Application Of Productivity Enhancement Tools In RIGS Manufacturing Industry: ABC AND MRP

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Abstract : Since the mid-1980s the strategic edges of inventory management and production designing and scheduling became obvious. First, inventory represents a serious money investment for any company. Inventories represent of 25 to 50 per cent of total assets in manufacturing firms and 75 to 80 per cent in wholesalers and retailers. On the opposite hand, from the operational perspective, inventories add an operational flexibility. Adequate inventories unbroken in producing corporations can sleek the assembly method. The paper attempts to identify the gap between inventory management theory and Practice based on the critical examination of the trends in academic research and the practicing world. This paper attempts to provide suggestions to potentially bridge this gap.

Index Terms : Inventory management, Forecasting Method, Master Production Schedule, Materials Requirement Planning.

1. INTRODUCTION

THE Indian oil and gas industry has undergone a paradigm shift in the last decade, with more and more policies being framed to encourage oil firms to carry out activities in the country. Policies like HELP, NELP, OALP focus on promoting oil and gas drilling and exploration in India, all the while giving incentives to the companies. In his address during an energy conference in 2015, Prime Minister Narendra Modi called for slashing the dependence on oil and gas imports by 10% in the coming years. Amidst this backdrop, a sudden upsurge in the demand of drilling rigs shouldn't be surprising. However, drilling rig accidents in recent times have brought the focus on deploying rigs of the right drilling rig manufacturers. Inventory is defined as a stock of items kept on hand by an organization to use in meeting customers demand. . The importance of inventory to a firm stems from 2 points of read monetary and operational. First, inventory represents a significant monetary investment for any company.On the opposite hand, from the operational perspective, inventories add an operating flexibility. Adequate inventories in manufacturing firms can swish the assembly method. The wholesalers and retailers offer sensible client services and gain sensible public image by holding comfortable inventories. The fundamental objective of inventory management is to realize a balance between the low inventories and high return on investment.

2 HISTORICAL REVIEW OF INVENTORY MANAGEMENT

Historically, inventory management has usually meant an excessive amount of inventory and insufficient management or insufficient inventory and an excessive amount of managing the whole system. There can be severe penalties for excesses in either direction or in cost losses. Inventory issues have proliferated as technological kind progress has accrued the organization's capacity to provide merchandise in the bigger quantities, quicker and with multiple methodsof differences may expect. The general people, the community or the public have combined the related matter by its willingness to variations and frequent approach of inventory changes. Since the mid of 1980s the kind of strategic and competitive advantages of inventory system management and production process designing and programming became obvious. The business magazines and industrial news has highlighted the hit of Japanese, European, North American corporations in achieving incomparable effectiveness and potency in the process of producing the product and distribution of the same. After the year 2012, most of the firms have 'raised the bar', and continuing again by coordinating and supporting with other firms in their supply chains activity.

For example, rather than considering to uncountable and inconsistent demand, they can contribute info so that the variability of the demand they examine is considerably lower. Silver, Pike and Peterson studied from their research and argued that in the USA and other Western Countries, manufacturing and productivity improvement was pursued through cost reduction in direct manufacturing labor expended per unit of output. This may consider as a legitimate strategy as a result of the above the level labor content in several factory-made goods. Though, the fraction of cost gratitude to labor has been steady falling in recent years. In fact, the quantitative relation of purchased materials to sales (in dollars) reached sixty percent for U.S. corporations in 1985. Even giant producing corporations, like the U.S automobile assemblers, purchase up to sixty percent of the worth of the merchandise. This suggests that management of raw materials inventories is a section that shows nice promise for productivity improvement. Japanese corporations received abundant merited attention within the mid-to late 1980's as a result of their exceptional performance on quality and inventory management. The tremendous interest in Just-in-Time producing (JIT) indicates that work-in-process inventory management is additionally a section ripe for improvement.

