Cost Reduction at Petrochemical industry
by
Material Management Technique

Abstract

In this project, there was delay in delivering product to the customers. It was necessary for solving this issue by analyzing the Supplier Rating on the basis of Quality of Raw Material Delivered, Quantity delivered against the purchase Order given, time taken to deliver the Raw Materials. It was also important to reduce the Inventory movement days due to the increase in Inventory Holding Cost and unavailability of space because of slow movement of the Raw Material and Finished Goods.

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Abbreviations

IATF – International Automotive Task Force

MRP – Material Requirement Planning

ERP – Enterprise Resource Planning

VMI – Vendor Managed Inventory

SLA – Service Level Agreement

JIT – Just in Time

RM – Raw Material

FG – Finished Goods

Vendor Evaluation and Rating

1.1 Theory

1.1.1 Vendor Evaluation and Rating

The vendor rating system is a by-product of the just-in-time approach. Vendor rating means rating vendors based on their product price, service, delivery performance, and quality of the product or services. Following are the four primary rating criteria for vendor rating:

A. **Quality rating**: Rate the quality of the product by considering two factors. They are quality acceptance and certification.

   Quality acceptance means material purchased by the vendor should pass at the first inspection level only so that we can consider that the quality of the product is good.

   The material should have some quality certification like ISO(International Organization for Standardization) certification, IRS, ABS, DQA(WP), and DQA(N).

B. **Price rating:** Compare the price of the present vendor with other vendors and compare the current worth of the material with the average cost of the material for a chosen period.

C. **Delivery Rating:** Rate the delivery performance of the vendor by comparing the actual delivery date with the predetermined delivery date.

D. **Service rating:** Rate the service based on the support provided by the vendor during post and pre-purchase orders and consider the warranty period.

1.1.2 Benefits of Vendor Assessment

Following are the significant benefits of vendor rating.

1. Vendor rating helps the buyer understand the vendor in every critical aspect, and it helps to know if the vendor is suitable to deal with or not. It does not deal with prejudices and word-of-mouth. It is more dependent on data.
2. It helps the buyers to strike the right kind of communication required.
3. It ensures a consistent standard of vendor performance with updated reviews of their performance.
4. It helps the buyer identify areas of weakness in the vendor's performance and allows the buyer to take corrective actions.

1.1.3 Techniques of Supplier Evaluation or Vendor Rating

1. **Categorical plan**: Managers from various verticals list crucial factors for a vendor to own based on their personal experiences, and vendors are compared based on the same.
2. **Weighted point plan**: Factors are categorized, and weight is assigned to each factor based on vendor performance. An example is given below for calculating the same.
3. **Cost ratio plan**: Supplier rating is based on different costs incurred for procuring the materials from other suppliers. The cost ratios are ascertained for the various rating variables such as quality, price, and timely delivery. The cost ratio is calculated in percentage based on the total individual cost and the total value of the purchase.
4. **Forced decision matrix:** the attributes of rating like quality, service, price, reliability of the vendor, and lead time of supply are identified first. Then these factors are compared between themselves. If something is more important, it will be assigned with one's weight, and the other will be zero for evaluation.
5. **Service cost ratio:** subjectively measuring other intangible aspects of a supplier's services. Aspects to consider could be Labour stability, financial stability, flexibility in production for rush orders, research, and development (R&D).
6. **Bell quality rating system:** This is developed by the bell helicopter company Lot Quality Index (LQI). It assesses lots received against lots rejected.
7. **IBM quality rating system:** It uses quality costs as the basis for rating vendors. The formula is VGR= ((Desired cost of inspection)/ **(**Actual cost of inspection)) x 100

1.1.4 Types of Vendor Rating

Generally, there are 3 types of Vendor rating process

1. **Evaluation with the help of records**: In this type, you can use the documents such as financial reports, logbooks, and journals to collect information about the supplier. Depending on the evaluation result, you can choose a suitable vendor for your business.
2. **After the event evaluation:** Here, you need to find the answer to questions like what happened? How did it happen? How did it fail? This data helps you to evaluate the vendor.
3. **Before the event evaluation**: In this type, collect the historical data of the vendor to find his capabilities

1.1.5 Reorder Point

Reorder point (ROP) is a specific level at which your stock needs to be replenished. In other words, it tells you when to place an order so you won't run out of stock.

