

An analysis of Demand Forecasting in Supply Chain Management

PEDDIREDDY DHARANI

MASTER OF BUSINESS ADMINISTRATION (HUMAN RESOURCE&OPERATIONS) SCHOOL OF MANAGEMENT STUDIES

SATHYABAMA INSTITUTION OF SCIENCE AND TECHNOLOGY, CHENNAI - 600119

dharanireddy.p11@gmail.com

ABSTRACT

The paper shows forecasting practice in supply chain management (SCM) at different locations, viz. Life science, Retail Chain, and FMCG. Authors illustrates the scenario of forecasting practices based on secondary data and presents SCM role, demand management, coordination in coordination, etc. Moreover, the paper exhibits the limitation and less practical solution of forecasting to be effective in business organization. Consequently, the authors describe recommendation and proposes a model on forecasting management model.

Though this paper highlights in intensive analysis, however, it unlocks further frontiers for the prospective researchers as well as practitioners in order to apply forecasting techniques.

Keywords-Forecasting, Supply Chain Management, Life Science

I. INTRODUCTION

Modern companies need to deal with different issues in challenging environment. The successful companies are more adaptable and immediately adopt the new or updated principles of business management. Step by step they implementthese techniques into functions. Supply Chain Management (SCM) is a new concept among the corporate houses of Bangladesh which was being implemented from late 90s. First the Multinational Companies (MNC) integrated Supply Chain Management into their structures and afterward other privates and local conglomerates adopted the concepts. As the starting purchase and materials management were the primary functions of SCM, but later SCM assumed the integrated form i.e. comprises sourcing, materials management, manufacturing support, and distribution management. In light of the competitive market situation, SCM turns into the primary operational zone among the firms. SCM handles direct, indirect, and services from the source (as input materials) to end customers as final goods.

A Supply Chain is a chain between the supply chain partners like suppliers, manufacturers, distributors, retailers, transporters etc. who share information, deliver goods, provide services and do other intermediate activities to fulfill customer demand. Forecasting is much most initial activities of SCM which starts the all other actions of SCM. But forecasting has a significant domain in inside as well as outside of the company.Forecasting is the main driving factor in planning and decision making in SCM as well as enterprise level.

Companies are, actually do professional way, greatly rely on actual numerical value of forecasting to make key decisions like capacity building, resource allocation, expansion and forward or backward integration etc. The exploratory study direct the following objectives:

- Large scale literature reviews on forecasting, demandmanagement based on secondary data.
- Familiarization with the practice, management and application of forecasting in the three industrial growing industries of Bangladesh like lifesaving industry, Retails Chain, and FMCG.



- Demand forecasting limitation and solution
- Forecasting management model proposal in Supply Chain Management.

Forecasting Management

Forecasting is very crucial part of business process of a company. This is taken as far most starting input in SCM dept. and within org. Forecasting as a part of SCM functions gains attention of the companies incrementally which time line evolution is almost similar to that of SCM evolution in Bangladesh. Within org., marketing dept. provides the forecast in rolling fashion that can be aggregate form, SKU basis, and in SKU basis with place and date of delivery.



II. LITERATURE REVIEW

S gilaninia et al. [6] In this study, authors attempted to identify of economic factors in the supply of Iranian tourists. In this respect 20 tourist destinations during time period 2007 to 2011 were analysed. with linear logarithm function and panel data estimation method was found that there is meaningful relationship between per capita income of urban households and the number of Iranian tourism supply and there is substantial exchange rate - number of Iranian tourism supply and income has been the most crucial factor.

HaixiaSang's et ala simulation method is used in this paper to investigate the rental housing supply chain's inventory problem. Unlike most commodities, the rental housing unit is a "circulation type" commodity, and the inventory problem is complex. In this paper, a systematic and adaptable procedure is suggested that effectively offers key decision-making assistance to managers in order to facilitate understanding and verification of the inventory problem in the rental housing supply chain. The suggested procedure took into account inventory impact factors, including the forecasting approach, the lead time, the initial inventory level, and the inventory filling indicator.