3 REVIEW OF LITERATURE

Suleman Bawa, George Effah Asamoah (2019) this study included 140 firm- year observations from 14 listed manufacturing firms in Ghana Stock Exchange (GSE) over a 10-year period, from 2007 to 2016. Measures of firm performance that were gain and in operation money flows were examined. Regression equations stated in the form of return on assets and operating cash flow was used in analyzing firm performance data. Pearson correlation and

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multiple regression analysis were also used as proxies in relatedness to effective inventory management. The empirical results provided proof that the most variable, inventory management haven't any impact on firm's performance and is insignificantly associated with firm performance of manufacturing firms in GhanaE. Balugani. F. Lolli. (2018) in this paper to cluster items into homogenous groups which has to be controlled with the same inventory control policies k-means and Ward's algorithm methods were used. The above uncontrolled step minimizes the need for automatic inventory management simulations. The efficiency of the system was found to be very essential with efficient intermediate transformation process. Hui zhao, Edward huang (2018) Studied about Multi-stage stochastic programming model to capture the dynamic inventory allocation process in the supply chains. Since this problem's solving time and required memory can increase significantly with the increase of the stage and scenario numbers, the progressive hedging algorithm is applied as the solution approach in this paper. In the numerical experiments, we study this algorithm's performance and compare the solving efficiency with the direct solution approach. Additionally, we have a tendency to establish the optimum production amount of clinical medication and provides a discussion regarding the tradeoffs between the clinical test delay and total cost. Hong Shen, Qiang Deng (2017) This paper identify the key factors that influence inventory management practices, investigate efficient and effective inventory management approaches, and examine the impact of supplier cooperation on supply chain improvement. A case study approach is employed to spot the key factors that influence inventory management in a major industrial plant. Economical and effective inventory management practices square measure derived from the case study and will give sensible steering for foreign manufacturers in China. It provides a valuable tool for identifying the key factors in inventory management which can be applied to similar problems encountered in actual manufactories. Kehinde Sobiyi (2017) this paper gives the significance of proper inventory control systems application in warehouses. The inventory control techniques applicable within the warehouse like batch quantities, ordering strategies and inventory classification and further because the factors causative to poor inventory control. Yellaswamy Ambat (2016) Raw materials consist of those units or input which are used to manufacture goods that require further processing to give a shape of finished goods. Finished goods are products ready for sale. Inventory should neither be too low to effect the production adversely nor too high to block the funds unnecessarily. About 90 per cent part of working capital is invested in inventories. Therefore, it is necessary for management to give proper attention to inventory management. A proper planning of buying, handling, storing and accounting should form a part of inventory management. An Pan, Chi-Leung Hui (2016) This paper gives inventory policy which incorporate the stock out risk, storage capacity, and partial backlog. The healthcare apparel service center, under the capacity constraint, aims to minimize the inventory cost and achieving a low stock out risk. To handle this challenge, an optimization problem is constructed. A real case-based information analysis is conducted, and also the result shows that the expected total value on an order cycle is reduced substantially. An in depth sensitivity analysis is conducted to come up with further insights. Syed Jamal Abdul Nasir bin Syed Mohamad, Nurul Nadia Suraidi(2016) The relationship between the inventory management and company performance was determined based on inventory days and return on asset (ROA) analysis. The analysis found that company X had a number of inventory issues like unorganized inventory arrangement, great amount of inventory days no cycle count and no correct records balance thanks to unskilled staff. The study also evidenced that there was a major relationship between come on plus (ROA) and inventory days. This paper also provides recommendation to the corporate and for additional analysis. Stephen aro-gordon (2016) research so far tends to treat multiple inventory management techniques in silos; there has been relatively few significant attempts to undertake a holistic review and presentation of the many key rising techniques out there to today's professional, therefore the motivation for this paper, that primarily aims at referring the reader to a top level view the conceptual literature on modern inventory management practice. HaiyanXie, Ranathunga (2015) the radio frequency network system seems to be a practical solution for this problem. RFID technology helps to create positive that the correct assets are located at the correct place with no discrepancies and errors. The result of this analysis can facilitate to extend the potency of inventory management, improve the accuracy and quality of the asset tracking process, and reduce human errors. Talatu Muhammad Barwa (2015) the paper centered on the concepts of inventory control decision-making process, and a detailed reports of different businesses implications of inventory control decision making process and its influence in company's survivals in competitive surroundings. The theoretical details of the analysis assess some samples of some firms that have successfully achieved inventory control that results in minimum value implications for holding inventory.

4 RESEARCH METHODOLOGY

The paper attempts to identify the gap between inventory management theory and practice based on the critical examination of the trends in academic research and the practicing world. This paper attempts to provide suggestions to potentially bridge this gap. The research publications and articles in the area of Raw material and finished goods inventory management. Rig industry was selected as a benchmark and academic research with real life inventory management was analyzed.

5 STATEMENT OF PROBLEM

A Manufacturing firm consists of inventory 70–80% of their total asset. So it is necessary to evaluate inventory and adopt technologies that increase the effectiveness of the company. The company follows previous quarterly month demand as input to production of products. The demand of the product may vary at any time .The Company has to evaluate inventory and classify the products based on annual consumption and cost. The company also has to forecast the demand based on historical data and to provide production schedule based on the inventory.