1.1.6 Inventory Turnover

Inventory turnover is the rate that inventory stock is sold, or used, and replaced. The inventory turnover ratio is calculated by dividing the cost of goods by average inventory for the same period.

1.1.7 Safety Stock

Safety stock is an extra quantity of a product which is stored in the warehouse to prevent an out-of-stock situation. It serves as insurance against fluctuations in demand.

1.1.8 EOQ

The economic order quantity (EOQ) is a company's optimal order quantity for minimizing its total costs related to ordering, receiving, and holding inventory.

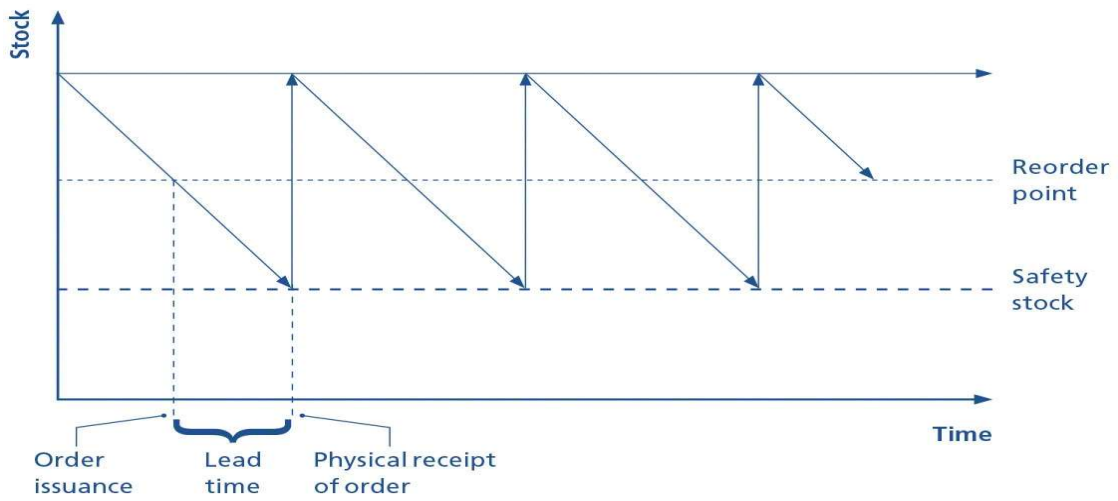


Figure 1.1 EOQ (Economic Order Quantity)

1.2 Problem Statement

Delivery Commitment given to the customers is not fulfilled by the company and gets extended by on an average 5 to 10 days

1.3 Causes

1. Unavailability of Raw Material for Production.
2. Inventory Movement days of RM in the stores is more.
3. Rejection of Finished Goods.
4. Breakdown of Machines.
5. Improper Production Scheduling.
6. Unavailability of Employees.

Task Assigned:

I was assigned to work on -

1. Unavailability of raw Material and
2. Reduction in Delivery Lead Time.

1.3.1 Reasons

1. Raw Material received from the vendor is not as per the required standards and specifications. This results in failure of the Raw Material in QC test.
2. Raw Material Delivered are not as -per the schedule.
3. Quantity of Raw Material received is less than the Quantity mentioned in the Purchase Order provided.

1.4 Impact of the Problem

1. Supplier and Customer relation weakens due to which there is diversion of customers towards other competitors.
2. This results in Business Loss due to which the company has to bear Financial Losses.
3. The company has to pay 6 to 8 % penalty to the customers on delayed delivery as the customers also have to face Business as well as Financial Loss.
4. The company has to pay premium freight to deliver FG to the customers as per the commitment given to them.

1.5 Suggestions

A. Vendor Evaluation and Rating

1. Creating a sheet with respect to the criteria that needs to be checked of the suppliers that will help in analyzing the vendors considering all the possible criteria.
2. Criteria are –
    a) PO Date
    b) Received Date
    c) PO Quantity
    d) Received Quantity
    e) Rejected Quantity
    f) Freight Cost
3. Updating the sheet every month and analyzing –
    a) Average Delay Days,
    b) Quantity delivered against PO,
    c) rejected material quantity due to quality issue.

4. Deciding Lead time for various suppliers based on their distance from the plant and also research for developing new suppliers that are closer to the plant locations and analyzing the overall cost difference between the new vendors and old vendors.

