A STUDY ON DEMAND ESTIMATION USING BAYESIAN APPROACH

UMASANKARI.S

Research Scholar, Dept of Mathematics, Mother Teresa Women's University, Kodaikanal-624101.

ABSTRACT:

Demand estimation is playing critical role in for the successes of an organization. Due to ever changing competitive pressure among the firms, it is dare need to project what will be the demand for the future. In order to take and choose right strategy it is necessary to understand the changing lifestyle, fashion, socio-economic, political and technological influence of the customer. Every firm compete each other. Companies trying attract new customer and retain old customer. In order to take price, market size, profitability, cost conditions, ROI, etc. The firm calculates the expected future demand for their products. This paper demonstrates the demand estimation technique of Bayesian approach, states its application and its features.

Keywords: Demand estimation, future demand, decision making, profitability, Bayesian approach.

1.1. INTRODUCTION

"The past is prologue"- William Shakespeare

Historically the demand forecasting is said to be paramount for any organization. The success or failure depends on how far the company able to predict the expected the demand of the future. This approach helps the planner what will be requirement and adjustment mechanism towards men, money, materials, and other resources including man power etc. This provide clear idea about inventory size, capacity planning, resources shortage, cost planning etc and how can be ordered for the raw material if any [1]. The concept of Demand estimation [forecasting] lays the strong foundation for many other critical analysis and business assumptions namely, turnover rate, level of profit margins, level cash flow, amount of capital expenditure, and capacity building planning.

This prediction of probable demand are the part of managerial economics discipline and supply chain management (SCM), but invariably it applies to every other company irrespective in industry, it is prerequisite for the company to operate and running a business.

Many updated business planning today uses various software application which gives us certain immediate and reliable results[2]. Demand estimation helps the company to make operational decisions by assessing the total supply chain and customer need, with most efficient way possible [3].

The profitability is major concern everybody. This approach of Demand forecasting helps to identify the business estimate the gross sales volume and revenue by sales for a future and definite period of time [4].

According to Evan J. Douglas, opines "as a practice of finding values for demand in potential time periods." In the words of Cundiff and Still, "Demand assessment is an estimation of sales volume during a specified and fixed future period. It is based on planned marketing game plan and a set of particular non-controllable and competitive forces."

1.2. WHY DEMAND FORECASTING?

According to Steven Steutermann, Gartner said that, It is very critical for the organizations to develop the right approach and demand planning process is to improve the so called effectiveness of business outcome. It is wise make good choice and take–up decision without knowing a functioning process that is consensus-driven demand sketch will prove extremely challenging and difficult task for the business manager to arrive reliable decisions [5]." This depends on

- Determination of sales target territories.
- Determining the pricing position strategy.
- Helpful in deciding the distribution method.
- How many salesmen required?
- Right product mix decisions.
- Right product line
- Planning for marketing programme.
- Deciding the promotional mix.
- Decision on enter a new market or not.
- Decision making on how much to produce?
- Performance measurement.

1.3. ASSESSMENT OF DEMAND

It is the field of business economics and helps to predict future demand and how consumers behave in certain situation [6]. The assessment of demand is done with various parameters like price of the product, market size, availability of product, quality considerations, necessity, multiple of product, demand elasticity in nature, future change etc., Demand forecasting means = Demand + Predicting future demand. Also, it implies that it includes the outside requirements of a product or service. Forecasting means making an assessment in the present time for the future period based on past history etc.

The bullwhip effect:

According to Andrew Kinder who work as director, Supply chain expert says "The bullwhip effect is as true today as it ever was in contemporary, lengthened global supply chains where small errors at the front are exaggerated throughout the procedure,"[7].

It is defined as "it is a process involves an estimate of the quantity of end user command for a product or service form". This method used for variety of reasons. It is used to predict demand or calculate the future demand. It is data analysis approach which endow with a subsequent likelihood allotment for some constraint derived from the experiential data and a prior prospect distribution which forms the basis for statistical inference.

> FORECASTING = ESTIMATION OF FUTURE SITUATIONS.

