The Alathur facility was awarded the prestigious Excellent Energy Efficient Unit award, a national award for excellence in energy management instituted by the CII in 2001 and 2002
Adjudged as the Best Corporate Citizen for the year 2000 and awarded the prestigious, Mother Teresa Award, by the Loyola Institute of Business Administration
Trophy for Excellent Performance in Exports for 1998-99 given by the then Prime Minister of India, Hon'ble Shri Atal Behari Vajpayee
The Anacon'98 Award was awarded to the R&D centre by the Department of Scientific & Industrial Research (DSIR) in 1998 at the Analytical Confederation of Anacon
The CEU Export Award for commendable export performance in 1994-95, 1995-96 and 1996-97
Industrial Economist's Business Excellence Award 1996-97 for all-round meritorious performance
The Visvesvaraya Industrial Award for performance during 1995-96 awarded by The All India Manufacturers Organization for having set very high standards in Financial Management and for employing an innovative approach in a competitive milieu, promising export orientation and a dynamic commitment to R&D
Trophy for meritorious performance in exports for the year 1995-96, by the Ministry of Commerce, Government of India, and the award was given by the then-President of India, H.E. Shri Shankar Dayal Sharma

2.6 DESCRIPTION OF VARIOUS FUNCTIONAL AREAS

MANUFACTURING

API Complex - Alathur

Orchid's bulk drug complex located at Alathur, south of Chennai is one of the largest integrated antibiotic manufacturing complexes in its class. This facility specialises in the manufacture of cephalosporin API's (Active Pharmaceutical Ingredients) and has an installed manufacturing capacity of over 800 MT per annum. Set in a total land area of nearly 100,000 sq. mts., this facility is a massive, state-of-the-art, most modern manufacturing complex that produces a wide range of new generation cephalosporin bulk actives.

This facility has over 100 reactors of varied metallurgy including titanium, cast alloy, graphite, PVDF and PTFE with over 300 kl of handling capacity together with several centrifuges, driers and varied production equipment. The facilities are versatile and are capable of carrying out varied reactions ranging from -70°c to +150°c.

Orchid is known for its world-class crystallisation and lyophillisation facilities, which provide a global competitive edge in sterile product manufacture. Orchid also has a unique spray drying facility, which ensures the lowest levels of moisture content.

Orchid has the capability to handle highly complex and hazardous reactions with utmost safety and productivity. Orchid's operations are backed by a full spectrum of utilities including a captive power generation plant, high technology solvent recovery facilities, sophisticated quality control equipment and a 'zero discharge' environment-friendly effluent treatment plant.

Orchid's Alathur API facility has been audited and approved by leading international regulatory agencies like the US FDA and UK MHRA

CHAPTER-3

MACRO AND MICRO ANALYSIS ON PHAMACEUTICAL INDUSTRY

PHARMACEUTICAL INDUSTRY- GLOBAL MARKET

The global Pharmaceuticals Market has demonstrated consistent strong growth patterns in the last five years generating total revenues of US$ 534.8 Billion in 2005.

- Much of the growth in the Global Pharmaceutical industry can be attributed to the change in the disease profile of the global population. Increasing incidence of lifestyle related diseases have led to an increase in demand for drugs for these particular categories.
- North America remains the largest Pharmaceutical market constituting 49% of the worldwide market followed by Europe and Asia-Pacific.
- Pharmaceutical market across the world is witnessing increased opportunities in the area of Bio Pharmaceuticals, Pharmacogenomics and Biologics market.
- The smaller national markets in Asia-Pacific and Latin America are expected to grow significantly and will increase their presence in the global Pharmaceutical landscape.

The global pharmaceutical industry is a multinational industry that is a highly regulated, capital intensive, and which is driven by large research and development expenditures. The industry is primarily privately owned and is technologically sophisticated. The global pharmaceutical market is forecasted to grow to US$ 842 billion in 2010, an equivalent CAGR of 6.9% over the next five years. The strong growth in the ten European market that joined the European Union in 2004 will help to boost European sales over the next five years. Of the leading product classes in 2005, cytostatics and angiotensin-II inhibitors generated the greatest year on year growth. There were sixteen blockbuster drugs in 2005, generating a combined sales of US$ 18.1 billion. The total pharmaceutical sales from the top ten companies accounted for more than 40% of the total market.

Despite a growth rate of 7% down sliding from 2004 and the lowest since 1998, in 2006 the total global pharmaceutical sales reached US$643(source: IMF). Among the ten leading international markets combined, which account for 81% of world wide sales, audited growth was just 5.7%, down from 7.2% in 2004. Emerging markets such as China, South Korea, Brazil, Russia and Turkey experienced double-digit growth signaling an important shift occurring in the pharmaceutical industry. As growth in the mature markets flatten, industry attention is shifting to smaller, developing markets that are doing exceptionally well. Many of these developing nations are experiencing significant gross domestic product growth which helps finance the healthcare systems, increase patient access and fuels the double digit growth. Pharmaceutical measures are gearing up to the challenges of meeting the unmet needs of these markets.

INDIAN PHARMACEUTICAL INDUSTRY

The **Indian Pharmaceutical Industry** today is in the front rank of India's science-based industries with wide ranging capabilities in the complex field of drug manufacture and technology. A highly organized sector, the Indian Pharma Industry is estimated to be worth $ 4.5 billion, growing at about 8 to 9 percent annually. It ranks very high in the third world, in terms of technology, quality and range of medicines manufactured. From simple headache pills to sophisticated antibiotics and complex cardiac compounds, almost every type of medicine is now made indigenously.

Playing a key role in promoting and sustaining development in the vital field of medicines, **Indian Pharma Industry** boasts of quality producers and many units approved by regulatory authorities in USA and UK. International companies associated with this sector have stimulated, assisted and spearheaded this dynamic development in the past 53 years and helped to put India on the pharmaceutical map of the world.

The Indian Pharmaceutical sector is highly fragmented with more than 20,000 registered units. It has expanded drastically in the last two decades. The leading 250 pharmaceutical

companies control 70% of the market with market leader holding nearly 7% of the market share. It is an extremely fragmented market with severe price competition and government price control.

The pharmaceutical industry in India meets around 70% of the country's demand for bulk drugs, drug intermediates, pharmaceutical formulations, chemicals, tablets, capsules, orals and injectibles. There are about 250 large units and about 8000 Small Scale Units, which form the core of the pharmaceutical industry in India (including 5 Central Public Sector Units). These units produce the complete range of pharmaceutical formulations, i.e., medicines ready for consumption by patients and about 350 bulk drugs, i.e., chemicals having therapeutic value and used for production of pharmaceutical formulations.