Eg. Let us rate two companies, A and B.

Factors considered are quality, price, and delivery.

Weights for each of the above factors is

- quality – 60%
- price – 20%
- delivery – 20%

If we multiply each factor's values by their weights, we can derive ratings and compare which one is better.

Company A inputs:

Total quantity supplied: 10 units, total quantity accepted: 8 units, price per unit: $10, Delay in delivery 20%time delay.

Quality rating = (8/10) X100=80%

Price rating = (10/10) X100=100% [price rating = (Price Ratio Lowest / Simpler Price) x 1000]

Delivery rating = 100 – 20 = 80%

weighted vendor rating of company A= (80X60+100X20+80X20) =84

Company B inputs:

Total quantity supplied: 20 units, total quantity accepted: 18 units, price per unit: $16, Delay in delivery 10% delay.

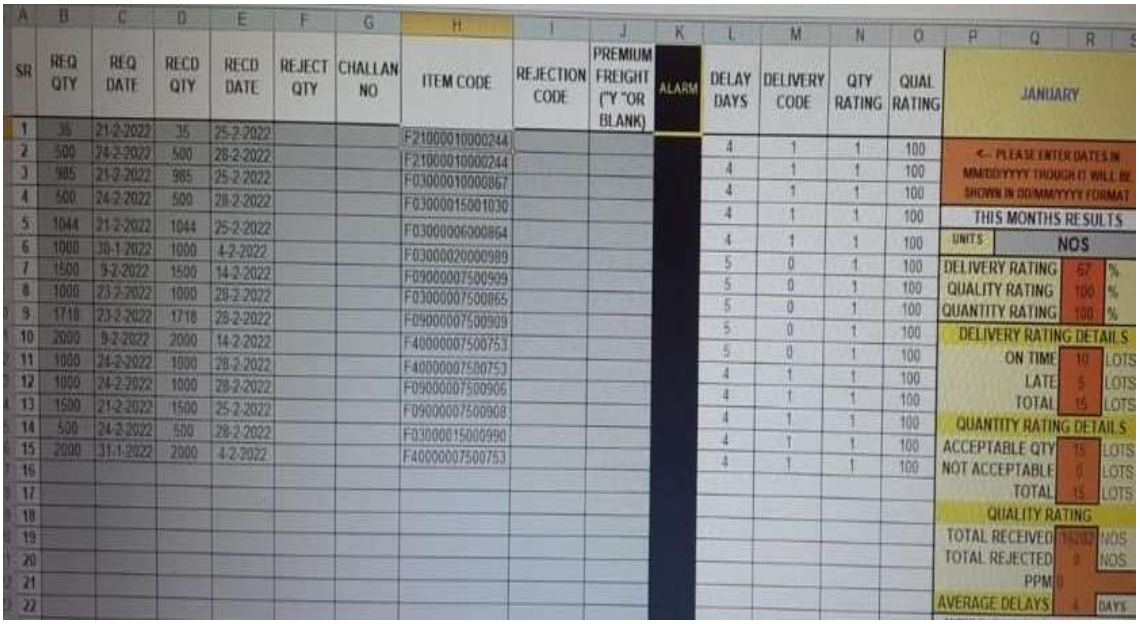
Quality rating = (18/20) X100 = 90%

Price rating = (10/16) X100=62.5% [price rating = (Price Ratio Lowest / Simpler Price) x 100]

Delivery rating = 100 – 10 = 90%

weighted supplier rating of company B= (90X60+62.5X20+90X20) =84.5

Though the price per unit of company B is more than company A, company B still wins because of overall rating is high.