- Demand estimation reduces the uncertainty factor
- Effective decision-making tool

- Basic and foundation for other determinants
- Increasing demand augments revenue
- Sales component is primary source for the company

1.4. BAYESIAN APPROACH:

Bayesian Approach also called as "method of statistical inference" coined by Thomas Bayes. That allows considering population parameter and combines prior information with selected sample to guide the statistical inference process. Parameter of interest is prominent prior probability distribution. Thus, Bayes's theorem to provide a posterior probability distribution for the parameter. The posterior distribution provides the basis for statistical supposition with reference to the consideration.

❖ Demand forecasting is the scientific and analytical estimation of demand for a product (service) for a particular period of time.
❖ It is the process of determining *how much* of *what* products is needed *when* and *where*.

- Specifying a Demand Equation
- General Form:
- $Q = F(P, M, P_R, T, P_e, N)$
- Empirical (Regression) Form:
  - $Q = a + bP + cM + dP_R + eN$
  - You estimated a demand equation like this in the demand project

⟩ To use these important demand relationship in decision analysis, we need empirically to estimate the structural form and parameters of the demand function-***Demand Estimation***.

$$Q_{dx} = (P, I, P_c, P_s, T)$$
$$(-, +, -, +, +)$$

The demand for a commodity arises from the consumers' willingness and ability to purchase the commodity. Consumer demand theory postulates that the quantity demanded of a commodity is a function of or depends on the price of the commodity, the consumers' income, the price of related commodities, and the tastes of the consumer.

(Source: Dominick Salvatore, Managerial Economics)

Bayesian statistics is said to a system which describes epistemological uncertainty with the application of mathematical tool of probability approach. It spells out the nature of belief and aftermath effect with the help of inferential decisions. This Bayesian decision theory is the concept of probability, which is statistical system and quantifies the tradeoff between the two cost and probability factor. It helps to assess the expected value with available new information.

Demand forecasting and business value
- *Better capacity utilization*
- *Better life cycle management*
- *Improved customer service line*
- *Improved distribution and logistics*
- *Improved supplier relationship*
- *Optimum inventory*

1.5. BAYESIAN APPROACH: A SNAPSHOT

- This approach drawing evidence-based conclusions and decision making.
- Make uses hypothesis as more evidence or information becomes available.

- Bayesian approach is said widely used in statistics, and mathematics.
- Continues approach probability distribution of parameters.
- Theorem can be used to get accurate results.

1.6. ESSENTIALS OF ACTIVE DEMAND FORECASTING

- Arranging the core group
- Contingency plan
- Create models
- Range of demand forecasting
- Reality check
- Reinforcement
- Set of assumptions
- Use of response time periods
- Use of techniques

1.7. CONCLUDING REMARKS

"In today's hectic and highly competitive world, if one wants gain profits, it is wise and better forecast them the future anticipated demand". Demand forecasting and planning helps businesses predict the demand of products by customers. The accurate results out of research work will certainly help the organization to predict the actual demand, and get satisfied consumer resulting in customer retention. Every commercial pursuit needs strategic planning of its operations, and the accuracy of this planning defines its survival. It is very clear that business organization understood that future market is only are called as "consumer –driven-market". Hence, predicting demands before they arise can give them both an edge over their rivals and access to crucial resources for tapping the opportunities [8]. The cost factors are the crucial one which decides the profitability and other business decisions and survival in the dynamic market. For estimating the demand factor and assessment about future demand, Bayesian approach provides most defensible framework within stated probabilistic questions and this problem can be seen in a broader perspective.

The capacity model is to face uncertainty under single scaffold capability which less used with the help of Bayesian approach. This approach is real measurement which provides comprehensive formula by taking certain information inputs for the company required and thereby make right decision. Demand forecasting uses the past and historic predict how many purchases in future period. Econometric modeling helps to get anticipated values, in order to make wise decisions it is essential to have clear cut budgeting and planning tools, to arrive easier, better, faster, more informed decisions and inputs like price, market mechanism capacity planning [9].

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