Following the de-licensing of the pharmaceutical industry, industrial licensing for most of the drugs and pharmaceutical products has been done away with. Manufacturers are free to produce any drug duly approved by the Drug Control Authority. Technologically strong and totally self-reliant, the pharmaceutical industry in India has low costs of production, low R&D costs, innovative scientific manpower, strength of national laboratories and an increasing balance of trade. The Pharmaceutical Industry, with its rich scientific talents and research capabilities, supported by Intellectual Property Protection regime is well set to take on the international market.

ADVANTAGE INDIA

Competent workforce: India has a pool of personnel with high managerial and technical competence as also skilled workforce. It has an educated work force and English is commonly used. Professional services are easily available.

Cost-effective chemical synthesis: Its track record of development, particularly in the area of improved cost-beneficial chemical synthesis for various drug molecules is excellent. It provides a wide variety of bulk drugs and exports sophisticated bulk drugs.

Legal & Financial Framework: India has a 53 year old democracyand hence has a solid legal framework and strong financial markets. There is already an established international industry and business community.

Information & Technology: It has a good network of world-class educational institutions and established strengths in Information Technology.

Globalization: The country is committed to a free market economy and globalization. Above all, it has a 70 million middle class market, which is continuously growing.

Consolidation: For the first time in many years, the international pharmaceutical industry is finding great opportunities in India. The process of consolidation, which has become a generalized phenomenon in the world pharmaceutical industry, has started taking place in India.

THE GROWTH SCENARIO

India's US$ 3.1 billion pharmaceutical industry is growing at the rate of 14 percent per year. It is one of the largest and most advanced among the developing countries.

Over 20,000 registered pharmaceutical manufacturers exist in the country. The domestic pharmaceuticals industry output is expected to exceed Rs320 billion, which accounts for merely 1.3% of the global pharmaceutical sector. Of this, bulk drugs will account for Rs 54 bn (21%) and formulations, the remaining Rs 210 bn (79%). In financial year 2001, imports were Rs 20 bn while exports were Rs87 bn.

STEPS TO STRENGTHEN THE INDUSTRY

Indian companies need to attain the right product-mix for sustained future growth. Core competencies will play an important role in determining the future of many Indian pharmaceutical companies in the post product-patent regime. Indian companies, in an effort to consolidate their position, will have to increasingly look at merger and acquisition options of either companies or products. This would help them to offset loss of new product options, improve their R&D efforts and improve distribution to penetrate markets.

Research and development has always taken the back seat amongst Indian pharmaceutical companies. In order to stay competitive in the future, Indian companies will have to refocus and invest heavily in R&D.

The Indian pharmaceutical industry also needs to take advantage of the recent advances in biotechnology and information technology. The future of the industry will be determined by how well it markets its products to several regions and distributes risks, its forward and backward integration capabilities, its R&D, its consolidation through mergers and acquisitions, co-marketing and licensing agreements.

Imperatives for the Indian pharmaceutical industry in a changing world

The Indian pharmaceutical industry can look forward to the New Year, as well as to the years to come, with great expectations. There are opportunities galore—in enlarging the reach of competitive generics as more people enjoy economic prosperity around the world; in expanding the range of generic products as more molecules come off patent; and, above all, in enhancing the value footprint into discovery as more profits come from traditional plays.

At the same time, the Indian pharma industry would have to contend with several challenges—in making generics more affordable so as to address the bottom of the affordability pyramid in a context of rising prices; in maneuvering increasingly protective innovator companies coming to terms with low research productivity and demanding capital markets; and in managing discovery research in a context of talent shortage.

We are living in a skewed world, with about 85 percent of the global population having to do with just 15 percent of the economic output. But this is changing, with China and India, representing a quarter of global population, seeing rising incomes. They are being joined by Brazil, Russia, Indonesia and some African countries.

Demand for medicines that treat diseases formerly associated with the developed world would be expanding to emerging economy countries. The real GDP of E7 countries—

Brazil, China, India, Mexico, Russia, Indonesia, and Turkey—is estimated to increase multi-fold increase to $15.7 trillion by the year 2020. In contrast, G7 countries will grow by just 40 percent, to $36.1 trillion. The richer the E7 countries become, the more they would be expected to spend on healthcare.

A shift towards a more equitable world opens a whole new world of markets for Indian pharma companies, who were hitherto serving the needs of developed world citizens. This expanding opportunity sphere comes with a caveat of having to be far more competitive than before, given affordability considerations.

This calls for innovation for more value to the user, through efficiencies in distribution, logistics and product promotion. Indian pharma companies would have to seek new business models around virtual delivery models in order to create greater value.

> Over the next four years, drugs worth $ 190 billion in annual revenues would be vulnerable to generics. The global generics market is expected to grow at about 15 percent to reach $ 70 billion in the year 2008. Although every innovator product coming off patent represents an opportunity in its own right, there are finite limits.

to which a business model characterised by declining prices and greater competition can be sustaining.

An accent on run-of-the-mill generics would therefore have to give way to specialty products such as hormones, steroids, peptides and biosimilars. Bringing about better economies of scale and integrated operations in manufacturing would also be necessary. Above all, a migration in the value chain to branded and own label products would be called for. The global pharma industry would see revenue growth of only five percent to reach $ 735 billion in the year 2008. Besides having to cope with slower revenue growth, pharma companies are facing host of internal and external challenges.

The core issue for most of the top drug companies is declining productivity of in-house R&D. In the last ten odd years, despite spending more than twice on R&D, there have been 50 percent fewer new compounds. Patent expirations of a number of blockbuster

drugs, increasing legal and regulatory constraints, more exacting clinical trial requirements and product safety issues are adding to woes. As a result, one can see larger pharma companies shifting to new business models around the consumer end of the value chain, with greater outsourcing of discovery services, clinical research and manufacturing.

Such a shift in the business model and organisation of the larger pharma industry does spell more opportunities for Indian pharma companies. At the same time, they demand greater attention to quality management and conformance to global GXP standards.

As a result of pressures to discover more, global pharma companies are resorting to acquiring innovation, even in early stage discovery. While there are risks inherent in such an approach, nevertheless they spell opportunities for discovery companies and venture capital firms operating in the pharma domain.

Unfortunately, Indian pharma companies are not in a position to capitalise on this trend. Discovery has been a weak chapter in the Indian pharma story. This is changing though. However, the momentum has to improve.

Traditionally, discovery has emanated either from large organisations with surpluses or from research-led academic institutions or from individuals with novel ideas. In the recent past, several large Indian organisations in non-pharma businesses have been seeing surpluses and have an imperative to forge new frontiers to create shareholder value. Some of these organisations are turning their attention to the pharma and health care sectors. One could therefore see new sources of competition in the industry.