SR	REQ QTY	REQ DATE	RECD QTY	RECD DATE	REJECT QTY	CHALLAN NO	ITEM CODE	REJECTION CODE	PREMIUM FREIGHT ("Y "OR BLANK)	ALARM	DELAY DAYS	DELIVERY CODE	QTY RATING	QUAL RATING
1	35	21-2-2022	35	25-2-2022			F21000010000244				4	1	1	100
2	500	24-2-2022	500	28-2-2022			F21000010000244				4	1	1	100
3	985	21-2-2022	985	25-2-2022			F03000010000867				4	1	1	100
4	500	24-2-2022	500	28-2-2022			F03000015001030				4	1	1	100
5	1044	21-2-2022	1044	25-2-2022			F03000006000864				4	1	1	100
6	1000	30-1-2022	1000	4-2-2022			F03000020000989				5	0	1	100
7	1500	9-2-2022	1500	14-2-2022			F09000007500909				5	0	1	100
8	1000	23-2-2022	1000	28-2-2022			F03000007500865				5	0	1	100
9	1718	23-2-2022	1718	28-2-2022			F09000007500909				5	0	1	100
10	2000	9-2-2022	2000	14-2-2022			F40000007500753				5	0	1	100
11	1000	24-2-2022	1000	28-2-2022			F40000007500753				4	1	1	100
12	1000	24-2-2022	1000	28-2-2022			F09000007500906				4	1	1	100
13	1500	21-2-2022	1500	25-2-2022			F09000007500908				4	1	1	100
14	500	24-2-2022	500	28-2-2022			F03000015000990				4	1	1	100
15	2000	31-1-2022	2000	4-2-2022			F40000007500753				4	1	1	100

JANUARY		
<-- PLEASE ENTER DATES IN MM/DD/YYYY THOUGH IT WILL BE SHOWN IN DD/MM/YYYY FORMAT		
THIS MONTHS RESULTS		
UNITS	NOS	
DELIVERY RATING	67	%
QUALITY RATING	100	%
QUANTITY RATING	100	%
DELIVERY RATING DETAILS		
ON TIME	10	LOTS
LATE	5	LOTS
TOTAL	15	LOTS
QUANTITY RATING DETAILS		
ACCEPTABLE QTY	15	LOTS
NOT ACCEPTABLE	0	LOTS
TOTAL	15	LOTS
QUALITY RATING		
TOTAL RECEIVED	16282	NOS
TOTAL REJECTED	0	NOS
PPM	0	
AVERAGE DELAYS	4	DAYS

Figure 1.2 Monthly Data Sheet

NPL								SUPPLIER MONITORING AND RATING SHEET					
SUPPLIER NAME	TIME TECHNOPLAST							VENDOR CODE		ST0105	YEAR	2021-22	
ALLOWABLE DELAY	4	DAY(S)		QUALITY WEIGHTAGE	60	THE SUM SHOULD BE EQUAL TO 100	EXCELLENT > 90, GOOD >80<90, AVERAGE >70<80, POOR <70					CURRENT RATING STATUS	
ALLOWABLE QTY VARIATION	10	%		QUANTITY WEIGHTAGE	20							92.7 %	
SUPPLIER SINCE	2016			DELIVERY WEIGHTAGE	20								
RESULTS->	EXCELLENT		GOOD		EXCELLENT		5 DAYS						

MONTH	QUAL RATING	DEL RATING	QTY RATING	AVG DELAY DAYS	OVERALL RATING	PREMIUM FREIGHT
JAN	100	58	100	6	92	
FEB	100	67	100	4	94	
MAR	100	59	100	4	92	
APR						
MAY						
JUN						
JUL						
AUG						
SEP						
OCT						
NOV						
DEC						

