

# Investigation of Sales Forecasting Process and Sales Forecasting System for Inventory Control

Sanjay Jaiswal, Abhishek Yadav, Narendra Kushwaha

**Abstract**— The future has always caught the attention of the human being. The thirst of exploring the future and to know the unknown has driven the human being toward innovativeness. Companies are expanding their operations worldwide since the past few decades. Profit growth coupled with an effective strategy has become the primary need of global companies. Research in this area has given rise to optimization of the supply chain for higher profitability. Considering the overall strategy the company needs to plan production well in advance. The operational planning comes in picture at this moment. In order to reduce excessive inventory at each stage of the production; one should know the demand of the next stage and preferably the end customer demand. The process of sales forecasting is undertaken to predict demand at different stages. It is a complex managerial function and hence needed to be undertaken by a scientific way. The sales forecasting the function includes process of forecasting, administration, hardware, software, users and developers of forecast.

**Index Terms**— Supply chain management, Bullwhip Effect, Inventory, forecasting, Demand and Supply.

## I. INTRODUCTION

Today many organizations are forced to increase their global market share in order to survive and sustain growth objectives. At the same time, the same organizations must defend their domestic market share from international competitors. For that supply chain should be efficient and effective. In that sense, efficient means optimizing resources to accomplish specific outcomes, and effective, in terms of designing distribution channels. Efficiency is measured by delivery performance, product quality, backorders and inventory level, whereas effectiveness is measured by service quality and the service needs. As a management philosophy, SCM takes a system approach to show the supply chain as a single entity. Every firm directly or indirectly contributes to the performance of the members in the supply chain and also the overall performance of the supply chain. Supply chain drives with customer needs. In order to ship products to customers who demand them in a dynamic and rapidly changing set of channels, strategic positioning of the inventories becomes essential. The products are thus available when the customer wants those. Smooth supply chain management is the result of well combined individual

managerial functions. Planning, organizing and controlling are important factors for effective supply chain management. An exact estimation and reliable predictions of product volume and related services are therefore important for efficient functioning. Such estimations are nothing but forecasts. Demand / Sales forecasting is a crucial factor to any firm. It is a basic factor for the whole planning process and for the control of various sectors of a company such as production, supply, purchasing, marketing and finance. Decisions made in these sectors influence each other either directly or indirectly. Variability in product demand influences several factors which are coming under these sectors such as inventory needed for production (Production department), capital needs (finance department) or special kind of strategies like outsourcing (Supply department). Forecasting becomes important at any level in the supply chain. Forecasting helps to understand the future demands which can be linked with numerous functions like purchasing, production and transport. Processes like purchasing raw material from supplier to delivery of finished goods to customer take time and hence one cannot wait till occurrence of customer orders at retailer level. When a Make-to-Stock strategy is applied in production; planning of future, managing inventory and finished goods can be done smoothly using forecasting. It helps to satisfy end customer demand.

## II. PROBLEM DISCUSSION

Every company has its own product portfolio and each product has its own demand in the market. The demand pattern varies based on product characteristics and depending on which stage of product life cycle you are. Demand remains more stable in a maturity phase than in the introduction phase and hence demand forecasting become easier. Mature products like bread has stable demand and hence demand forecasting could be easy and with few errors. On the other hand for products like fashion garments, where short term planning is needed due to seasonality, forecasting become more difficult because of higher variation and uncertainty in demand. The accuracy level of long term forecasting is lower than that of short term forecasting. These various aspects give rise to different methods of forecasting which are based on factors like historical demand, production lead time, advertising and marketing strategy as well as competitive strategy. Every company chooses and develops its own method of forecasting. Preparing successful forecasting process towards meeting accurate demand forecasting is scientific art and could be achieved by combined forecast i.e. using mix of methods. The concept of demand forecasting might seem simple but it is often complex in the process of implementation. Both data

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of internal and external resources are utilized for this action. The accuracy of demand forecasting is related to many factors. The distortion of information flow related to these factors at different point can increase the error. Available suppliers, variation in product regime, influence of different products on each other and competitor’s strategies are some of the factors affecting the accuracy of demand forecasting. Different sectors may face different problems during demand forecasting.