Looking ahead, the worldwide pharma market is estimated to more than double to $ 1.3 trillion by the year 2020. However, the market composition and demand would be different from what we have seen historically, influenced by demographic, epidemiological and economic shifts. Global population is projected to grow to 7.6 billion by the year 2020. At that time, about 719 million people will be 65 or more years of age. Most of this growth, as well as the ageing population, would be in emerging markets like India and China. Indian pharma companies would therefore be required to

move away from a 'look west' policy. For the first time, the seven largest markets will contribute to just 50 percent of growth, while seven emerging markets—Brazil, China, India, Mexico, Russia, Indonesia, and Turkey—will contribute to nearly 25 percent of growth worldwide.

Scientific developments in the past decde have converted some previously terminal illnesses into chronic conditions. New diseases, including mutated forms of old diseases are surfacing. These diseases pose new challenges to drug developers.

The pharma market would also see changes in the way drugs are developed, approved and sold—from treatment to prevention, from generalised to personalised medicine from distribution chain to direct consumer sales and from multilateral to unilateral regulatory regime.

These scientific, epidemiological and social trends impacting the pharma markets would necessitate greater play of knowledge, innovation and technology in the industry. The traditional approach of reverse engineering and innovation around known discovery targets would simply not be sufficient.

As a research-led, biotechnology-driven, nascent organisation, Reliance sees enormous opportunities in the global pharma and health care markets. Reliance is building four global verticals—in biopharma, pharma, clinical research services and biofuels. Concurrently, it is also incubating other global businesses in regenerative medicine, molecular medicine, plant biotechnology, biopolymers and biochemicals.

In the medical biotechnology domain, Reliance would have a wide array of products in the plasma proteins, biosimilars, monoclonal antibodies, fusion proteins, siRNA and stem cell therapy categories. In addition, it would have service plays in molecular diagnostics, genetics and clinical research.

The recent acquisition of GeneMedix in UK/Ireland places Reliance in a good position to address the emerging opportunities in EU for biosimilars. A strategic alliance with MPM

Capital, USA, the largest life sciences venture capital firm in the world, enables Reliance to access innovation outside its own corporate boundaries.

Within the small molecule pharma business, Reliance is building an India-based global generics business. While the initial target markets for these products are US, EU and Japan, Reliance would also focus on select rest of the world markets. This position could potentially be leveraged to access the branded generics market in India.

Reliance probably represents the most diverse and integrated life sciences plays in the world. The company would also have a very unique, innovation-driven footprint in the medical domain to address global and Indian markets.

Opportunities in the global pharma market are undoubtedly promising. At the same time, there are several challenges; key ones being in competency development, scaling up, global operations and innovation. Reliance Life Sciences is well-placed to address the opportunities and is equally geared to facing the challenges.

CHAPTER-4

DATA ANALYSIS AND INTERPRETATION

ABC ANALYSIS

ABC Analysis for 25 raw materials used in anti-infective drug formulation was calculated

TABLE: 4.1.1

TABLE SHOWING ABC ANALYSIS FOR MATERIALS OF ANTI-INFECTIVE DRUGS

Rs in Lakhs

S.No	ITEM	VALUE	STK %	CUM %	ABC
1	Hydroxy Ethyl Phthalamide.	4712604	43.36	43.36	A
2	Methyl-3- Amino-Crotonate	2401946	22.1	65.46	A
3	2- methyl chlorophenyl	2055366	18.91	84.37	B
4	4-dihydropyridine	489030	4.5	88.38	B
5	1,2,3,4-Tetrahydro-4-oxocarbazole	356585	3.29	92.16	C
6	4-hydroxy-9-(H)-Carbazol	165484	1.52	93.68	C

7	Aminoethoxy)methyl]-4-(2-chlorophenyl	112268	1.03	94.71	C
8	Ethambutol Hydrochloride	100321	0.92	95.63	C
9	3-MethylaminoPheny Propanol	82273	0.76	96.39	C
10	Amino butanol	76423	0.7	97.09	C
11	Ethyl-3-aminocrotonate	60575	0.56	97.65	C
12	3-amino crotonic acid methyl ester	56134	0.52	98.17	C
13	5-methoxy-carbonyl	55930	0.51	98.68	C
14	3-ethoxycarbonyl	40892	0.38	99.06	C
15	6-methyl-1,4-dihydropyridine	30434	0.28	99.34	C
16	2-Amino-3-Cyano-5-Methyl-Thiophene	22742	0.21	99.55	C
17	Methanone hydrochloride	20113	0.19	99.74	C
18	Nebivolol	8181	0.08	99.82	C
19	Carvedilol	6558	0.06	99.88	C
20	Meloxicam	5215	0.048	99.92	C
21	Chlorhexidine HCl	4950	0.046	99.96	C

22	Loratadine	2232	0.021	99.98	**C**
23	Desloratadine	1657	0.012	100	**C**
24	Sildenafil Citrate	775	0.007	100	**C**
25	Zolpidem Tartrate	216	0.002	100	**C**
	TOTAL	**10868904**			

TABLE 4.1.1(a) SHOWING A CLASS ITEMS

Rs in lakhs

S.No	ITEM	VALUE	STK %	CUM %
1	HydroxyEthyl Phthalamide.	4712604	43.36	43.36
2	Methyl-3- Amino-Crotonate	2401946	22.1	65.46

TABLE 4.1.1(b) SHOWING B CLASS ITEMS

Rs in Lakhs

S.No	ITEM	VALUE	STK %	CUM %
1	2- methyl chlorophenyl	2055366	18.91	84.37
2	4-dihydropyridine	489030	4.5	88.38

TABLE 4.1.1(c) SHOWING C CLASS ITEMS

Rs in Lakhs

S.No	ITEM	VALUE	STK %	CUM %
1	1,2,3,4-Tetrahydro-4-oxocarbazole	356585	3.29	92.16
2	4-hydroxy-9-(H)-Carbazol	165484	1.52	93.68
3	Aminoethoxy)methyl]-4-(2-chlorophenyl	112268	1.03	94.71
4	Ethambutol Hydrochloride	100321	0.92	95.63
5	3-MethylaminoPheny Propanol	82273	0.76	96.39
6	Amino butanol	76423	0.7	97.09
7	Ethyl-3-aminocrotonate	60575	0.56	97.65

8	3-amino crotonic acid methyl ester	56134	0.52	98.17
9	5-methoxy-carbonyl	55930	0.51	98.68
10	3-ethoxycarbonyl	40892	0.38	99.06
11	6-methyl-1,4-dihydropyridine	30434	0.28	99.34
12	2-Amino-3-Cyano-5-Methyl-Thiophene	22742	0.21	99.55
13	Methanone hydrochloride	20113	0.19	99.74
14	Nebivolol	8181	0.08	99.82
15	Carvedilol	6558	0.06	99.88
16	Meloxicam	5215	0.048	99.92
17	Chlorhexidine HCl	4950	0.046	99.96
18	Loratadine	2232	0.021	99.98
19	Desloratadine	1657	0.012	100
20	Sildenafil Citrate	775	0.007	100
21	Zolpidem Tartrate	216	0.002	100

