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COST REDUCTION USING COMBINE-COST-MATRIX IN A MANUFACTURING INDUSTRY – A CASE STUDY

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ABSTRACT

A case study has been carried out in one of the manufacturing unit engaged in the business of design, manufacturing, and installation of sugar plant equipment having customers in India and abroad. The annual budget highlighted the high capital cost of holding huge inventory. A new approach using selective inventory control results in noticeable annual savings. High priority items are identified by using combined cost matrix of ABC and VED analysis. Moving average forecasting technique is employed to predict future demand for next production cycle. The analysis helps in reducing inventory capital up to 11 Lacks using above strategy without disturbing production.

KEYWORDS: Inventory Control, Sugar Industries, Condensers, Automation, ABC, VED, Cost Matrix.

I. INTRODUCTION

Managing inventory is a challenging task. The excessive stock may place a heavy burden on the cash resources of business while insufficient stocks may lead to loss of production and delay customer's orders. Though an inventory of material is an idle resource, almost every company needs to maintain it for the efficient and smooth working of its operations [1]. The stock holding cost and the procurement cost are two important costs involved in inventory control models. Stock holding cost is the cost of maintaining the assets and the interest paid on the capital. The procurement cost includes the fixed cost associated with placing an order or setting up machinery before starting production [2]. It includes costs of purchase, requisition, follow-up, receiving the goods and quality control, etc. The money saved on inventories by minimising excess stocks is an alternative to competing in the market. Inventory classification supported with demand forecast can save considerable cost and space of an enterprise. There is a need to adopt newer tools like selective inventory control and forecasting techniques which promise many long-term benefits [3]. A new decision support system was developed to achieve efficient production system, 4] based on ABC, VED and FSN classifications [5], the new system reduced the inventory cost up to 25%. To identify drugs requiring greater managerial control, Thawani[6] and others conducted an economic analysis of drug expenditure in the Government Medical College Hospital, Nagpur and managed to reduce the inventory cost through combined cost matrix of (ABC) and (VED) analysis. Inventory classification of items by multiple criteria and weighted linear optimisation model [7] has been proposed and illustrated to classify the incoming items; the design is similar to the linear programming model that can be easily understood by inventory managers. In an inventory system of a large manufacturing organisation, the criticality of different spare parts was studied, and a new design was utilised to obtain absolute measurements of criticality, which were compared with pre-specified numerical limits for classifying components as Vital, Essential, or Desirable [8]. The working of the model is demonstrated through an inventory system involving spare parts. A user-friendly inventory control system is developed in a small production unit, where the use of Excel tools generates an interface and performing ABC analysis [9]. The new regime is found to offer considerable improvements. A method is developed based on exponential smoothing and modifications are proposed to overcome certain implementation difficulties. This approach is illustrated on real demand data for car parts [10].

II. METHODOLOGY

The present work is conducted at M/S Spray Engineering Devices Private Limited, with an annual turnover of Rs 70 Crore. The industry does not have a proper system of codification for incoming materials, due to which the classification of materials is rendered difficult. Moreover, no scientific method has been adopted to streamline the incoming materials. The requirement of materials and planning is based on orders placed by

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customers and personal judgment only; no measures have been taken to reduce the cost of materials. The use of bin cards has been started as recently as April-2016. The important practice of testing every tool of inventory has been grossly overlooked. The industry seems to have a tremendous scope of savings if a material planning is done effectively at each stage.

Data Collection

The data for materials used in the manufacturing unit for the year 2015-16 is collected from stores, purchase and production department. Total one hundred and seven items have been selected, recording major details like item name; cost/unit; consumption per month; lead time. The data is compiled into a standard Excel format to facilitate data retrieval in various combinations using filters.

ABC Classification

Always Better Control is a traditional inventory control technique, which is based on Pareto's Law, also known as 80-20 rule. Which states that 20% of the items account for 80% of the total inventory cost designated as A-items, and the remaining 80 per cent of the items become B and C items, accounting for 20% of the total cost [11] [12].

The annual consumption value of each item taken from stores is calculated by multiplying unit cost with a total number of annual issues. After that, items are arranged in descending order according to their annual usage value. Then the cumulative cost is calculated.

VED classification

VED stands for vital, essential, and desirable items. This type of classification is most applicable to spare parts. The basis of the VED classification is that, if the non-availability of an article shuts the process completely and there is no standby unit as spare then the item comes under vital items. If the non-availability of an item reduces the output but does not shut down the process, then it goes to an essential category, whereas if the non-availability of the item does not affect the efficiency, the item is called desirable.VED classification is done in consultation with the user department [12]. The questionnaire is circulated to the user and according to their feedback; they are classified as Vital, Essential and Desirable items. The same itemised list is used to prepare a questionnaire for VED analysis.

Figure 1 ***Condensers for sugar plants***

III. RESULTS AND DISCUSSION

Combined Cost Matrix

The Combined Cost Matrix is formulated by combining results of ABC and VED analysis. This helps to categorise the items into various groups. The results of combined cost-matrix have been shown in Table 1. The resultant matrix contributes to narrow down the items into two categories to direct the supervisory monitoring. Category I comprising of the articles needing greater attention, i.e. AV, AE, AD, BV and BE groups of items. Category II of low priority items belonging to the CV, BD, CE and CD groups of items. Whereas the first

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alphabet denotes its place in the ABC analysis, the second one stands for its place in the VED analysis. The grouping is illustrated in Figures 1, 2 and 3.