6 OBJECTIVES OF THE STUDY

- To study about the order time and lead time and how they match demand with the production schedule
- To study about the safety stocks that balances the loss of sales and customer goodwill
- To study about how production schedule changes with inventory

- To evaluate the inventory management practices of RIG industries in and around Tamilnadu
- To provide appropriate suggestions for the development of inventory management practices.

7 SCOPE OF THE STUDY

Production planning and inventory control system identification for a manufacturing firm would be a challenging task. Choosing the right system for firm's profitability in case of both short and long term is essential because investment in inventory control system is huge and constant over a period of time.The unplanned production results in bulk inventory and product defects. The cost incurred for loading and unloading is high. So planned production make inventory less and cost Incurred for company low. In this study production activities are scheduled in order to reduce the inventory and to meet customer demands with adequate end product inventory.

8 METHODOLOGY

The Evaluation of inventory is done through ABC analysis and production schedule done through Material Requirement Planning.

8.1 Data Collection

Primary Data: Empirical study also can used to analyze the primary data. In this phase, selected 8 rig companies were included in the study. In light of the above, it has to be indicated that the respondents in this population were precisely those dealing with inventory management and Production. Secondary Data: Secondary information, that is, the literature part of the analysis has primarily been provided within the previous chapters

8.2 Quantitative Forecasting Technique

In this technique, the companies can identify where historical demand data are used to project future demand. Extrinsic and intrinsic techniques are typically used. ABC Analysis: ABC analysis of inventory may be a method of classifying the product supported the worth of importance. This idea springs from the Pareto principle of 80/20 rule which focuses on vital few from trivial many. Not all components in an inventory are of the same worth, thus these components are broken down into three classes A, B and C. Class category A consists of most beneficial things, though this stuff represent solely 100% of amount they account for 70-80% of consumption worth, Category B consists of things with moderate importance accounting for 10-20% of revenue and sophistication C consists of least valuable things that contribute to solely 10% of revenue. This classification helps managers in prioritizing and observance things of high importance closely. In this study ABC analysis is taken for Raw Material and Finished goods inventory.

Table-1

Raw Material	Quantity	Cost/ kg	Cost/ unit	Total Cost
OpaleneHm (f52h04) Granules	19047	108	2700	51426900
Propel HDPE Granules	14403	101	2525	36367575
Poly propylene Blue Granules	6530	90	2250	14692500
Propel LLDPE White Granules	4644	118	2950	13699800
Propel LLDPE Granules	4353	94	2350	10229550
Poly propylene Black Granules	4353	60	1500	6529500
Lubricants	1500	270	270	405000
Belt	200	1500	1500	300000
80 mm Saw Blade	336	600	600	201600
Oil filters E125HD209	150	750	750	112500
Ball bearing (40)	15	3000	3000	45000
Ball bearing (30)	25	1500	1500	37500
Lamp tube	120	300	300	36000
Compressor filters	140	250	250	35000
Ball Bearing (50)	10	3500	3500	35000
Detection switch	15	400	400	6000
Clamp Rail	20	100	100	2000

Table-2

Raw materials	Percentage Annual Quantity (%)	Percentage Annual Cost(%)
OpaleneHm (f52h04) Granules	34%	38%
Table Propel HDPE Granules, Polypropylene Blue Granules	38%	38%
Like Propel LLDPE White Granules, Propel LLDPE Granules, Polypropylene Black Granuels, Lubricants, Belt, 80 mm Saw Blade, Oil filters E125HD209, Ball bearing (40), Ball bearing (30), Lamp tube, Compress or filters, Ball Bearing (50), Detection switch, Clamp Rail	28%	24%

Interpretation: From the ABC analysis of raw material inventory OpaleneHm (f52h04) Granules Contributes 38% of total inventory cost and the consumption is also high annually most valuable item. So it is called A needs very tight control over cost. Also from the table Propel HDPE Granules, Polypropylene Blue Granules combine contribute about another 38% of total inventory cost moderate importance named as B needs medium control over cost. The items like Propel LLDPE White Granules, Propel LLDPE Granules, Polypropylene Black Granules, Lubricants, Belt, 80 mm Saw Blade, Oil filters E125HD209, Ball bearing (40), Ball bearing (30), Lamp tube, Compressor filters, Ball Bearing (50), Detection switch, Clamp Rail are least importance items totally contribute 24% of the total inventory cost named as C needs less control over the inventory cost.

