ABC Analysis as a Inventory Control Technique

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ABSTRACT

This paper reports an attempt to present the ABC analysis to control the inventory costs associated with spare parts store of a services company and suggests that past inventory problems in this store are largely due to congestion of spare parts and use of inappropriate computer package and recognition of the effects that computer package has on inventory. It is also pointed out that due to these problems some parts take too much time to find at the time of need, which effects the working efficiency of the company.

1.   INTRODUCTION

In any inventory, which contains more than one stocked item, some items, will be more important to organisation than others. Some items might have a very high usage rate, so if they ran out many customers would be disappointed. Other items might be of particularly high value, so excessively high inventory levels would be particularly expensive. One common way of discriminating between different stock items is to rank them by the value of their usage. Items with a particular high value of usage are deemed to warrant careful control, whereas those with low usage values need not be controlled quite so rigorously [I].

The use of vending machines to bring cold and hot drinks to the public has become increasingly popular with manufactures of soft drinks. These machines create sales opportunities and provide efficient services to the customers in both populous and remote locations. To continue providing customers with high level of services and to maintain customers' satisfaction in this field, many companies have started operating these machines. Gardener Merchant Vending Services (GMVS) is one of the largest independent operators of vending machines in the UK, and a division of the world's largest contract catering organisation. With fifty years in the business, GMVS is the most experienced vending operator in Britain. They operate four offices in the UK, located in London, Rotherham, Salford, and Glasgow. GMVS is a clear market leader with an installed base of more than 18,000 machines. The majority of company customers were won independently from their contract catering business. Vending customers include the Midland Bank Group, British Aerospace, the Automobile Association, and the London Underground. The company recognises the important role that vending has in today's busy commercial environment and the company's vending services division not only demonstrates quality and value for money, but also features a high level of flexibility, allowing for the creation of a tailor-made vending service to fit every client's precise needs. The company is not a manufacturer of vending equipment and, therefore, is able to take a completely unbiased and objective review of a client's particular needs.

GMVS also provides technical support that starts with the installation and commissioning of all equipment to ensure an effective service from day one. Their manufacturer-trained and qualified engineers provide a rapid response to rectify any machine malfunction, either on a call-out basis or contractually. Being a specialist division of Gardner Merchant, the company claims to be able to offer all its clients unrivalled economies of scale, both in terms of ingredient costs and methods of purchase. Equipment is supplied on a cash-purchase or a rental basis with or without maintenance agreement.

Presently GMVS is facing problems concerned with spare parts store. These problems are considered as the main factors inhibiting development. Insufficient space availability and poor organisation of existing space leads to problems such as congestion, an unsatisfactory working environment, waste of time, and increased lead times, which

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result in increased inventory and stock holding. Most of the company's problems are focused on congestion and the use of space in the spare parts store area. This paper presents the methods to help the company to overcome these problems lo improve working efficiency and to reduce the total costs to the company.

2. LITERATURE SURVEY

Maintaining inventory through counting, placing orders, receiving stock, and so on takes personnel time and costs money. When there arc limits on these resources, the logical move is to try to use the available resources to control inventory in the most efficient way; to achieve this, an ABC analysis is one way to control the inventory effectively. ABC analysis is based on the Pareto principle, after the nineteenth-century Italian philosopher who illustrated graphically the fact a small proportion of the population owned that most of the wealth in Italy. It is sometimes cal led the 80:20 rule, as 20% of the population owned 80% of the wealth [2,3].

In the context of an inventory system this suggests that there are a few items which contribute most of the inventory costs and a large number of items whose costs are relatively low. This is also known as the 80-20 phenomenon, as approximately 20 percent of items contribute 80 percent of the cost and the remaining 80 percent of items account for only 20 percent of costs. Obviously, it is important to maintain tight controls on the 20% and moderate controls on the rest, in other words, it means that 80% of inventory items need 20% of the attention, while the remaining 20% of items need 80% of the attention [4], Thus controlling the cost of only a few items will contribute to effective control of a large amount of cosls; clerical costs are reduced and inventory costs will be well-controlled [5]. Therefore, ABC analysis is a useful and appropriate technique for classifying inventory items according to the importance of their contribution to the annual cost of the entire inventory system. Inventory has been divided into the following categories [6,4J:

A items are expensive = 70-80% of total cost or value of all items (10-20% of all items) and requiring special care.

B items arc ordinary = 15-20% of total cost of all items (20-40% of all items)and requiring standard care.

C items are cheap = 5-10% of total cost of alt items (40-70% of all items) and require little care.

The ABC" method can be used for material, purchased parts, subassemblies, component parts, or products, depending on what form of inventory the company usually carries. The procedure for an ABC analysis starts by taking each item and multiplying the number of units used in a year by the unit cost. This gives the total annual use of items in terms of usage value. If the items are listed in order of decreasing annual usage by value, A items will be at the top of the list and C items will be at the bottom of the list. The unit cost of an item is not the sole determinant of the classification.

