ABSTRACT

Fierce competition in today's global environment ,the introduction of products with shorter life cycles and the heightened expectations of customers have forced business enterprises to invest and focus attention on their supply chains. Effective supply chain strategies must take into account the interactions at various levels in the supply chain to reduce cost and improve the performance.

Demand forecasts play a crucial role for supply chain. Demand forecasting is an uncertain process that is vital for survival in today's international business environment. The future demand for a certain product is the basis for the respective replenishment systems. Several forecasting techniques have been developed, each one with its particular advantages and disadvantages compared to other approaches. Rapid technological advances have given consumers greater product diversity as well as more information on which they make their product choices. Forecasting is done with as much accuracy as possible, but that is becoming even more difficult in today's fast-paced business environment.

The difficulty shoots up in different ways for different types of products and the forecasting method for any type of products and industries remains unique. A common method of forecasting demand cannot be applied uniformly everywhere. Hence the need to forecast the demand based on the varieties of products and with respect to the industry rises up.

Different types of products such as Fast moving consumer goods (FMCG), slow moving items, new product exists in the market .A better methodology needs to be developed and used for the varieties of products. Especially for new products entering into the market, the firm will need to make a market survey of customer need analysis of sales records of potentially competing products or analysis of the life cycle of existing products which may be substitutes.

Demand forecasting for a slow moving product is another critical area of concern and becomes crucial to find the optimistic forecast value for a slow moving product which results in huge inventory ultimately affecting the cost.

Gaps in the Literature

The following points are identified as the gaps in the Literature and have been addressed in the Methodology of this work.

- Improper static demand forecasting models resulting in inaccurate forecasts.
- Ineffective demand forecasting for slow moving items.
- Low utilization of promotions in the forecasting process.
- Imperfect Forecast Accuracy Measure

In this context, the work presented in this research focuses on developing a demand forecasting model. 4 models have been developed for the varieties of products such as normal products, slow moving items, products with seasonal effects and new products for Consumer goods Industry. A new measure for evaluating forecast accuracy has also been developed in this work.

First Model deals with a new model that has been developed for demand forecasting by using the dynamic techniques instead of the static forecasts. It has been concluded that the dynamic Forecasting is much better when compared to Static Forecasting since it takes into account the recent trend, seasonality etc observed in the sales data. The sales data of various products has been analyzed so as to fit the best forecast method for the respective forecast horizon. This Forecasting model is giving satisfactory results as different products were analyzed and the model is chosen based on the history of the product, thus producing demand forecast for the future horizons.

The **Second model** for slow moving items discusses about the two new models developed in this work. Enhanced Probabilistic Demand Model (EPDM) and Demand Size Based Model (DSBM) have been developed by modifying the Croston's model for slow moving items. Enhanced Probabilistic Demand Model (EPDM) has been developed by considering the probabilities in the demand size per period. Demand Size Based Model (DSBM) has been developed by directly estimating the demand size without any average per period considerations. Forecasted values of Demand Size Based Model (DSBM) have been computed for various values of smoothing constant and the forecast

accuracy has also been measured. The new models are versatile and forecast values can be computed easily without any complicated calculations. Enhanced Probabilistic Demand Model (EPDM) gives non zero demand values and Demand Size Based Model (DSBM) can be used for both zero and non zero demands.

Third model discusses about the development and analysis of a dynamic forecasting model for products with seasonal effects. New Dynamic Model has been developed successfully and analysis has been carried out for different products in this work. After studying the practical implications of different forecasting models, forecasting methods were selected which are likely to give the best possible forecast with maximum accuracy.

The **Fourth model** for new products, Modified Bass Model has been developed by merging together Bass model and Fourt-Woodlock model and introducing a new parameter called the parameter of promotion in the Bass equation. This method can be used for the initial purchase as well as the repeat purchases optimistically.

Fifth one discusses about an efficient method for forecast accuracy measurement that has been developed and named as Modified MAPE 1 and Modified MAPE 2. One of the main advantages of these formulae is that they do not give undefined/infinite values when we have zero values in the demand series. Thus, they can be used to calculate the forecast accuracy of intermittent-demand data.

Thus different models and a forecast accuracy measure has been developed and analyzed in this work. The developed models produce dynamic and better forecasting results.