III. ORDERING FOCUSED FORECASTING

Traditionally forecasting was done based on orders from retailers. But these orders do not indicate real customer demand and variation in customer demand may increase during backward ordering. Each layer considers these orders as a base of their own demand forecast and pass the same to its supplier downward. A minute change in this demand may elevate inventory because this demand ordering moves back and each stage want to keep some safety inventory with them. In case of the random changes in demand, retailer may interpret it in wrong way and this could cause elevation or decrease of buffers in whole supply chain. As suppliers do not have direct visibility of this demand pattern they may never take their own decisions and hence rely on interpreted information from retailer. This elevates Bullwhip effect.

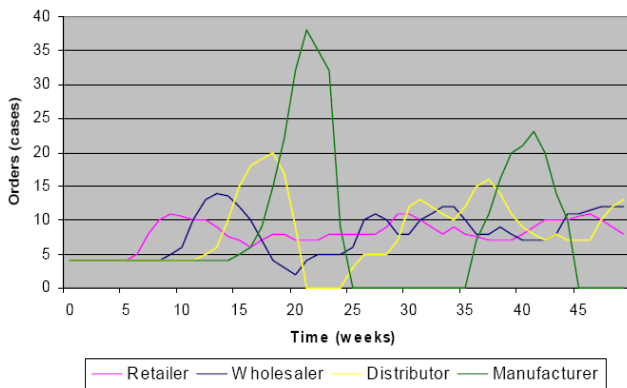


Figure: variation of order pattern in bullwhip effect.

IV. SALES FORECASTING NEED IN PLANNING

Manufacturing industries work on principle to satisfy customer demand by appropriate supply. According to Mentzer and Moon (2005), companies consider the sales forecasting as integral part of this process. The co relation is simplified through figure.

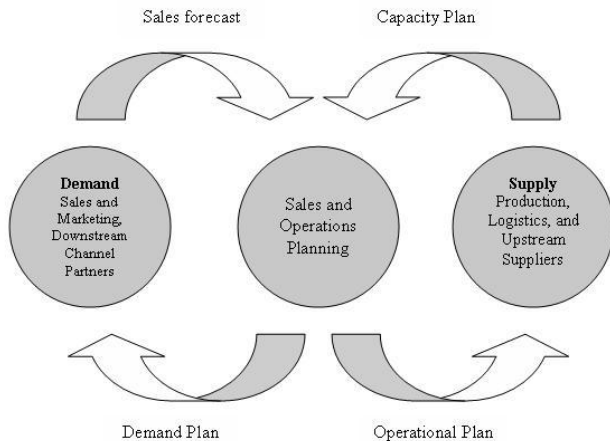


Figure: Sales forecast in sales and operations planning

End customers create demand and it can be increased by activities like promotions. Hence marketing focus on end customers for creating demand. Sales department ease the same by different strategies such as servicing other parties in this streamline like wholesaler and retailers. Supply should be enough to meet demand. Different management functions like manufacturing, purchasing and logistics work together to maintain the supply. Different suppliers also play an important role in this chain. A constant flow of information flows through the complex structure of different management functions and the parties involved in this. This flow of information is managed by sales and operational process (S&OP). S&OP process is different for different companies and can change as the environment changes. Sales forecasting serve as the initial seeding to the S&OP process. The forecasting may originates from study of past demand history. As the marketing function originates and manages the demand toward final customer, the arrow of sales forecasting arises from the demand side. Based on the sales forecasting, supply side prepares the capacity plan. The capacity plan is nothing but the capabilities to satisfy demand using maximum possible inputs. Via information net both forecasting and capacity plans studied out to consider strategies. Operation plan and demand plan respectively. Considering different information collected time to time and strategies undertaken, the demand plans are given out from S & OP system. The demand plans makes marketing and supply departments understand future product launching and action needed to achieve corporate strategies. Based on the information available; the operation plan is given out from S&OP to supply functions. This plan consists of different functional plans. Smooth running of S&OP needs accurate forecasting.

