# Optimization of generation-specific buying plan for premium lingerie brand

*Vinosha B.*
*vinosha.ft15@bitsathy.ac.in*
*Bannari Amman Institute of Technology,*
*Sathyamangalam, Tamil Nadu*

*Nithyaprakash V.*
*nithyaprakashv@bitsathy.ac.in*
*Bannari Amman Institute of Technology,*
*Sathyamangalam, Tamil Nadu*

## ABSTRACT

*Buying a plan is the most important aspect of a profitable retail business. Retail buying plan includes sales forecast process by analyzing the factors affecting it namely aggregation of sales and exogenous variables. The conventional buying plan is centred on a common customer profile. However, in future, we need generation specific buying plan catering to their specific design expectations. In this study propose a new replenishment strategy formulated for Gen Z customers. The new buying plan strategy weighs the recent trends and prevailing sales scenarios to forecast the replenishment quantity and re-order point. The evolved strategy carries its references to sales history data, trends, aggregation of data for the product topology, especially for Gen Z customers.*

*Keywords— Forecast quantity, End of month stock, Actual sales quantity, Absolute deviation*

## 1. INTRODUCTION

Merchandise plan is the statement plan that provides details about what product, style and so on to be purchased for the upcoming period [5]. According to the author [13], a merchandising plan is a process created by the retailer to deliver the quality product at the right time and place. There are two terms used in buying a plan that is merchandise planning and replenishment planning. Merchandise planning includes pre-season forecasting process for medium or long term period whereas replenishment planning is the in-season forecasting for short term period which is based on the product's net requirement in store in order to replenish the needed stock. Some of the characteristics of bad demand forecast include under-forecast which results in a reduction of service level that disappoints the customer's expectations. Another important characteristic is over demand which leads to excessive stock levels. By undergoing an optimized replenishment plan these features for bad demand can be reduced [12].

## 2. LITERATURE REVIEW

### 2.1 Types of merchandise planning

Two distinct types of merchandise planning are stable and fashion merchandise [4]. Stable is nothing but demand over an extended period whereas fashion merchandise is the demand over a short period of time. In case of stable merchandise category, we can predict the demand easily by the past sales data but alternately in the case of fashion merchandise category, it is difficult to predict the demand with respect to the past sales data. Forecasting the stable merchandise is totally based on the data obtained from sales history as sales remain constant in every year in the case of stable merchandise. Some of the factors that affect the sales forecasting consists of both controllable and uncontrollable variables. The factors that come under controllable variable are marketing, the location of the store, merchandise allotment and cannibalization. The uncontrollable factors are a seasonal factor, weather, competition, availability of the product and economic conditions. Forecasting for fashion merchandise category requires previous sales data, analysis of fashion and current trend and undergoing market research [4].

### 2.2 Sales forecasting

A sales forecasting is typically made of a particular timeframe, this might be weeks or a season or a year. This may be short or long term forecast according to the need. The individual who forecasts for the particular category should know about the adjustments in tastes and customer attitudes, the extent of the objective market and changes in their spending pattern [17]. Some steps of sales forecasting involve reviewing the past sales data, analyzing the competitor's innovation and economic conditions. Finally, create a six-month merchandise plan by using different forecasting techniques.

There are many forecasting techniques that include both quantitative and qualitative analysis. Some of the qualitative models are mostly done by taking surveys among the customers, sales person and sometimes an educated guess by the professional person or

by undergoing market research. Quantitative analysis involves in mathematical model approach such as linear regression, moving average, weighted moving average, exponential smoothing, and exponential smoothing with the trend. Selecting the accurate forecasting may depend on various factors like cost and accuracy, data available, nature of time span and so on [11].

There are a various paper published that include forecasting techniques for different purposes. In Samir and Issam [14] initiated a study on forecasting accuracy among different moving average models and found that exponential weighted moving average with an autoregressive moving average is more efficient when compared to the traditional ARIMA model. Serkan, Ipek and Cigdem [16] made a comparative study on single forecasting model with combination forecasting model in order to find the effective method and concluded with the result that identifying the advance model for forecasting is a difficult task as single model give effective results in some case whereas combining forecast beats single model in some cases. Consequently, the perfect forecasting model can be identified only with reference to the data given and the product involved. According to the study conducted by Alp Ustandug [1]. It is seen that there were no effective forecasting technique that suits for all the situation so he decided to take research on specific product category that is sales forecasting for paint companies that introduces hybrid forecasting model that has the combination of multiple linear regression method and artificial intelligent method, this results were appreciable among all other techniques.

## 2.3 Generation Z
It is seen that most of the generation Z customers are immersed in technology and use of the internet is high when compared to other generation. They are independent as well as matured when compared to the rest. They can easily evaluate the product with the competitor's product through the internet and then they will decide the brand and the product [2]. Most of the generation Z customers are willing to buy online in order to save their time. According to the study conducted [7], it is shown that clothing sector female consumers dominate over the male. Generation Z most preferred steam is clothing where as other categories fall apart. Generation Z is becoming adult, therefore, they will be the core customers for the near future [7].

## 2.4 Demand fluctuation
Fluctuation in demand for generation Z customers may be due to the larger number of heterogeneity among the customers as each one has their own set of attitudes and taste. Sometimes it is difficult to predict the future demand as the customer perception varies from time to time. High volatility may cause a major problem while predicting demand. In some cases, product varieties can also affect the customer buying behaviour where the competitor's innovation in products may attract the customer to move towards their products [10].