A Nasiri Pour In this research based on typical of bumpy demand patterns of spare parts a hybrid forecasting technique has been established, which utilize a multi-layered perceptron neural network and a conventional recursive method for



predicting future demands. In the proposed method the multi-layered perceptrons are trained to predict instances of nonzero demands, and subsequently a conventional recursive method is applied to estimate the number of non-zero demands.

F. Saleheen the paper is a thorough study of retail operation. The paper elaborates a wide view of a demand and supply chain which interacts with macro and micro environmental factors and converts it into a customer requirement. The authors explain on various techniques and tools on demand and supply planning which results in an optimized level of inventory, less cash outflow, higher product varieties and more customer satisfaction.

Ultimately meeting all these guarantees growth in sales and profits to stakeholders; a final goal of a firm. This paper exhibits a complete overview on how a firm's supply chain functions as an entire system. Apart from that, this study also presents some retail examples in the US as well as in Bangladesh which unlock additional frontiers for the practitioners and future researchers to renew their practices as well as knowledge in the retail field respectively.

III. SPARE PARTS FORECASTING

Usually, the maintenance or production department hold the control of spare parts inventory. So, they make requisition for spare parts. Although recently limited number of forecasting technique on spare parts have been developed, no application of these techniques in spare parts forecasting is found. The problem of spare parts rarely discussed in monthly coordination meeting. Products character classification and demand pattern are the deciding factors for forecasting of spare parts. The life cycle of spare parts is a deciding factors as final product life cycle is related to it. Most spare parts show the intermittent demand that is happened at any moment and then remain long time without any demand. It is difficult to predict the intermittent demand. Researchers developed few models based on the industry, duration, mathematical and statistical method.



IV. ROLE OF FORECASTING IN A SUPPLY CHAIN

- The basis for all strategic and planning decisions in a supply chain
- Used for both push and pull processes
- Examples:
- Production: scheduling, inventory, aggregate planning
- Marketing: sales force allocation, promotions, new production
- Finance: plant/equipment investment, budgetary planning



- Personnel: workforce planning, hiring, layoffs
- All these decisions are interrelated.

V. COMPONENTS OF A FORECAST AND FORECASTING METHODS

A company must be knowledgeable about numerous factors that are related to the demand forecast. Some of these factors are listed next.

- Past demand
- Lead time of product
- Planned advertising or marketing efforts
- State of the economy
- Planned price discounts

Such a firm needs to know such parameters prior to its ability to choose a proper forecasting technique. For instance, in the past a firm might have found that there has been low demand for chicken noodle soup during July and high demand during December and January. Suppose the firm sells the product at a discount during July, then the conditions are likely to alter and some of the future demand would move into the month of July. The company ought to make the projection with this aspect in consideration. Forecasting techniques are divided based on the following four types.

1. Qualitative: Qualitative techniques of forecasting are largely subjective and depend on the judgment of a human being. They are most suitable when historical data is sparse or when authorities possess market insight that can impact the forecast. These techniques are also required to forecast a few years ahead in a new industry.

2. Time series: Time-series forecasting techniques utilize historical demand to create a forecast. They are founded on the premise that historical demand pattern is a good predictor of future demand. These techniques are best used when the underlying demand pattern does not change much from year to year. These are the simplest to apply and can be used as a reasonable starting point for a demand forecast.

3. **Causal:** Causal forecasting techniques believe that the demand forecast will be closely related to some factors in the environment (the state of the economy, interest rates, etc.). Causal forecasting techniques identify this relationship between demand and environmental factors and apply estimates of what environmental factors will be to predict future demand.

4. **Simulation:** Simulation forecasting techniques mimic the customer decisions that bring about demand to make a prediction. Through simulation, a business can integrate time series and causal techniques to respond to such questions as: What will be the effect of a price cut? What will be the effect of a rival opening a shop close by? Airlines model customer purchasing behaviour to predict demand for higher-fare seats when there are no seats available at the lower fares.





VI. BASIC APPROACH TO DEMANDFORECASTING

The following basic, six-step method assists an organization in carrying out effective forecasting.