Table-3

Liters	Finished Goods	Quantity	Cost	Annual Cost	Quantity Annual %	Annual cost
750	yellow tank	4300	2250	9675000	6.07%	8.17%
300	drum	3500	900	3150000	4.94%	2.66%
750	blue tank	3300	2250	7425000	4.66%	6.27%
1500	yellow tank	1600	4500	7200000	2.26%	6.08%
500	blue tank	4500	1500	6750000	6.36%	5.70%
1000	yellow tank	2100	3000	6300000	2.97%	5.32%
1500	blue tank	1270	4500	5715000	1.79%	4.83%
300	blue tank	6000	900	5400000	8.47%	4.56%
1000	blue tank	1650	3000	4950000	2.33%	4.18%
400	drum	3500	1200	4200000	4.94%	3.55%
2000	yellow tank	700	6000	4200000	0.99%	3.55%
500	yellow tank	2500	1500	3750000	3.53%	3.17%
300	yellow tank	4000	900	3600000	5.65%	3.04%
2000	blue tank	550	6000	3300000	0.78%	2.79%
750	black tank	650	4500	2925000	0.92%	2.47%

350	drum	2700	1050	2835000	3.81%	2.39%
3000	blue tank	300	9000	2700000	0.42%	2.28%
3000	yellow tank	260	9000	2340000	0.37%	1.98%
250	drum	3100	750	2325000	4.38%	1.96%
1500	white tank	380	6000	2280000	0.54%	1.93%
1000	white tank	560	4000	2240000	0.79%	1.89%
200	drum	3700	600	2220000	5.23%	1.88%
2000	white tank	270	8000	2160000	0.38%	1.82%
2000	black tank	150	12000	1800000	0.21%	1.52%
255	drum	2300	765	1759500	3.25%	1.49%
500	black tank	510	3000	1530000	0.72%	1.29%
3000	white tank	120	12000	1440000	0.17%	1.22%
750	white tank	470	3000	1410000	0.66%	1.19%
300	black tank	770	1800	1386000	1.09%	1.17%
500	white tank	630	2000	1260000	0.89%	1.06%
185	drum	2200	555	1221000	3.11%	1.03%
1000	black tank	200	6000	1200000	0.28%	1.01%
1500	black tank	120	9000	1080000	0.17%	0.91%
125	drum	1800	375	675000	2.54%	0.57%
300	white tank	500	1200	600000	0.71%	0.51%
120	drum	1350	360	486000	1.91%	0.41%
50	drum	1200	150	180000	1.69%	0.15%
80	drum	400	240	96000	0.56%	0.08%
25	drum	800	75	60000	1.13%	0.05%
	plastic water pot	500	60	30000	0.71%	0.03%
	plastic basket	400	70	28000	0.56%	0.02%

Table-4

Litres	Categories	Quantity	Cost	Annual Cost	Cumulative Cost %
750	yellow tank	4300	2250	9675000	8%
300	drum	3500	900	3150000	11%
750	blue tank	3300	2250	7425000	17%
1500	yellow tank	1600	4500	7200000	23%
500	blue tank	4500	1500	6750000	29%
1000	yellow tank	2100	3000	6300000	34%
1500	blue tank	1270	4500	5715000	39%
300	blue tank	6000	900	5400000	44%
1000	blue tank	1650	3000	4950000	48%
400	drum	3500	1200	4200000	51%
2000	yellow tank	700	6000	4200000	55%
500	yellow tank	2500	1500	3750000	58%
300	yellow tank	4000	900	3600000	61%
2000	blue tank	550	6000	3300000	64%
750	black tank	650	4500	2925000	66%
350	drum	2700	1050	2835000	69%
3000	blue tank	300	9000	2700000	71%
3000	yellow tank	260	9000	2340000	73%
250	drum	3100	750	2325000	75%
1500	white tank	380	6000	2280000	77%
1000	white tank	560	4000	2240000	79%
200	drum	3700	600	2220000	81%
2000	white tank	270	8000	2160000	82%
2000	black tank	150	12000	1800000	84%
255	drum	2300	765	1759500	85%
500	black tank	510	3000	1530000	87%
3000	white tank	120	12000	1440000	88%
750	white tank	470	3000	1410000	89%
300	black tank	770	1800	1386000	90%
500	white tank	630	2000	1260000	91%
185	drum	2200	555	1221000	92%
1000	black tank	200	6000	1200000	93%
1500	black tank	120	9000	1080000	94%
125	drum	1800	375	675000	95%
300	white tank	500	1200	600000	95%
120	drum	1350	360	486000	96%
50	drum	1200	150	180000	96%
80	drum	400	240	96000	96%