Table 1 Results of Combined Cost Matrix

A		B		C		Total	
Cost percent	**No. of spares**	Cost percent	**No. of spares**	Cost percent	**No. of spares**	Cost percent	**No. of spares**
76	**5**	3	**1**	1	**17**	80	**22**
3	**1**	7	**6**	2	**34**	13	**42**
0	**0**	6	**5**	2	**38**	7	**43**
79	**6**	16	**12**	5	**89**	100	**107**

The results of combined cost matrix in Category-I comprises of high priority items, AV, AE, AD, BV and BE groups, consisting of total thirty-five (35) items. These things must always be kept in stock and must have more than one supplier. Strict control, frequent ordering in smaller lots and periodic follow-up are suggested control strategies for this category. Category-II comprises of CV, BD, CE and CD groups, consists of total seventy-seven low priority items. Group AD requires reasonable control, frequent ordering in smaller lots, no need to maintain safety stocks. The Groups CV, BD, CE and CD need only rough estimates for planning, bulk order, once in three months, and can be fully delegated. The consumption details for critical items come under category- AV has been taken from materials department, further analysis is done to predict the future demand for these articles based on this data. The moving average and exponential smoothening are adopted as forecasting techniques. The results of the forecasted demand for high consumption value items are given in the table2.

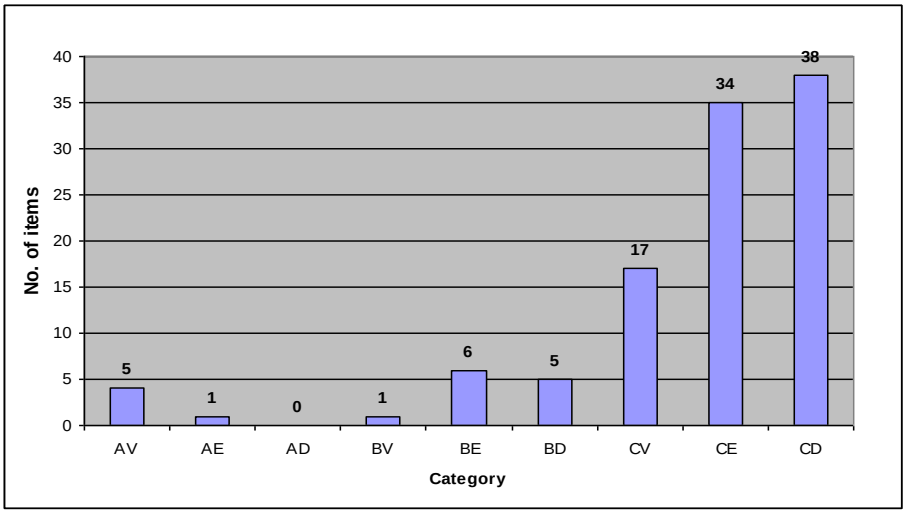

Figure 2 Number of issues vs. Category

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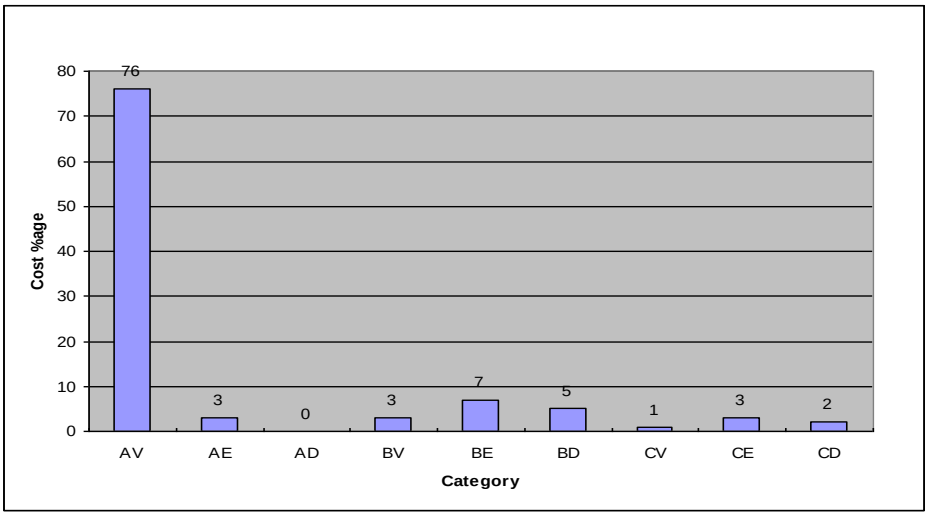

Figure 3 Percentage of cost involved in each category

Table 2: Summary of savings on capital cost for group-AV items

Item Name	Stock (Kg)	Units	Demand Forecast	Cost/Unit (Rs)	Difference	Capital Cost (Rs)
SS304	44325	KG	20861.0	191.00	23464	44,81,624.00
SS316L	12675	KG	6037.0	202.70	6638	13,45,522.60
MS	28800	KG	21492.0	29.00	7308	2,11,932.00
SS409	6380	KG	3838.0	68.00	2542	1,72,856.00
E3.15x450	3977	KG	3424.0	72.00	553	39,816.00
Total Reduction in Capital cost						**62,51,750.60**
Annual savings on capital cost			93776 x	12	=	11, 25315/-

IV. CONCLUSION

The exercise helps in identification of various control groups. It gives more clarity and confidence to purchase and store departments about inventory items. These groups form the basis control strategies through careful control of incoming material more precisely. Demand forecasting is done for the next quarter for high priority items, and control strategies are also suggested for different groups for efficient inventory control. Industry can save Rs. 11.25 Lacks per annum, through this model, after identifying the materials of high criticality and high annual consumption value.

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