SELECTIVE INVENTORY CONTROL

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ABSTRACT

This paper is a review on various selective inventory control techniques. The references are taken from various research papers already published in this domain but on different types of industry or fields. This paper tells how efficiently selective inventory control technique can be used to optimize the resources and reduce cost. The inventory control techniques are used in combination of one another. Various combinations are used to solve varied types of problems.

Keywords: - *Inventory management techniques, ABC analysis, VED analysis, FSN analysis, XYZ analysis, SDE analysis.*

INTRODUCTION

Every industry works on certain inventory. Thus it forms an important asset of the industry and thus needs to be properly managed. Inventory control techniques helps to optimize the inventory by considering various factors depending upon the type of technique. From industry at small scale to large scale needs proper maintenance of inventory. Inventory management includes deciding the inventory level, cost involved and the time at which material should be ordered or stocked. Thus it forms a crucial part of Industrial processes. Inventory management is a systematic approach to sourcing, storing, and selling inventory—both raw materials (components) and finished goods (products). In business terms, inventory management means the right stock, at the right levels, in the right place, at the right time, and at the right cost as well as price.

METHOLOGY:

Inventory Management Techniques

ABC Analysis:-

ABC analysis stands for Always Better Control Analysis. It is an inventory management technique where inventory items are classified into three categories namely: A, B, and C. The items in A category of inventory are closely controlled as it consists of high-priced inventory which may be less in number but are very expensive.

The items in B category are relatively lesser expensive inventory as compared to A category and the number of items in B category is moderate so control level is also moderate. The C category consists of a high number of inventory items which require lesser investments so the control level is minimum.

VED Analysis

VED stands for Vital Essential and Desirable. Organizations mainly use this technique for controlling spare parts of inventory. Like, a higher level of inventory is required for vital parts that are very costly and essential for production. Others are essential spare parts, whose absence may slow down the production process, hence it is necessary to maintain such inventory. Similarly, an organization can maintain a low level of inventory for desirable parts, which are not often required for production.

It attempts to classify the items used into three broad categories, namely Vital, Essential, and Desirable. The analysis classifies items on the basis of their criticality for the industry or company.

- Vital: Vital category items are those items without which the production activities or any other activity of the company, would come to a halt, or at least be drastically affected.
- Essential: Essential items are those items whose stock – out cost is very high for the company.
- Desirable: Desirable items are those items whose stock-out or shortage causes only a minor disruption for a short duration in the production schedule.

The cost incurred is very nominal. VED Analysis is very useful to categorize items of spare parts and components. In fact, in the inventory control of spare parts and components it is advisable, for the organization to use a combination of ABC and VED Analysis. Such control system would be found to be more effective and meaningful.

FAST, SLOW & NON-MOVING (FSN) Analysis:-

This method of inventory control is very useful for controlling obsolescence. All the items of inventory are not used in the same order; some are required frequently, while some are not required at all. So this method classifies inventory into three categories, fast-moving inventory, slow-moving inventory and non-moving inventory. The order for new inventory is placed based on the utilization of inventory.

XYZ Analysis

XYZ analysis is one of the basic supply chain techniques, often used to determine the inventory valuation inside the stores. It's also strategic as it intends to enable the Inventory manager in exercising maximum control over the highest stocked item, in terms of stock value.

The XYZ analysis is a way to classify inventory items according to variability of their demand.

- X class items which are critically important and require close monitoring and tight control – while this may account for large value these will typically comprise a small percentage of the overall inventory count.
- Y class are of lower criticality requiring standard controls and periodic reviews of usage.

Z class require the least controls, are sometimes issues as “free stock” or forward holding.

GOLF Classification:-

The letter stands for Government, Ordinary, Local and Foreign. There are mainly imported items which are canalized through the State Trading Corporation (STC) Minerals and Metals Trading Corporation, etc. Indian Drugs and Pharmaceutical Ltd (IDPL), Mica trading corporation etc. These are special procedures of inventory control which may not applicable to ordinary items as they require special procedures.