CHART: 4.1.1

CHART SHOWING ABC CATEGORY ITEMS OF ANTI-INFECTIVE DRUGS

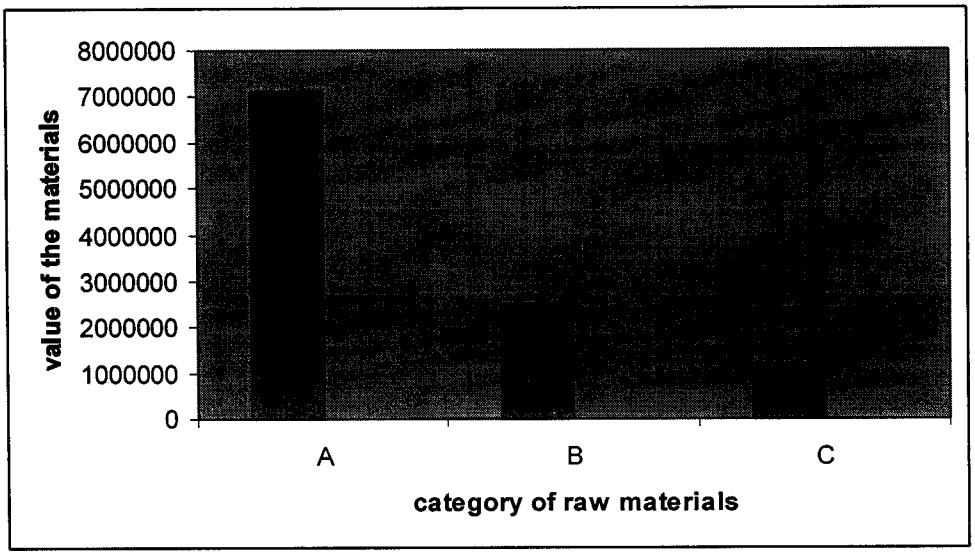

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TABLE 4.1.2 SHOWING ABC ANALYSIS FOR ACTIVE PHARMACEUTICAL INGREDIENTS

Rs in Lakhs

S.No	ITEM	VALUE	STK %	CUM %	ABC
1	4-(2-aminoethyl) benzenesulfonamide.	80781371	15.2	15.2	A
2	pyridine-2-carboxylic acid	71215156	13.4	28.6	A
3	N,N-dimethylaminoethanol	60054572	11.3	39.9	A

4	**N-(2-hydroxyethyl)morpholine**	57928747	10.9	50.8	**A**
5	**amino ethyl benzene**	51551270	9.7	60.5	**A**
6	**2-(phenylmethyl)-pyridine**	45705250	8.6	69.1	**A**
7	**albendazole EP**	41985055	7.9	77	**B**
8	**budesonide**	28698645	5.4	82.4	**B**
9	**calcium glycerophosphate**	12754953	2.4	84.8	**B**
10	**benzydamine HCl**	10629128	2.0	86.8	**B**
11	**cefazolin sodium**	9566215	1.8	88.6	**B**
12	**ceftiofur sodium sterile**	5367710	1.01	89.61	**C**
13	**atorvastatin calcium**	5208273	0.98	90.59	**C**
14	**cefpodoxim proxetil**	4942544	0.93	91.52	**C**
15	**chromium picolinate**	4304797	0.81	92.33	**C**
16	**glipizide**	3932777	0.74	93.07	**C**
17	**cefadroxil mohohydrate**	3667049	0.69	93.76	**C**
18	**cefuroxime axetil**	3560758	0.67	94.43	**C**

19	**Palmitate Potassium**	3507612	0.66	95.09	**C**
20	**cefuroxime sodium**	3135593	0.59	95.68	**C**
21	**cefaclor**	3029301	0.57	96.25	**C**
22	**ceftriaxone sodium**	2869865	0.54	96.79	**C**
23	**Rabeprazole sodium**	2285262	0.43	97.22	**C**
24	**sertraline hcl**	1700660	0.32	97.54	**C**
25	**clomiphene citrate**	1647515	0.31	97.85	**C**
26	**carbamazepine**	1541224	0.29	98.14	**C**
27	**tramadol**	1381787	0.26	98.4	**C**
28	**valporic acid**	1328641	0.25	98.65	**C**
29	**luconazole itopride**	1222350	0.23	98.88	**C**
30	**luconazole itopride**	1116058	0.21	99.09	**C**
31	**Calcium sterile**	797184.6	0.15	99.24	**C**
32	**Valporic base**	531456.4	0.10	99.34	**C**
33	**Luconazole sterile**	478310.8	0.09	99.43	**C**

34	**quetiapine hemifumarate**	451737.9	0.085	99.52	**C**
35	**palmitate chlorhexidine**	419319.1	0.078	99.5939	**C**
36	**itraconazole pellets**	398592.3	0.075	99.6689	**C**
37	**losarton potassium**	356075.8	0.067	99.7359	**C**
38	**esomeprazole magnesium trihydrate**	345446.7	0.065	99.8009	**C**
39	**chlorhexidine**	286986.5	0.054	99.8549	C
40	**erythromycin stearate**	260413.6	0.049	99.9039	C
41	**erithromycin estolate**	170066	0.032	99.9359	C
42	**erithromycin base**	143493.2	0.027	99.9629	C
43	**sodium iodide**	111605.8	0.021	99.9839	C
44	**terconazole**	79718.46	0.015	99.9989	C
	Total	**531456390**	100		

TABLE 4.1.2(a) SHOWING A CLASS ITEMS

Rs in Lakhs

S.No	ITEM	VALUE	STK %	CUM %	ABC
1	**4-(2-aminoethyl) benzenesulfonamide.**	80781371	15.2	15.2	**A**
2	**pyridine-2-carboxylic acid**	71215156	13.4	28.6	**A**
3	**N,Ndimethylaminoethanol**	60054572	11.3	39.9	**A**
4	**N-(2 hydroxyethyl)morpholine**	57928747	10.9	50.8	**A**
5	**amino ethyl benzene**	51551270	9.7	60.5	**A**
6	**2-(phenylmethyl)-pyridine**	45705250	8.6	69.1	**A**

TABLE 4.1.2(b) SHOWING B CLASS ITEMS

Rs in Lakhs

S.No	ITEM	VALUE	STK %	CUM %
1	**albendazole EP**	41985055	7.9	77
2	**budesonide**	28698645	5.4	82.4
3	**calcium glycerophosphate**	12754953	2.4	84.8
4	**benzydamine**	10629128	2.0	86.8