EXCELLENT

Figure 1.3 Outcome after Evaluation was done over three months

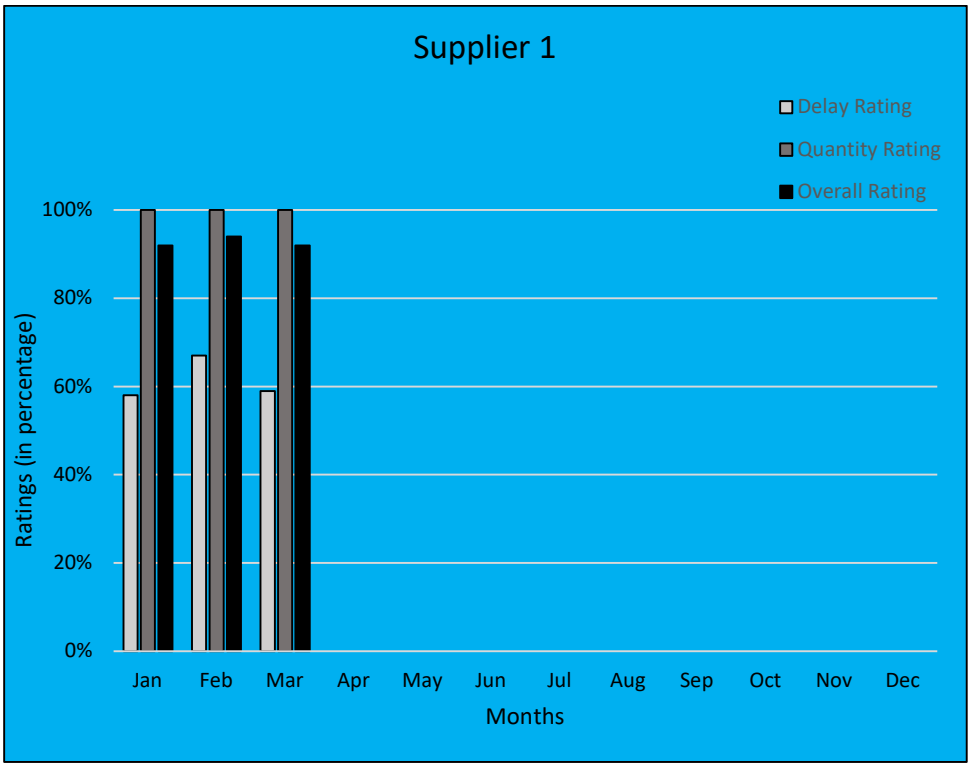


Figure 1.4 Ratings of a Supplier

B. Inventory Movement Days Reduction

1. Analyzing the movement of the product on the basis of the dates when orders were placed by the sales department and the fulfilment of the orders by the production and SCM departments.

2. Communicating with Marketing department for Obsolete Inventory materials and discussing about the benefits of scrapping these materials as well as comparing to the results if these materials are held in inventory.

3. Calculating and Reducing the Inventory Turnover Ratio (ITR) in order to move the Raw Materials in inventory continuously and reduce Inventory Movement Days of the RM.

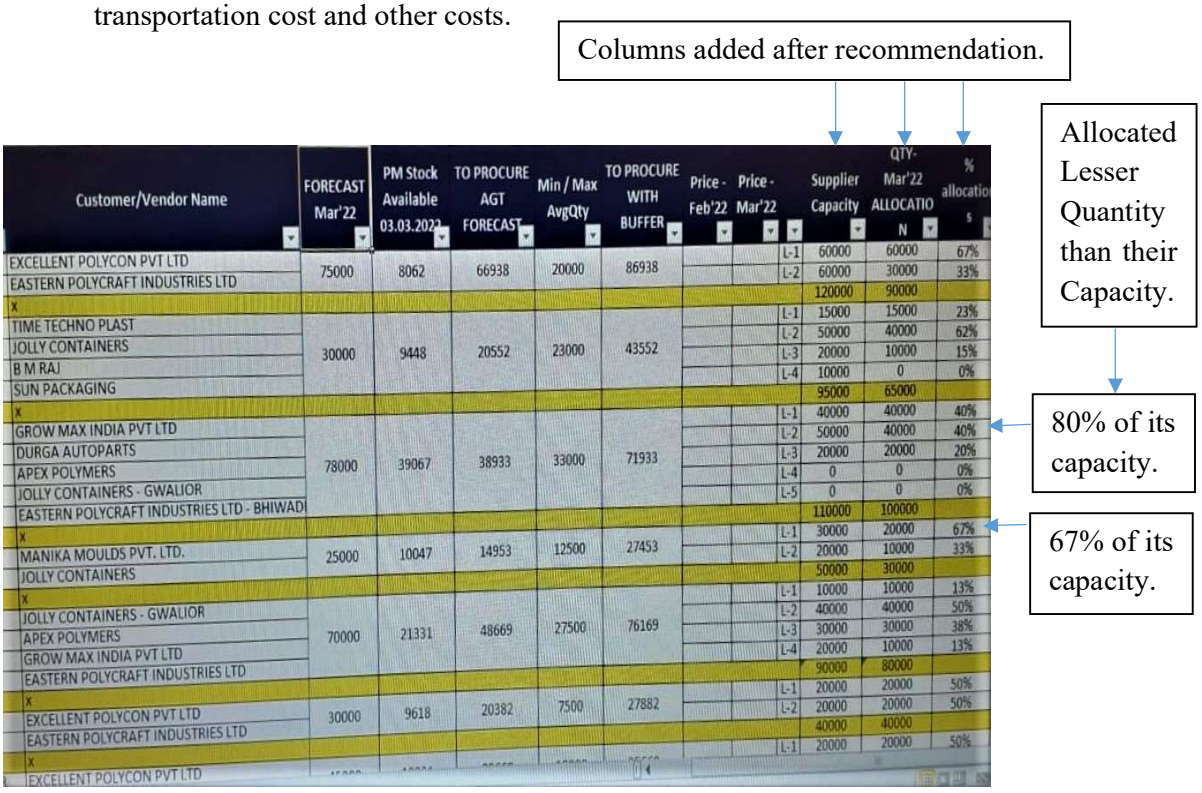
4. Reducing the Reorder Point. Though sometime it is advisable and feasible to stock excessive RM to satisfy delivery date of the customer and fulfill the commitment made to the customers.