High Medium Low (HML) Classification:-

HML Analysis classifies inventory based on how much a product costs/its unit price. The HML classification is same procedure as adopted in ABC.

- High Cost (H) – Item with a high unit value.
- Medium Cost (M) – Item with a medium unit value.
- Low Cost (L) – Item with a low unit value.

The core difference is, for HML classification; unit value is the criterion and not the annual consumption value. The inventories should be place in descending order and it is up to management to fix limits of these three categories. Example: the management may decide all units of items with unit value of Rs 2,000 and above will be H items; between Rs. 2000-1000 will be M items & those below Rs. 1000 will be L items.

SOS Classification:-

SOS analysis is based on seasonality of items and it classifies all the items into two categories

S- Seasonal

0S- Off seasonal

The analysis helps in:

1. Identifying items that are available only during a limited period of the year .For e.g. Raw mangoes are only available only during a summers

2. Identifying items that are seasonal but available throughout the year however their costs in offseason are relatively high.

3. Non Seasonal items

As discussed above there are a number of methods used for selective inventory control and each method highlights a different aspect .The right method should be selected on the purpose for which we wish to carry out the selective inventory control.

SDE Analysis:-

The criterion for this analysis is the availability of the materials in the market. In industrial situations where certain materials are scarce (especially in a developing country like India) this analysis is very useful and gives proper guideline for deciding the inventory policies.

D stands for difficult items, items which are not readily available in local markets and have to be procured from faraway places, or items for which there are a limited number of suppliers; or items for which quality suppliers are difficult to get.

E refers to items which are easily available in the local markets

2. REVIEW WORK

We collected and studied 15 research papers to analyze how different inventory control techniques can help inventory management.

Sr. No.	Paper Title	Author(s)	Inventory control technique used.	Summary
1	Inventory control using FSN Analysis - A case study on a Manufacturing industry**.**	Shibamay Mitra, M Sukumar Reddy, Kumar Prince.	FSN analysis.	This case study discusses FSN analysis method of inventory control analysis of an Electric Multiple Unit manufacturing industry. We have found that the priorities of the items changes according to different inventory analysis techniques therefore the team needs to decide which one to go for.
2	Management of Spare part & Reduction of Downtime of Resistive welding machine.	Sagar V.Mahajan, Amit K.Chavan, Prof. M. S. Rohokale.	VED analysis & FSN analysis.	After analysis for maintenance downtime and spare part management using VED-FSN analysis, the layout of store department was modified which
3	Study of Inventory audit and Control of Automobile Spare parts using Selective Inventory control.	R K Malviya, S. Dharmadhikari, S. Choudhary, S.Gupta and V. Raghuwanshi.	ABC analysis, XYZ analysis & FSN analysis.	The objective of this study was to identify items for inventory management using selective control techniques. The integrated ABC, XYZ and FSN analysis methodology was adopted in isolation as well as conjunction to determine the most optimal method for classification of spare part inventory. Firstly individual analysis was performed like ABC on all components but single analysis failed to achieve proper economic control.