	HCl			
5	**cefazolin sodium**	9566215	1.8	88.6

TABLE 4.1.2(c) SHOWING C CLASS ITEMS

Rs in Lakhs

S.No	ITEM	VALUE	STK %	CUM %
1	**ceftiofur sodium sterile**	5367710	1.01	89.61
2	**atorvastatin calcium**	5208273	0.98	90.59
3	**cefpodoxim proxetil**	4942544	0.93	91.52
4	**chromium picolinate**	4304797	0.81	92.33
5	**glipizide**	3932777	0.74	93.07
6	**cefadroxil mohohydrate**	3667049	0.69	93.76
7	**cefuroxime axetil**	3560758	0.67	94.43
8	**Palmitate Potassium**	3507612	0.66	95.09
9	**cefuroxime sodium**	3135593	0.59	95.68
10	**cefaclor**	3029301	0.57	96.25

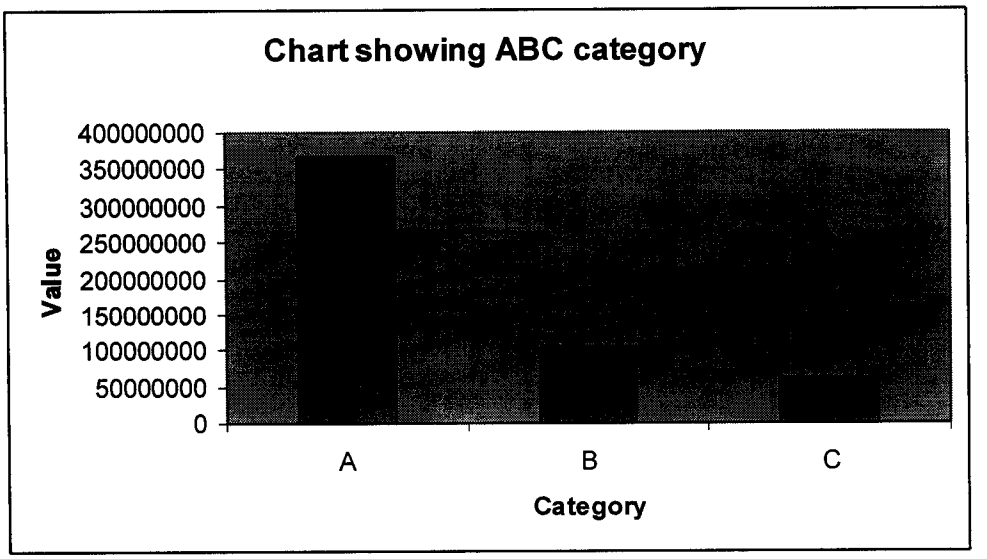
11	**ceftriaxone sodium**	2869865	0.54	96.79
12	**Rabeprazole sodium**	2285262	0.43	97.22
13	**sertraline hcl**	1700660	0.32	97.54
14	**clomiphene citrate**	1647515	0.31	97.85
15	**carbamazepine**	1541224	0.29	98.14
16	**tramadol**	1381787	0.26	98.4
17	**valporic acid**	1328641	0.25	98.65
18	**luconazole itopride**	1222350	0.23	98.88
19	**luconazole itopride**	1116058	0.21	99.09
20	**Calcium sterile**	797184.6	0.15	99.24
21	**Valporic base**	531456.4	0.10	99.34
22	**Luconazole sterile**	478310.8	0.09	99.43
23	**quetiapine hemifumarate**	451737.9	0.085	99.52
24	**palmitate chlorhexidine**	419319.1	0.078	99.5939

25	**itraconazole pellets**	398592.3	0.075	99.6689
26	**losarton potassium**	356075.8	0.067	99.7359
27	**esomeprazole magnesium trihydrate**	345446.7	0.065	99.8009
28	**chlorhexidine**	286986.5	0.054	99.8549
29	**erythromycin stearate**	260413.6	0.049	99.9039
30	**erithromycin estolate**	170066	0.032	99.9359
31	**erithromycin base**	143493.2	0.027	99.9629
32	**sodium iodide**	111605.8	0.021	99.9839
33	**terconazole**	79718.46	0.015	99.9989

Inference:

It was found that items of high price and less consumption were categorized as A-class items because of their total value. From the above classification items of high value constitutes approximately 70% of total cost. So due care must be taken for items falling in A-class and someone at senior level must be made responsible to regularly review the consumption of these items up to date and accurate records should be maintain for this items. The inventory of this item must be minimum and the orders for these items should be staggered

CHART 4.1.2 SHOWING ABC CATEGORY ITEMS OF ACTIVE PHARMACEUTICAL INGREDIENTS



4.2 INVENTORY TURNOVER RATIO

This ratio indicates as to how fast the inventory is consumed and can be highly useful when compared to the past so we are measuring how many times did we turn our inventory over the years. Generally, a higher inventory turnover ratio is considered a positive indicator of operating efficiency, since inventory that remains in place produces no revenue and increases the cost associated with maintaining those inventories because a higher ratio is generally considered good from the point of view of liquidity. If inventory is turning too slowly, it could indicate that it may be hampering the cash flow.

Inventory Turnover Ratio= Sales (turnover)/ Average Inventory.

TABLE: 4.2

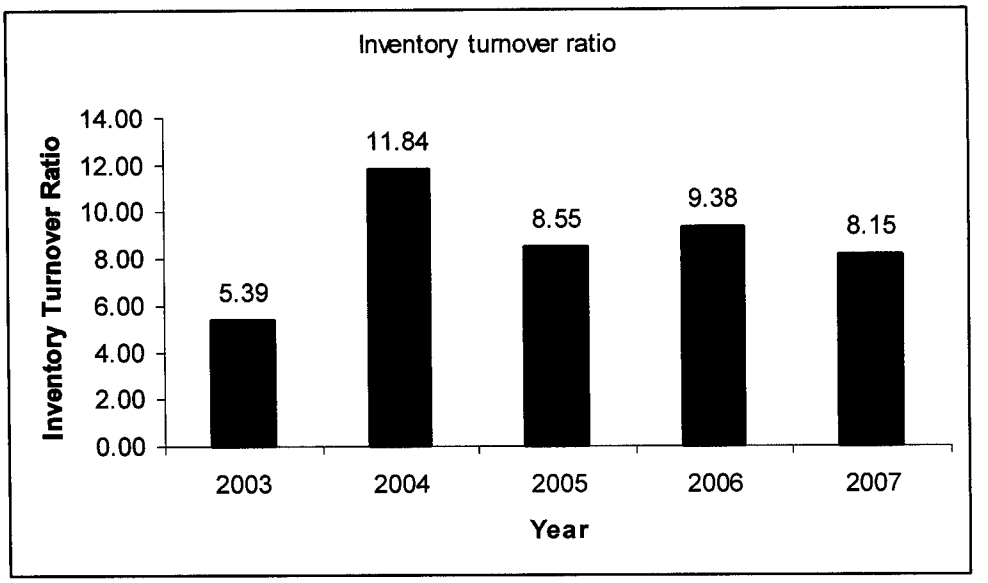
TABLE SHOWING THE INVENTORY TURNOVER RATIO

