



FORECASTING OF SPARE PARTS INVENTORY BY EXPONENTIAL METHOD

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Abstract: Sales of product of any store will increase or decrease is a wide issue which can directly effect to the inventory of firm. Today every firm wants to maintain efficient inventory for avoiding storing long term spare parts, increase benefit and also make good relation with customer. To avoid this problem studied the inventory of escort spare parts in Bilaspur. The first part of the Synopsis is data collection and segregation. The whole spare parts data is collected and then divided into A, B and C categories according to their prices (ABC analysis). The statistics Moving Average method apply to avoid storage high quantity raw material.

Key Words:-Inventory, Moving Average Method, Spare Parts.

Introduction

Demand forecasting involves techniques including both informal methods, such as educated guesses, and quantitative methods, such as the use of historical sales data or current data from test markets. Demand forecasting may be used in making pricing decisions, in assessing future capacity requirements, or in making decisions on whether to enter a new. Firms balance the costs of having inventories deviate from their desired level against the costs

of adjusting production. The optimal trade off is based on current values and expected future paths of inventories, sales, and output investments. One implication of this early model is that empirical models of inventory investment should incorporate both long-term and short-term dynamics.

In the past, maintenance problems received little attention and research in this area did not have much impact. Today, this is changing because of the increasing importance of the role of maintenance in the new industrial environment. Maintenance, if optimized, can be used as a key factor in organizations efficiency and effectiveness. It also enhances the ability of the organization to be competitive and meets its stated objectives. The research in the area of maintenance management and engineering is on the rise. Over the past few decades, there has

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been tremendous interest and a great deal of research in the area of maintenance modeling and optimization. Models have been developed for a wide variety of maintenance problems. Although the subject of maintenance modeling is a late developer compared to other area like production systems, the interest in this area is growing at an unprecedented rate. In particular, the availability of spare parts and material is critical for maintenance systems. Insufficient stocks can lead to extended equipment down time. On the contrary, excessive stocks lead to large inventory costs and increase system operating costs. The logistics inventory management system LOGIC aims to provide an optimal logistics of demanded materials by getting:-

- The requested quantity of the required quality in the right place at the Right time.
- At the lowest costs.

The procedures and programs described hereafter, to find of optimal reordering for a fixed configuration. In order to determine the optimal ordering conditions, quantities and methods, for a given stores configuration, it is very important to distinguish the different types of demand to be served, and different sources of supply.

Forecasting

Forecasting method using a modeling procedure that decomposes the series, the sum of three separate components, namely trend, harmonic and irregular components. On the other hand, some theories reported in the statistical literature are relatively complicated to use in practice, even though their large sample behavior is impressive [8]. Using historical data to project ahead, these econometric models typically consider a very large number of factors that help drive the economy. Forecasters have long had complex algorithmic approaches at their disposal, but their ability to effectively execute those approaches has been limited by the availability of information and costs of manual information manipulation and analysis[9]. Sheikh et al (2012), suggest Load forecasting is the technique for prediction of electrical load. In a deregulated market it is much needed for a generating company to know

about the market load demand for generating near to accurate power. If the generation is not sufficient to fulfill the demand, there would be problem of irregular supply and in case of excess generation the generating company will have to bear the loss. Neural network techniques have been recently suggested for short- term load forecasting by a large number of researchers. This work studies the applicability of this kind of models. The work is intended to be a basis for a real forecasting application. There are numerous model suggestions, but the large variation and lack of comparisons make it difficult to directly apply proposed methods. It was concluded that a comparative study of different model types seems necessary. [10] Patuwo et al (1998), using artificial neural networks (ANNs) for forecasting has led to a tremendous surge in research activities in the past decade. Researchers to date are still not certain about the effect of key factors on forecasting performance of ANNs. [3]

Objective of Work

. Based on where store and the customer are in the process, store can forecast it. Forecasting management won't hit it the entire time, unexpected thing may happen, but the process is pretty simple and can be very accurate. Bad forecasts bring the quality of the entire sequence, your sales process, and your deal strategies into question. Everything is up for grabs, not just the forecast. There are no longer issues about making the forecast, but it's an issue about the organization's overall ability to consistently achieve its goals. Management doesn't know what to attack to improve the business.