- 1.Know the purpose of forecasting.
- 2. Integrate demand planning and forecasting throughout the supply chain.
- 3. Understand and identify customer segments.
- 4. Identify the major factors that influence the demand forecast.
- 5. Determine the appropriate forecasting technique

1) Understand the Objective of Forecasting Every forecast supports decisions that are based on the forecast, so an important first step is to identify these decisions clearly. Examples of such decisions include how much of a particular product to make, how much to inventory, and how much to order. All parties affected by a supply chain decision should be aware of the link between the decision and the forecast.

2) Integrate Demand Planning and Forecasting Throughout the Supply Chain A company should link its forecast to all planning activities throughout the supply chain. These include capacity planning, production planning, promotion planning, and purchasing, among others. This link should exist at both the information system and the human resources management level. As a variety of functions are affected by the outcomes of the planning process, it is important that all of them are integrated into the forecasting process. In one unfortunately common scenario, a retailer develops forecasts based on promotional activities, whereas a manufacturer, unaware of these promotions. Develops a different forecast for its production planning based on historical orders. This leads to a mismatch between supply and demand. Resulting in poor customer service.

3) Understand and Identify Customer Segments A firm must identify the customer segments the supply chain serves. Customers may be grouped by similarities in service requirements, demand volumes, order frequency, demand volatility, seasonality, and so forth. In general, companies may use different forecasting methods

4) Identify Major Factors That Influence the Demand Forecast A firm must identify demand, supply, and product-related phenomena that influence the demand forecast. On the demand side, a company must ascertain whether demand is growing, declining, or has a seasonal pattern. These estimates must be based on demand-not sales data.

5) Determine the Appropriate Forecasting Technique In selecting an appropriate forecasting technique, a company should first understand the dimensions that are relevant to the forecast. These dimensions include geographic area, product groups, and customer groups. The company should understand the differences in demand along each dimension and will likely want different forecasts and techniques for each dimension. At this stage, a firm selects an appropriate forecasting method from among the four methods discussed earlier qualitative, time-series, causal, or simulation. As mentioned earlier, using a combination of these methods is often most effective.

6) Establish Performance and Error Measures for the Forecast Companies should establish clear performance measures to evaluate the accuracy and timeliness of the forecast. These measures should be highly correlated with the objectives of the business decisions based on these forecasts. For example, consider a mail-order company that uses a forecast to place orders with its suppliers up the supply chain. Suppliers take two months to send in the orders. The mail-order company must ensure that the forecast is created at least two months before the start of the sales season because of the two-month lead time for replenishment. At the end of the sales season, the company must compare actual demand to forecasted demand to estimate the accuracy of the forecast. Then plans for decreasing future forecast errors or responding to the observed forecast errors can he put into place.



VII. CONCLUSION

The practice of forecasting in the mentioned three sectors is limited though there are enormous opportunities to use this managerial technique along with the SCM strategy. Competitive situation always asks for change rapidly and this would be the continuous process for sustainable growth. Forecasting could be used in other than direct materials requirement such as spare parts, office stationery etc. which are untapped area in the organization. Organization can be more effective by eliminating nonvalue added activities from the concerned department.

REFERENCE

1) Chopra S., Meindl P. Supply Chain Management, 4th ed., Dorling Kindersley Pvt. Ltd, 2011

2) Dr. M. Habib, Supply Chain Management (SCM): Theory and Evolution, Intech 2011

3) Lindsay R. Berry, Paul Helman "Probabilistic forecasting of heterogeneous consumer transaction sales time series" August 2018

4) S Gilaninia, Raya Sharifi, " Economic Factors affecting Tourism Supply", International Journal of Business and Behavioural Science" Vol 3, No 10, Oct 2013

5) HaixiaSang's "A dynamic modelling simulation for supply chain management inventory service: a case study on a rental housing unit manufacturing and logistics company "Conference:

6) A Nasiri Pour, B. RostamiTabar and A Rahim Zadeh, "A Hybrid Neural Network and Traditional approach for Forecasting lumpy demand"

7) F. Saleheen, MH Mirza, Md M. Habib, Z. Hanafi," Challenges of Warehouse operations: A case study in Retail Super market", International Journal of Supply Chain Management, Vol 3, No 4, pp 63-67, 2012

8) F. Maon, A Lindgreen, J. Vanhamme, "Supply Chains in Disaster relief operations", Cross Sector Socially Oriented Collaborations ISBN 978-1-906422-09-7