5. Creating New Vendors which are located near the plant so that lead time for delivery will reduce. This will help us in providing PO to them 2 to 3 days in advance and not store excess inventory by ordering a week in advance.

1.6 Benefits Observed

A. Vendor Evaluation and Rating

1. Supplier Performance Improved.
2. New Suppliers Developed.
3. Proper timely Supply of Raw/Packing Material from the suppliers.
4. Rejection of Raw/Packing Material reduced.
5. Lead Time reduced due to increase in newly developed suppliers.
6. Allocations of the Materials changed according to the supplier sheet.
7. Inventory Control System:
   As per the study raw materials has increased the efficiency of the inventory performance with less wastages and that has achieved significant reduction in the transportation cost and other costs.



Customer/Vendor Name	FORECAST Mar'22	PM Stock Available 03.03.2022	TO PROCURE AGT FORECAST	Min / Max AvgQty	TO PROCURE WITH BUFFER	Price - Feb'22	Price - Mar'22		Supplier Capacity	QTY- Mar'22 ALLOCATION	% allocation
EXCELLENT POLYCON PVT LTD	75000	8062	66938	20000	86938			L-1	60000	60000	67%
EASTERN POLYCRAFT INDUSTRIES LTD								L-2	60000	30000	33%
x									120000	90000	
TIME TECHNO PLAST	30000	9448	20552	23000	43552			L-1	15000	15000	23%
JOLLY CONTAINERS								L-2	50000	40000	62%
B M RAJ								L-3	20000	10000	15%
SUN PACKAGING								L-4	10000	0	0%
x									95000	65000	
GROW MAX INDIA PVT LTD	78000	39067	38933	33000	71933			L-1	40000	40000	40%
DURGA AUTOPARTS								L-2	50000	40000	40%
APEX POLYMERS								L-3	20000	20000	20%
JOLLY CONTAINERS - GWALIOR								L-4	0	0	0%
EASTERN POLYCRAFT INDUSTRIES LTD - BHIWADI								L-5	0	0	0%
x									110000	100000	
MANIKA MOULDS PVT. LTD.	25000	10047	14953	12500	27453			L-1	30000	20000	67%
JOLLY CONTAINERS								L-2	20000	10000	33%
x									50000	30000	
JOLLY CONTAINERS - GWALIOR	70000	21331	48669	27500	76169			L-1	10000	10000	13%
APEX POLYMERS								L-2	40000	40000	50%
GROW MAX INDIA PVT LTD								L-3	30000	30000	38%
EASTERN POLYCRAFT INDUSTRIES LTD								L-4	20000	10000	13%
x									90000	80000	
EXCELLENT POLYCON PVT LTD	30000	9618	20382	7500	27882			L-1	20000	20000	50%
EASTERN POLYCRAFT INDUSTRIES LTD								L-2	20000	20000	50%
x									40000	40000	
EXCELLENT POLYCON PVT LTD								L-1	20000	20000	50%

Figure 1.5. Outcome of Supplier Evaluation Sheet

B. Inventory Movement Days Reduction

1. Inventory moving days reduced to 58 days from 60 days.
2. Supplier Evaluation Sheet helped in reducing the Inventory holding days that resulted in reduction of Inventory moving days.

Conclusion

Vendor Rating helped the Organization is solving Quality, Quantity, delivery performance of the supplier as well as overall performance of the supplier. This helped the organization to fulfil their commitments made to the customers. Reduction in Lead Time was also an added advantage due to which movement of Raw Material as well as Finished Goods increased and thus ensuring proper utilisation of space.