Planning is a set of activities in company. Four steps in planning are:

- 1) Specify objectives;
- 2) Generate strategies;
- 3) Evaluate strategies and take actions accordingly;
- 4) Monitor results.

Commitment towards the basic goal is a key towards success. But still the accurate forecast plays a major role in successful planning and achieving of the final goal. One needs to understand that the difference between planning and forecasting. Forecasting is the process to give estimates and, planning is the process to prepare strategies based on these estimates. An operational plan from S&OP model has been used to take action. Results may be submitted to the main database for future and present use. Choice of method of forecasting is an intermediate step between this function.

V. SALES FORECASTING NEED IN SALES

Being a managerial function, sales and forecasting are both closely interdependent. One should not underestimate forecasting function while planning sales. Sales department consist various management levels and sales force. Planning occurs based on forecasting and sales goals are decided territory, period or product wise. Basis of territory helps while preparing forecasting horizons and levels. One can forecast product wise (SKU), or product and place wise (SKUL). Time levels during forecasting could be decided by nature of sales force commissions.

VI. SALES FORECASTING NEED IN FINANCE/ACCOUNT

The finance department carry important functions and play crucial role while corporate planning. Based on the forecast the finance department decides the financial level of expenditure on different activities for products. Normally this planning occurs annually. In some cases such as launching new products and completion of long term goals, planning can span up to 5 years. Furthermore finance department also plan the corporate profit based on forecasting. Each division may plan profit levels annually and it may span up to up to five years depending on strategies. Intervals are decided based on the nature of product and other terms like once for month exists.

VII. SALES FORECASTING NEED IN PRODUCTION / PURCHASING

The production and the aggregate planning are closely related with demand forecasting. When planning is considered the long term forecasting take place. When production planning of selected product/product range; related functions like selection of right supplier, developing relations with supplier and planning the cost structure of manufacturing plant are important. It can take many years to set the whole process and hence the long term forecasting is important. Plans are dependent on future sale of products which will be produced and marketed site wise. During short term forecasting, the production plans depends on purchasing forecast. It reveals the importance of forecasting in process of preparation of master purchase plan. Purchasing action includes time lags due to shipping and logistic action from suppliers and hence purchasing department need to know the forecasting for planning so that no stock out will occur. This helps in smooth production without stock outs.

VIII. SALES FORECASTING NEED IN LOGISTICS

The logistic department is considered responsible for both storage and distribution toward the destination from site of storage of produced goods. Therefore logistics department need demand forecast with level of SKU and SKUL. Both short and long term forecasts are needed while planning. Long term planning with SKU level is needed to decide storage capacity of warehouse and services together it. Transportation services are also needed to consider while this long term planning. Based upon the production plan logistic department prepare own service plan and hence forecasting plays important role in logistics planning. On urgent basis and for small SKUs, the short term forecasting comes in picture. This planning ranges from daily to weeks or months based on orders. Usually companies either purchase specialized logistic facilities from third party logistic providers or prepare them on their own. While purchasing or renting such facilities, company should know the characteristics of services needed. This can be known from the production forecast. For this purpose SKU and SKUL based forecast are needed.

IX. SALES FORECASTING NEED IN MARKETING

The marketing success is based on capability of company to satisfy customer demand and needs. Conditions like stock

outs and low innovativeness may decrease demand and lost sales can occur. Considering this principle a company plans its activities. Marketing plans are based on current demand, derived demand, and competitors pricing and different promotions. To yield from marketing plan knowledge of the forecasting is needed. Normally annual levels could be considered and intervals can be either monthly or quarterly depending on product Sales forecasting need in different managerial functions. Flow of Sales Forecasting Process Every company has peculiar process of forecasting. Preparing the structured process is the first step which should be done by coagulating marketing functions, as stated earlier, this process depends on different factors like product portfolio, demand for products and season ability. Collectively we could name these factors as ‘environment of the company’. Based on demand forecasting method, the process flow gets designed. Here we should not forget that management and demand forecasting cannot run as different processes but should run as integrated processes. Demand forecasting process should be developed based on management functions. Ideal demand forecast process should consider

- 1) Exact forecasting method,
- 2) The system which is combined with management functions and
- 3) The philosophy of management.