Each organisation should tailor its inventory system to its own peculiarities. Organisations may choose to group their inventory into more than three classifications, but the principle is the same: high value items receive the most attention and low value items the least. A comparison of A, B, and C classes is contained in the Table 1.

Furthermore, to use ABC analysis, a study needs to be made, based on past records and future forecasts, of the requirements of the non-regular items involved. Also data needs to be compiled about the use values of each of ihe stock items. Stock items are classified, based on the data and on the study, with the classification being revised from lime to time, to achieve the objective of ABC inventory classification. This is to enable formulation of appropriate inventory control policy for each type of stock item.

3. ABC ANALYSIS

Table 2 shows a coarse ABC analysis of some of the critical items of the GMVS company. The items are classified into A, B and C based on their percentage contribution to turnover.

This classification can be used to determine where to allocate inventory system operating costs and where care should be taken to minimize costs. Using this classification, the following points should be considered:

(1)   Very strict control should be placed on class A items. These items should be ordered in Economic Order Quantity (F.OQ) batches. Accurate service levels should be specified to determine exactly what the safety stock level should be. Cooperation with vendors should be explored, so that the variance in lead times is reduced and consequently the level of safety stock is also reduced.

(2)   For B items, moderate control should be used, Generally, the approach should he to allow some deviation from the optimal EOQ and safety stock levels so as to reduce the operation costs.

(3)   C items have low usage value because of low demand, or low costs. Therefore, strict control is not important, as it is economic to hold these items in quantities large enough to make the possibility of stock-out negligible. This might mean that particular item might not be ordered in EOQ batches, but ordered annually or semi-annually. The general concept is to ensure that low cost items will not cause an expensive production or service system to stop.

4.   SPARE PARTS STORE

This store is facing two fundamental problems, Space and computer system problems. The space allocated for spare parts storage is not sufficient for (he purpose, while a very large range of spare parts is held in the inventory; at the same time, the current organisation of the store is very poor and not according to rational plant layout principles, creating congestion in the store. The result is that materials are kept in cartoon boxes and kept in disarray on the floor. Very little space is devoted to receiving and dispatching parts, difficulties are experienced in identifying the required

parts, and very little space is allocated to the co-ordinator's office, so that paper work has become scattered throughout the store area, leading to inefficient administration and stock control.

The computer system being used is not capable of performing all the functions needed for scientific inventory control. The SMS computer package, which is being used by the company, cannot print the items that need to be ordered, so all the stock has to be checked physically for reordering purposes. This creates problems in the spare parts store and for inventory control; it wastes time in checking stocks of items needed for reordering and it increases the number of small orders, leading to an increase in purchasing costs. These factors are the main reasons for the poor efficiency of the spare parts store and the poor control of the inventory, and the consequent difficulties in providing a good service and satisfying customers. Urgent action is needed to eliminate these defects. ABC analysis has been suggested as an essential technique for maintaining inventory. This identifies the most important items based on their percentage contribution. An appropriate reordering level for all the stocked items should be introduced to help the company to issue orders on 'ime. The computer system used by the company should be upgraded or replaced by a more appropriate package, so that the company can adopt an automated, scientific reordering system. This will enable the company to avoid mistakes and reduce costs, and to reduce space requirements.

TABLE 1. COMFARIS1ON OF A, b, AND C CLASSES.

Class	Degree of Control	Types of Records	Lot Sies	Frequency of Review	Size of Safety Stocks
A	Tight	Accurate and Complete	Low	Continuous	Small
B	Moderate	Good	Medium	Occasional	Moderate
C	Loose	Simple	Large	Infrequent	Large

TABLE 2. ABC **ANALYSIS, THE TURNOVER OF** PARTS IN THE **SPARE PARTS STORE** OF THE **GMVs COMPANY**

Class	Cumulative Usage (%)	Cumulative Valus Usage (%)
A	39	73
B	15	16
C	46	11

5. CONCLUSIONS

The overall study of the company reveals that the company is not operating at maximum efficiency, so that it is not as competitive as it could be. If the company is to improve its competitiveness, it needs to improve the techniques it uses for inventory control. ABC analysis has been proposed for maintaining inventory and reducing total costs. An initial ABC analysis has identified some critical items from the spare parts store; it is suggested that items should be classified on their contribution to annual cost.

The spare parts store suffers from a number of inter-related problems. The store is over-crowded and poorly organised. The SMS computer system is incapable of providing the information needed for scientific inventory control, with the result that current stock levels are not known with any certainty. The store does not have a logical system of bins for spare parts, it has inadequate office space, and paper records are distributed and disorganised. The key to solving these problems is scientific inventory control based on ABC analysis. Proper inventory control should result, overtime, in a significant reduction in the number and types of items stored. This would, in [urn, allow a proper system of bins to be introduced, adequate space to be devoted to the office and record keeping, and an on-going reduction in congestion. Such an inventory control must be built upon upgrading or replacing the present computer system. In this way, company can achieve significant benefits in the form of cost reduction and service improvement.

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