Methodologies Adopted

The forecast of seasonal demand is essential for inventory planning prior to an active selling season. In demand forecasting, a single model may not be adequate to represent a particular demand series for all times. Therefore, a number of forecasting models are studied to provide wider choices to find the best demand forecast of a seasonal product. In the first forecasting model, forecast by extrapolation is avoided by using a non-negative probability distribution to represent the

seasonal demand. Due to time constraints, the analysis was done by considering two methods i.e. Simple Moving Average and Exponential Smoothing. Thus, the literature on forecasting models is extended by using probably exponential techniques. An exponential forecasting model is developed as the second model to forecast the seasonal demand. In inventory management literature, emergency procurement option is not always included in procurement strategy and inventory cost is not considered as a basis to find the best demand forecast. The above two model used to determine the optimal inventory quantity and which one is closer to using several demand forecasts where the best one is chosen by the forecast that produces for minimum maintenance cost

ABC analysis

The ABC analysis is used to differentiate spare parts into a limited number of categories, by ranking them according to a given criterion such as number of customer orders, sales, profits, market share or competitiveness, or number of breakdowns when the item is used as spare part. Usually a small number of items are contributing a high proportion of the sales volume. "A" items are typically the slow movers, "B" items the medium movers, and "C" items the fast movers.

Moving Average Method

The moving average forecast is based on the assumption of a constant model. A moving average is commonly used with time series data to smooth out short-term fluctuations and highlight longer-term trends or cycles. The threshold between short-term and long-term depends on the application, and the parameters of the moving average will be set accordingly. In this thesis three month moving average method is applied to forecast the current month.

4.3.1 Simple Moving Average

However, in science and engineering the mean is normally taken from an equal number of data on either side of a central value. This ensures that variations in the mean are aligned with the variations in the data rather than being shifted in time. An example of a simple unweight running mean for n-month sample of closing price is the mean of the previous n

month's closing prices. If those supplies are $S_m, S_{m-1}, \dots, S_{m-(n-1)}$ then the formula is

$$SMA = \frac{S_m + S_{m-1} + \dots + S_{m-(n-1)}}{n}$$

When calculating successive values, a new value comes into the sum and an old value drops out, meaning a full summation each time is unnecessary for this simple case,

$$SMA \text{ (current month)} = SMA \text{ (next month)}$$

The period selected depends on the type of movement of interest, such as short, intermediate, or long term. In financial terms moving average levels can be interpreted as support in a rising market, or resistance in a falling market. One characteristic of the SMA is that if the data have a periodic fluctuation, then applying an SMA of that period will eliminate that variation (the average always containing one complete cycle). But a perfectly regular cycle is rarely encountered.

Calculation is done by SMA

For the month of April Forecasted

$$D_{\text{april}} = \frac{D_{\text{jan}} + D_{\text{feb}} + D_{\text{march}}}{3}$$

Results and Discussion

The lost profit is considered as the loss incurred (opportunity cost) by not satisfying the demand. In this case the loss is considered as 10 % of the cost of the material. This cost has been evaluated by taking into consideration the profit incurred by selling a single unit of item which is typically 10% (margin). By not satisfying the demand the company is indirectly hitting its profits. Though it's not a financial loss but still it's an opportunity missed for getting higher profits to the company and thus considered as loss. The justification of a forecasting technique in terms of its total cost is important for ensuring that it is adopted and used in practice. Total forecasting cost entails both the cost of operating the procedure and the cost of the resulting forecast errors. The following spare

parts are maintained in store which causes maintained cost of spare parts. Maintenance is typically done for that items which are in store for more than a month. The primary goal of maintenance is to avoid or mitigate the consequences of failure of equipment. This is done by implementing preventive maintenance. It is designed to preserve and restore equipment reliability by replacing worn components before they actually fail. In addition, workers can record equipment deterioration so they know to replace or repair worn parts before they cause system failure.

Conclusions

The service period of the forecasting period is three times longer than the period of historical data, traditional statistical forecasting tools are unreliable in spare parts management (SPM). By applying ABC analysis gives distinguish between the spare parts, and apply Moving average method for make forecasting results.

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