				Therefore to gain more efficient control, 3-dimensional matrix of ABC-XYZ-FSN was prepared which forms the basis of inventory control. On the basis this 3-Dimensional matrix 12 items come in AXF category which needs strict control and efforts should be made to reduce the stock to Z category. Likewise 105 items are in CZN category. They don't have much value but they occupy large space within their inventory, hence suggestions were made to free shelf space by disposing them via selling them at discount. Most of the non- moving items have low value so that is the reason they don't need much control. 9 items fall in BYS category. From the above study it was found that the priorities of the items change according to different selective inventory control category.
4	Spare parts classification and demand forecasting for stock control: Investigating the between research and practice.	Andrea Bacchetti & Nicola Saccani.		First of all, a comprehensive literature review on research about spare parts categorization, spare parts demand forecasting, and their integration with inventory management approaches was undertaken. Secondly, they performed ten case studies in various sectors (automotive, household appliances, printing systems, heating and air conditioning).
5	Prioritized ABC-FSN analysis of inventory management in private and hospital pharmacy.	Manivel P & Rajesh Ranganathan.	ABC analysis & FSN analysis.	The constraints and problems faced by the hospital inventory management to be overcome by implementing a new inventory model and attain serviceability in an effective and efficient way. The initial step of achieving the efficient inventory model, the inventory analysis to be selected based up on the present situation. Then formed the priority based ABC – FSN inventory matrix and narrowed down the drugs for monitoring and control strategies of pharmacy drugs.
6	Analysis of Inventory Control Techniques; A comparative study.	Tom Jose V, Akhilesh Jayakumar & Sijo M T.	EOQ, ABC analysis & FSN analysis	It is found that, there is a variation in the EOQ & no. of unit purchased. It is understood that the company is not following EOQ for purchasing the materials. So, the inventory management is not satisfactory. From calculation of safety stock, we can able to determine how much the company can hold the inventory in reserve stock per annum.
7	An Inventory control using ABC and FSN analysis.	Rohan Nadkarni & Dr. Asita Ghewari.	ABC analysis & FSN analysis.	The case study discusses ABC analysis methods of inventory control analysis of a wheel manufacturing industry. From the above study we have found that the priorities of the items changes according to different inventory analysis techniques. As compare to ABC analysis, FSN works with usage rate and ABC works with annual consumption value.

				As per the importance of materials in production ABC and FSN are used. FSN techniques significantly reduces unnecessary motions while issuing materials if they are arranged accordingly.
8	Construction material management through Inventory Control Techniques.	V. Rathinakumar, K. LalithaPriya, Prassana Kumar I. & C. Ravekumar.	ABC analysis & BOQ analysis.	A study indicates that the overall efficiency of the project has increased by 35% by implementing proper material management. For efficient material management some simple tools are proposed in this project work. ABC classification and EOQ analysis are used to overcome stock out issues and to abate the total inventory cost. Instead of using inflated software for inventory management, the engineers & contractors may use these simple inventory control techniques which are equally advantageous and cost-effective.
9	"XYZ" Inventory Classification and Challenges.	Dinesh Kumar Dhoka & Dr. Y.Lokeswara Choudary.	XYZ analysis.	Different Inventory Classification methods may be employed for different purposes. But we must carefully understand their limitations and implications before major decisions are put in place based on these classifications It would be better if some kind of automations and procedures with checks are designed for such Analysis like XYZ where entire process may be very tedious. ABC along with XYZ, a 2-dimensional approach to inventory classifications can be used more effectively.
10	Analysis of Inventory Management Performance- A case Study.	Surbhi Mishra, Sourabh Tege & Vishnu Agrawal.	XYZ analysis & FSN analysis.	From the classification of items it was found that X category items hold the priority from management perspective and should be strictly monitored as they are the only products on which high investment is incurred. Y class items holds 20 % contribution to the total components in terms of investment , and as they are of lower criticality, they requires lower standard controls and periodic reviews of usage. Z class items contributes to about 65% of the total components which require the least controls, sometimes can be neglected.
11	ABC Inventory management support system with a clinical laboratory application.	Hooshang M. Beheshti, Dale Grgurich & Faye W. Gilbert.	ABC analysis.	Data for a group of 29 coagulation and hematology reagents were used to examine inventory ordering policy from the management perspective grouped by total annual dollar value rather than by cost per item or quantity demanded. Total inventory costs are then viewed concurrently and in coordination with total transaction costs. Laboratory managers must balance profit maximization and cost minimization