Rs in Lakhs

YEAR	TURNOVER	AVERAGE INVENTORY	INVENTORY TURNOVER RATIO
2003	54141	10036	5.394679
2004	71341	6027	11.8369
2005	68929	8064	8.547743
2006	88877	9480	9.375211
2007	93418	11466	8.147392

CHART: 4.2

CHART SHOWING INVENTORY TURNOVER RATIO



Source: Annual Reports

Interpretation:

From the above table it is clear that the inventory turnover ratio of orchid pharma Is quiet high and ranges between 8 to 12 except for the year 2003 where the ITR is low at 5.4. this decrease in the ratio can be attributed to the low productivity or higher inventory held.

Inference:

The ratio indicates the speed of inventory conversion into sales. A higher inventory turnover ratio of the firm is a sign of a high liquidity. The ratio was at its highest at 11.84 during the year 2004. It also indicates the better efficiency of inventory management. The higher inventory turnover ratio depicts better utilization of the inventory assets by the firm.

4.3 INVENTORY TO NET WORKING CAPITAL

This is the ratio between the inventory and the firms net working capital.Net working capital refers to the difference between the current assets and current liabilities. This ratio tells how much of a company's funds are tied up in inventory.

It also indicates if too high a proportion of current working capital is in inventory. Because inventory is a less liquid resource than cash, too high a level of inventory can indicate the inability to turn working capital into cash to meet short-term obligations.

Inventory to net working capital = Inventory / Net working capital

TABLE: 4.3

TABLE SHOWING NET WORKING CAPITAL

Rs in Lakhs

Year	Current Assests	Current Liabilities	Net Working Capital
2003	41605	13583	28018
2004	49993	14556	35436
2005	67891	25697	42194
2006	87673	24070	63602
2007	121033	63339	57695

TABLE: 4.3.1

TABLE SHOWING INVENTORY TO NET WORKING CAPITAL

Rs in Lakhs

Year	Inventory	Net Working Capital	Inventory to Net Working Capital
2003	10036	28018	0.3582
2004	6027	35436	0.1701
2005	8064	42194	0.1911
2006	9480	63602	0.1491
2007	11466	57695	0.1987

Interpretation:

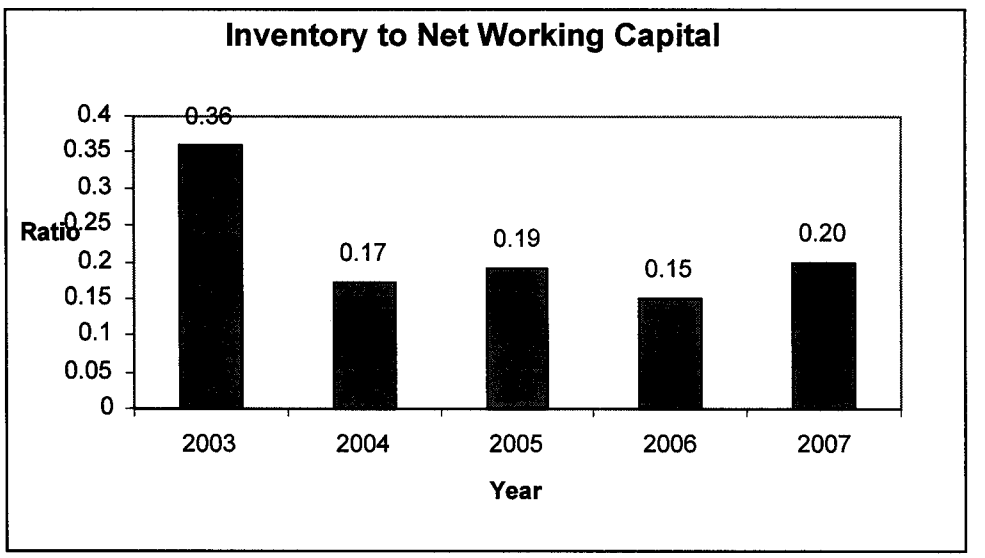
The inventory to net working capital ratio ranges between 0.15 to 0.35 and the ratio has decreased from 2003 to 2007. During the last four years the inventory to net working capital lies below 0.20.The highest inventory to net working capital ratio is found to be at 0.36 during the year 2003

Inference:

The portion of inventory to the net working capital indicates the percentage of working capital invested in inventory. A ratio of less than 0.20 during the past four years depicts a positive sign of the operational efficiency also the lesser portion of working capital invested in inventory will also smoothen the payment of the short term obligations.

CHART: 4.3

CHART SHOWING INVENTORY TO NET WORKING CAPITAL



4.4 INVENTORY HOLDING PERIOD

The number of days inventory is also known as average inventory period and inventory holding period. A high number of days inventory indicates that there is a lack of demand for the product being sold. A low days inventory ratio may indicate that the company is not keeping enough stock on hand to meet demands.

TABLE: 4.4

TABLE SHOWING INVENTORY HOLDING PERIOD

Rs in Lakhs

YEAR	NO OF DAYS	INVENTORY TURNOVER RATIO	INVENTORY HOLDING PERIOD
2003	360	5.394679	67
2004	360	11.8369	31
2005	360	8.547743	43
2006	360	9.375211	39
2007	360	8.147392	45

Interpretation

The inventory holding period has been maintained between 30 to 40 days except during the year 2003 where the no of days the stock were shelved is found to be in the increasing stage. The high inventory holding period during the year 2002-03 which was at 67 days have been reduced by more than 40 % in the later years.