Personnel acts as an active members in decisions/ process and hence while designing ideal process; personnel need to be well versed with both management functions and forecasting process. One may prepare the outline of the forecasting process by analysis of available information and by use of advanced web based / electronic communication tools like EDI. It is observed that for ease, central information system with electronic data transmission may be used. This flow of information is carried out using central information system were the earlier draft and revised draft can be compared by the same system.

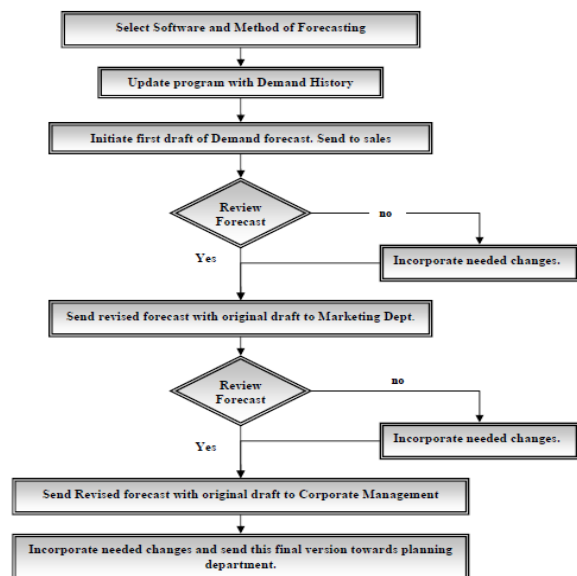


Figure: General Sales Forecasting Process.

In demand forecasting the field sales officers play an important role. These field officers have business development territories. Adjustment of sale is normally based on these territories and hence information coming from sales

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force is importance throughout the entire process. The first step is to select appropriate forecasting method and software. By the historical demand data, this software prepares the first draft of demand forecast. This demand forecast can be prepared product wise or territory wise. This draft is then sent to sales department and further to field officers. As field officers know demand for their product in real time, they can adjust provided forecast draft with reasons behind it. These adjustments are sent to sales department and collectively sent to forecasting department. A revised demand forecast draft gets prepared by the forecasting department. This new draft is forwarded to the marketing department. Different marketing managers put their adjustments based on future strategies, competitors promotions etc. These adjustments get recorded in the system. Demand forecasting department add these adjustments in forecast and send the new revised form to corporate level management. Here again adjustments are done and before sent back to forecasting department. After final adjustments the demand forecast is divided by products etc. and then sent to planning department for further action on that.

Department Responsible for Inventory			
Department	Raw material %	Work-In process %	Finished Goods %
Production	65	78	32
Planning	26	23	29
Logistics	17	17	46
Product Management	11	8	26
Purchasing	9	-	-
R&D	9	3	4
Finance	8	5	10
Engineering	5	7	3
Marketing	3	4	20
Sales	3	1	27

**Table: Departments responsible for Inventory management**

### X. MANAGEMENT OF SALES FORECASTING PROCESS

According to Lawless (1990), sales forecasting is a key process for maintaining effectively throughout the supply chain since having a clear idea of demand is one of the success factor behind successful supply chain. When sales forecasting is considered as process; one should have clear cut goals and predefined priorities towards it. The forecasters should carry enough responsibility and understanding towards other key result areas. Forecasters need not to know complex basics of forecasting software but they need to know all essential managerial functions in supply chain. This increases accuracy of forecast. Involvement of higher management in the whole process is important. It helps to introduce company strategy in the final forecast. The culture of industry and mentality of forecasters play a big role in the process and hence one can maintain equal communication throughout the process in order to ensure success of sales forecasting process. Forecasters have to know that the process they are undergoing is not self contained. They should understand that one has to integrate different

department by mean of different aspects to achieve best combination of planning and forecasting. This can be done by combining forecasting professionals in planning area.

### XI. CONCLUSION

The purpose of our study was to describe and analyze the process of sales forecasting, the sales forecasting system and the method used in forecasting as well as proposing possible improvements in the existing sales forecasting process, the company management may consider for enhancing accuracy of forecast. The measurement of performance of forecasting process is an integral part of the forecasting process.

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