				consideration as well as personnel time placed into the management and control of inventory, and be flexible to deal with uncertainties. The ABC classification allows managers to establish reorder policies for each class based on the days of supplies, lead time and safety stock and not the optimum order quantity for each item in a given class.
12	Integration of demand forecasts in ABC-XYZ analysis: practical investigation at an industrial company.	Bernd Scholz-reiter, Jens Heger & Christian Meinecke.	ABC analysis & XYZ analysis.	The consideration of consumption forecasts proves to be beneficial since future trends have a greater influence on the classification quality than forecasting errors. In contrast to the classic method of making the ABC-XYZ analysis based on consumption data only, the developed approach in this paper offers considerable advantages. These are quantifiable in respect to an assumed optimal reference classification, with the classic approach having a correspondence of 75 percent and the developed approach reaching a correspondence of 92 percent.
13	Analysis of different Inventory Control Techniques: A case study in a Retail shop.	S.K.Biswas, C.L.Karmaker, Ariful Islam, Nazmul Hossain, Shamim Ahmed.	ABC analysis, HML analysis & EOQ analysis.	The retail shop should have tighter control to 'A' class items rather than 'B' and 'C' classes items as 'A' class items have the highest consumption of BDT value. Safety stock should be maintained to reduce the probability of stock-out of items. EOQ can be an appropriate technique to lower the overstock and minimise total inventory cost. The analysis of different inventory control techniques in this paper can bring a promising result in overcoming these problems. High priced items should be checked more frequently than low priced items. Excess supply than the required order quantity should not be accepted for high priced and medium priced items. 'H' and 'M' categories of items should be purchased by skilled person and relative importance for handling these items should be given properly.
14	Multicriteria Inventory ABC Classification in an Automobile Rubber components Manufacturing Industry.	K.Balaji & V.S.Senthil Kumar.	Analytical Hierarchy Process (AHP) & ABC analysis.	The Analytic Hierarchy Process (AHP) has been utilized, for estimating the judgment of the inventory system. By analyzing the various criteria, sub criteria and alternatives, the weights are obtained for the different types of bins. Based on the usage of the bin, the inventory items are classified as A, B, C items. The multi criteria inventory ABC classification is proposed, for an automobile rubber components manufacturing industry. Due to improper material allocation and inefficient inventory handling process, storing the inventory of the rubber components in a proper location and in

				the proper bin is the main problem in the automobile rubber components industry. The criteria, unit weight of the component, and shape of the product, are used along with the other traditional criteria for the inventory classification.
15	Material Management using Selective Inventory Control and ARIMA Methodology in a Manufacturing Industry	Ramandeep Singh and Harvinder Lal	HML Analysis	ABC analysis is not helpful for the materials to less the cost of inventory, due to some high individual cost items fall in C or B class of ABC analysis. It do because the consumption of such items is low; although the items are expensive they fall in C or B class. By the rule of ABC analysis, company needs to purchase in bulk of C class items, if company did this then high inventory will be blocked. In order to eliminate such a situation we need to do HML analysis to support ABC analysis to find out expensive items. ABC analysis is not helpful for the materials to less the cost of inventory, due to some high individual cost items fall in C or B class of ABC analysis. It do because the consumption of such items is low; although the items are expensive they fall in C or B class. By the rule of ABC analysis, company needs to purchase in bulk of C class items, if company did this then high inventory will be blocked. In order to eliminate such a situation we need to do HML analysis to support ABC analysis to find out expensive items.

3. CONCLUSIONS

Inventory management is an important technique for manufacturing organizations. The review of the research papers indicates that, timely flow of inventory is imperative for the success and the growth of any organization. Some conclusions are drawn from various case studies are as following:

1. ABC analysis is the kind of technique which provides the means for identifying the items which have largest impacts on organization's overall inventory cost. ABC is very simple inventory model and recommended by many researchers as it is also considering consumption of materials.
2. ABC analysis alone cannot minimize the cost of inventory. HML Analysis in combination with ABC analysis can prove more efficient for cost optimization and inventory management.
3. For XYZ Analysis, X class of items should be strictly monitored, Y class of items are less critical and Z class of items are of least concern.
4. FSN-VED Analysis together can optimize the time required for inventory replenishment.

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