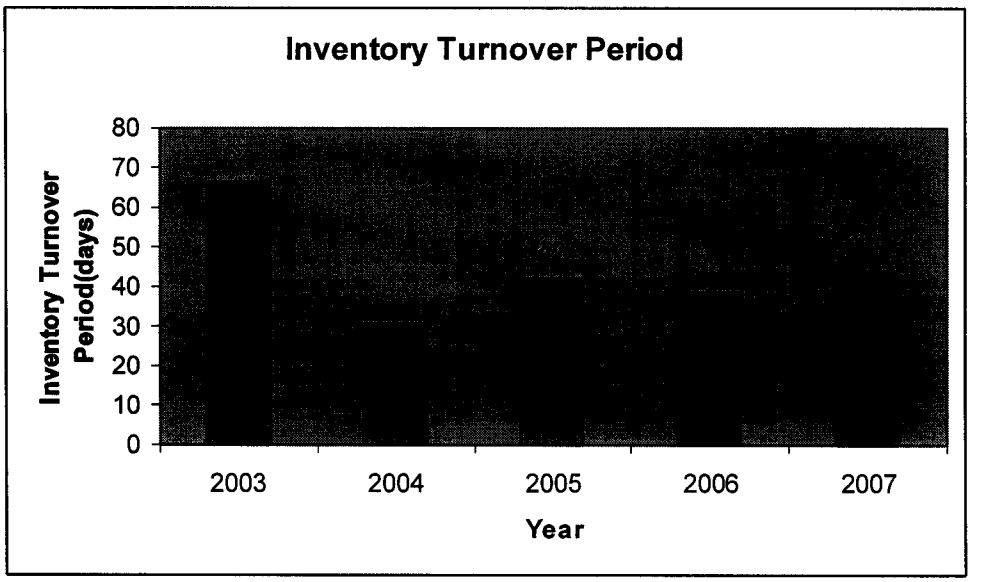
Inference

The decreasing inv holding period is a good sign of the fast movement of the products and the effective management of inventory.

CHART: 4.4

CHART SHOWING INVENTORY HOLDING PERIOD

Rs in Lakhs



4.5 CORRELATION ANALYSIS BETWEEN RECEIPTS AND ISSUES

The correlation is one of the most common and most useful statistics. A correlation is a single number that describes the degree of relationship between two variables. In statiscal analysis the study of two variables wherein the change in the value of one variable produces a change in the value of other variable is said to be correlation. In that case that the variables are correlated or here is correlation between two variables.

In the present study correlation co-efficient is calculated for the two variables receipts and issues of materials in the stores

TABLE: 4.5

TABLE SHOWING MONTHLY RECEIPTS AND ISSUES OF MATERIALS

MONTHS	RECEIPTS	ISSUES
APR	97,566,667	95,765,243
MAY	100,542,345	96,234,512
JUN	98,234,189	94,564,231
JUL	96,234,152	91,763,452
AUG	101,871,324	99,241,324
SEP	100,987,231	98,634,213
OCT	102,541,980	97,324,162
NOV	100,216,592	99,287,165
DEC	100,034,256	94,352,676
JAN	99,231,531	99,073,624
FEB	101,278,736	97,327,538
MAR	102,871,524	98,298,648

The formula for the correlation is:

$$r = \frac{N\Sigma xy - (\Sigma x)(\Sigma y)}{\sqrt{[N\Sigma x^2 - (\Sigma x)^2][N\Sigma y^2 - (\Sigma y)^2]}}$$

Where:

N	=	number of pairs of scores
Σxy	=	sum of the products of paired scores
Σx	=	sum of x scores
Σy	=	sum of y scores
Σx^2	=	sum of squared x scores
Σy^2	=	sum of squared y scores

The symbol **r** represents the correlation. Through the magic of mathematics it turns out that rays be between -1.0 and +1.0. if the correlation is negative, we have a negative relationship; if it's positive, the relationship is positive.

The correlation co-efficient between receipts and issues is :

$$r = \frac{437850995758336.00}{628129190305193.00}$$

r = +0.69

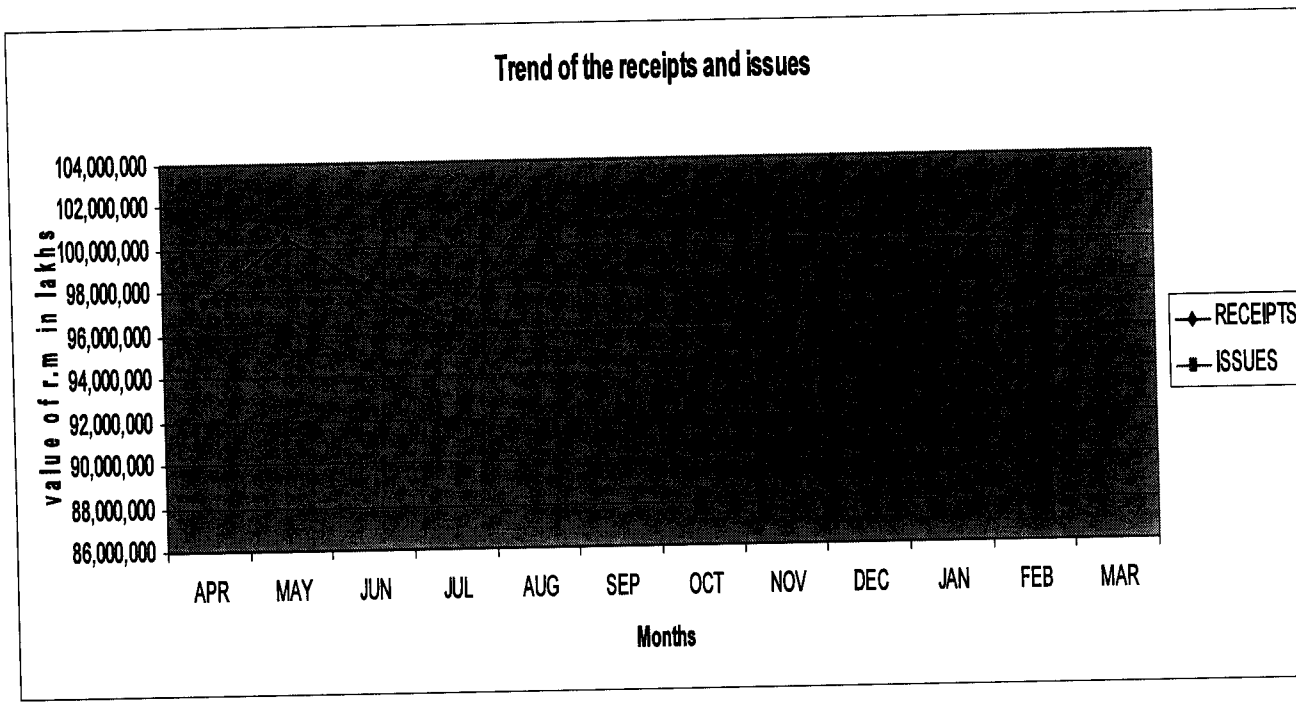
Inference:

So, the correlation between issues and receipts of raw materials in the stores is 0.70, which shows a **positive** relationship. This shows that if for an increase in the value of receipts there is a corresponding increase in the value of issues that is receipts and issues change in the same directions.

This positive relationship further shows that the inventory has been under proper management without neither a dead stock nor a stockout situation.

CHART: 4.5

CHART SHOWING TREND OF RECEIPTS AND ISSUES



4.6 FIXING SAFETY STOCK LEVEL USING STATISTICAL MODEL OF STANDARD DEVIATION USING NORMAL DISTRIBUTION

Safety Stock

Safety stock as the name suggests is the stock level till which the dead stock or stock out situation will not arise.