Table-5

Finished goods	Percentage Annual Quantity (%)	Percentage Annual Cost (%)
Tank blue (300, 500, 750, 1000, 1500) & Yellow tank (750, 1000, 1500, 2000)	27%	55%
Also Blue Tank (2000) & Yellow tank (300, 500) & Black tank (750)	19%	23%
Other items	36%	30%

Interpretation: In the finished goods inventory a total of 41 products ABC analysis is done. From the ABC analysis Tank blue (13, 14, 15, 16, 17) & Yellow tank (750, 1000, 1500, 2000) contributes 55% of total inventory cost and annual quantity of 22% named as A. The A items are controlled precisely. Such that the needs very tight control over inventory. Also Blue Tank (2000) & Yellow tank (300, 500) & Black tank (750) contribute about 23% of total inventory cost and annual quantity of nearly 20% needs medium control over the inventory. Other products totally contribute about 30% of the total inventory cost and annual quantity of 36% named as C. These items require less Control over the Inventory.

8.3 Material Requirements Planning

Material Requirements Planning (MRP) is a computer-based inventory control system designed to schedule and place orders for items of dependent demand. Dependent demand items are components of finished goods such as raw materials, component parts, and subassemblies for which the amount of inventory needed depends on the level of production of the final product. For instance, in a plant that factory-made bicycles, dependent demand inventory things would possibly embody aluminum, tires, seats, and bike chains.

8.4 Master Production Schedule

The Master Production Schedule is a elaborated Plan of Production. It drives the MRP system by referencing inventory, necessities and bill of materials. For the aim of Materials Requirements Planning, the time periods must be identical with those utilized in MRP system. The MPS for the products have been done and the production forecast done with demand, safety stock, lead time into consideration. With this MPS the company can produce drums and tanks only scheduled quantity. This will reduce the inventory level of finished goods overtime. The company produces tanks and drums only for the demand schedule. The cost involved in holding the bulk products for sale is reduced. The MPS for the 41 products are done for12 months with lead time, Safety stock, Available inventory, ending inventory.

A model MPS and MRP for the drums has been depicted in the following table.

MPS	1	2	3	4	5	6	7	8	9	10	11	12
MPS: A (Drum 25 lit)	10		40			300	200		150		100	

ITEM: A									LEAD TIME:		1 month	
Description : Drum (25 Lit)									SAFETY STK:		20 Units	
	1	2	3	4	5	6	7	8	9	10	11	12

Gross Requirement	10	0	40	0	0	300	200	0	150	0	100	0
Beginning Inventory	60	50	70	30	30	30	20	20	20	20	20	20
Scheduled Receipts		20										
Ending Inventory	50	70	30	30	30	-270	-180	20	-130	20	-80	20
Net Requirement	0	0	0	0	0	290	200	0	150	0	100	0
Planned Receipts	0	0	0	0	0	290	200	0	150	0	100	0
Planned Release	0	0	0	0	290	200	0	150	0	100	0	0

9 FINDINGS, SUGGESTIONS AND CONCLUSION

9.1 Findings

- Company stocks inventory initially without any forecast, which results in huge inventory
- Company doesn't have any record of product production date and inventory storage date.
- The product tends to damage due to storage of products in open space
- Company doesn't have any quality department to check the quality of the product, only the supervisors check the quality of the product.
- The workers didn't have safety equipment's while handling the production of products.
- The company didn't adopt any technology in inventory management.
- Company uses only quarterly demand forecast for production
- Company doesn't have Weigh Bridge for weighing the empty vehicle and load vehicle.

9.2 Suggestions

- ERP software implementation helps the company to keep record of inventory items, production report and inventory reports.
- The ERP software helps to know about the date on which products are stored and which product leave first for sales.
- The defect products are should be carefully handled, the products are recycled
- The causes for defect product should be analyzed every week
- The company should use lot to lot production and storage

9.3 Conclusion

Too little and too much inventory in any enterprise may affect the performance of the whole company Optimization of inventory is a key to the success of any enterprise. Here inventory is analyzed using ABC analysis based on consumption quantity and percentage of cost per product. The order time, lead time and safety stock of the inventory were studied. The products that are having higher consumption and cost are controlled.

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