As such this figure is not stock, it is cut-off figure maintained which is used for Planning.

Safety Stock is the quantity of stock held to satisfy unexpectedly high requirements in the stocking-up period.

The purpose of the safety stock is to prevent a material shortage from occurring. In order to determine the safety stock level, you must first specify the risk of a material shortage and also the desired service level.

Usually the safety stock will not be used in production.

The purpose of the safety stock is to prevent a material shortage from occurring.

Calculating Safety Stock

*Safety stock = (standard deviation) * (service factor)*

Standard deviation: MAD (mean absolute deviation)

MAD: $\sum$ (deviation of actual usage and demand forecasted)/no of periods(n)

Service factor: Factor used as a multiplier with the Standard Deviation to calculate a specific quantity to meet the specified service level

Service level: It measures the probability that all customer orders arriving within a given time interval will be completely delivered from stock on hand, i.e. without delay.

TABLE: 4.6

TABLE SHOWING SERVICE LEVEL AND CORRESPONDING SERVICE FACTOR[14]

Service Level	Service Factor	Service Level	Service Factor
50.00%	0.00	90.00%	1.28
55.00%	0.13	91.00%	1.34
60.00%	0.25	92.00%	1.41
65.00%	0.39	93.00%	1.48
70.00%	0.52	94.00%	1.55
75.00%	0.67	95.00%	1.64
80.00%	0.84	96.00%	1.75
81.00%	0.88	97.00%	1.88
82.00%	0.92	98.00%	2.05
83.00%	0.95	99.00%	2.33
84.00%	0.99	99.50%	2.58
85.00%	1.04	99.60%	2.65
86.00%	1.08	99.70%	2.75
87.00%	1.13	99.80%	2.88
88.00%	1.17	99.90%	3.09
89.00%	1.23	99.99%	3.72

[14] Source : http://www.inventoryops.com/safety_stock.htm

TABLE: 4.6.1

TABLE SHOWING THE CALCULATION OF MEAN ABSOLUTE DEVIATION

(Units in thousands)

Period	**Demand for raw materials**	**Actual usage**	**Deviation**
April	3783	3522	261
May	3783	3283	500
June	3783	3603	180
July	3783	3400	383
August	3783	3668	115
Sept	3783	3404	379
Oct	3783	3547	236
Nov	3783	3711	72
Dec	3783	3599	184
Jan	3783	3437	346
Feb	3783	3562	221
March	3783	3534	249
Total	45400	42270	3126

MAD = 260.5

Service Level=99%

Service Factor=2.33

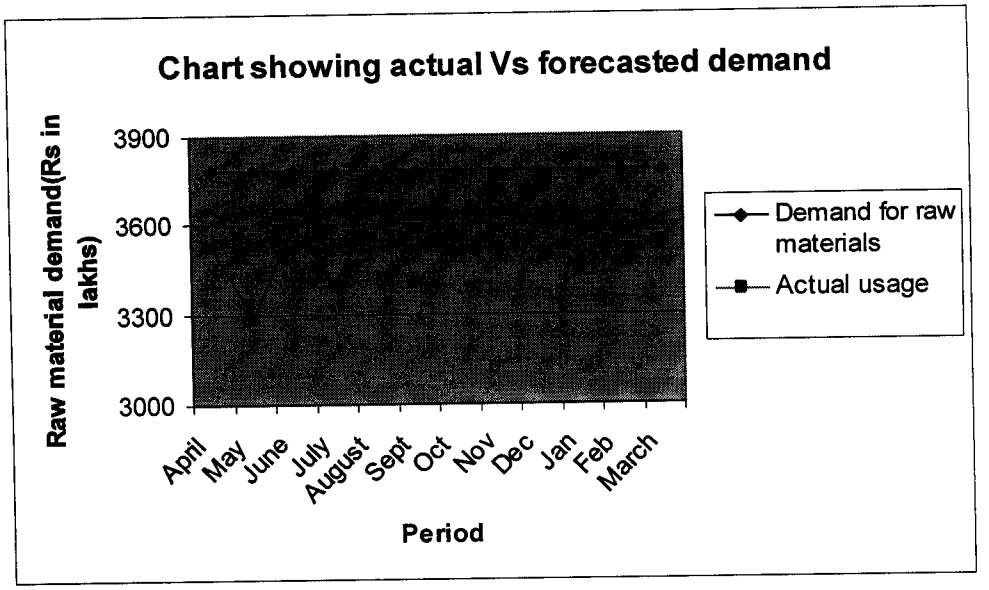
Safety stock = MAD * Service Factor

= 260.5 * 2.33

= 606.965(Units)

CHART: 4.6

CHART SHOWING ACTUAL Vs FORECASTED DEMAND



Interpretation

The statistical method of standard deviation using normal distribution has been applied and the desired safety stock level is found to be 606965 units.

CHAPTER-5

FINDINGS AND SUGGESTIONS

5.1 FINDINGS

- There is effective inventory management system followed in the company.
- There is proper and regular check on the inventory.
- The company imports necessary raw materials from other countries like USA, Russia, China.
- The number of A, B and C category of materials used in the anti-infective drug formulation were found to be as follows

CATEGORY	NUMBER OF MATERIALS
A	2.
B	2
C	21

- The number of A, B and C category of materials used in the Active Pharmaceutical ingredients formulation were found to be as follows

CATEGORY	NUMBER OF MATERIALS
A	6
B	5

C	33

- There is an effective use of inventory assets by the company which is reflected from the inventory turnover ratio which ranges from 8 to 11 during the period 2003-07.
- The inventory to net working capital ratio ranges between 0.15 and 0.35. A ratio of less than 0.20 during the past four years depicts a positive sign of the operational efficiency also the lesser portion of working capital invested in inventory will also smoothen the payment of the short term obligations.
- The correlation co-efficient between receipts and issues of raw materials is found to be 0.70 which shows that there is a fairly positive correlation and depicts the proper procurement and usage of the materials without any stock out or a dead stock situation.

RECOMMENDATIONS

The following suggestions will further enhance the effectiveness and efficiency of inventory management at Orchid Chemicals & Pharmaceuticals

- The Inventory turnover ratio can be maintained at the current levels.
- The Inventory to working capital shall be maintained below 0.20.
- The safety stock has been fixed at 606965 units which would if adopted by the company avoid stock out situations and meet demand during emergency situations

CONCLUSION

It is essential for every company to follow inventory and materials management for minimizing its investment and maintaining optimum levels of inventory. The present study on the inventory control system followed in Orchid Chemicals reveals that there is an efficient management of the inventories there by keeping a strict control on the procurement and other costs involved with the materials.

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