## 3. OBJECTIVE OF THIS RESEARCH
- Minimize the inventory and maximize the service level.
- Traditional buying plan has only according to the general customer perception, in this we include generation specific buying plan especially for generation Z customers according to their expectation and buying behaviour.

## 4. HYPOTHESIS STATEMENT
- By following the recent trends of sales history, is it possible to create replenishment plan?
- Using sales history and moving average method, replenishment planning calculations fall short of demand.
- It is possible to maintain the demand for service level 90%.

## 5. RESULT AND FINDINGS
According to the trend analysis of T-shirt bra and flat pack, it is seen that bold colors, printed and smooth texture including centre bow is mostly used in a T-shirt bra. In Flat pack, printed designs are often used with unique necklines and sleeves. Therefore, with respect to the collected data trend and sales data, the forecast for the next 6 month are made. Thus obtained result could meet the demand with the service level at 90%.

### 5.1 Selected method and procedure
**5.1.1 Exponential smoothening method:** Exponential smoothening is the advanced method of all other time series forecasting which emphasis on more recent sales data. This method would smoothen out the fluctuations in demand for the previous period and also smoothen out an error that will occur in future forecast period [9].

### 5.1.2 Exponential smoothing forecasting – Procedure [15] (In excel sheet)
- Open a new sheet
- Insert the sales data
- Go to the data tab and click on to the data analysis (if not available, install it from excel options)
- Tab will appear when you click data analysis, In that, there will be a various option (forecasting methods) select the exponential smoothing.
- Fill in the data asked and an α value.
- Click ok once filled with the data
- Similarly find the error, absolute error and so by using the formulas
- Finally, insert the graph that reflects the forecast data.

Sales data are taken from a fashion retail brand (identity is disclosed). The calculated forecast excel sheet is shown in figure 1 and 2. In this, we have calculated α=0.1, 0.2, 0.3, but the absolute deviation is high so we planned to find an exact α value that projects

a minimum absolute deviation [17]. Therefore that can be identified by using the solver [16, 18] that is present in the data tab. When you insert the values and click ok then automatically the perfect α value will appear on the screen with minimum absolute deviation.
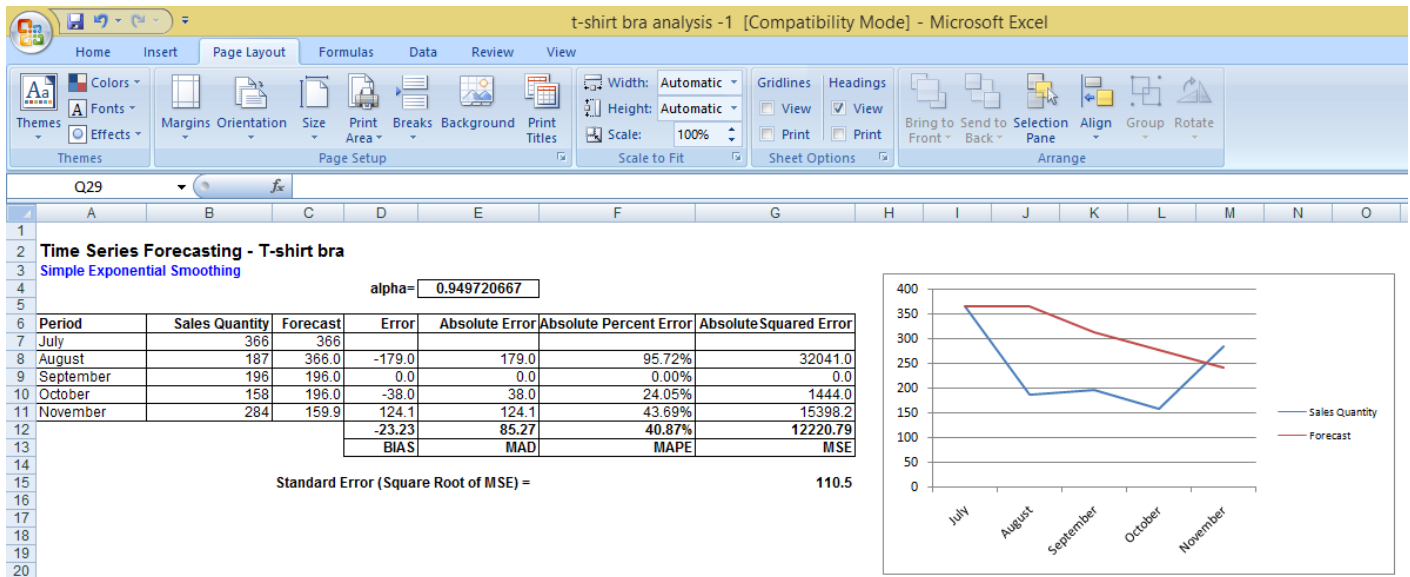


**Fig. 1: Simple exponential forecasting for T-shirt bra (α value is calculated using solver )**

**Absolute mean deviation at different α values for T-shirt bra**
MAD(at α=0.1) = 134.35
MAD(at α=0.2) = 117.07
MAD(at α=0.3) = 114.28
MAD(at α=0.9497) = 85.27(α value that is obtained through solver)

As the absolute mean deviation is minimum at α=0.9497, hence we calculate the forecast value with reference to this α value.



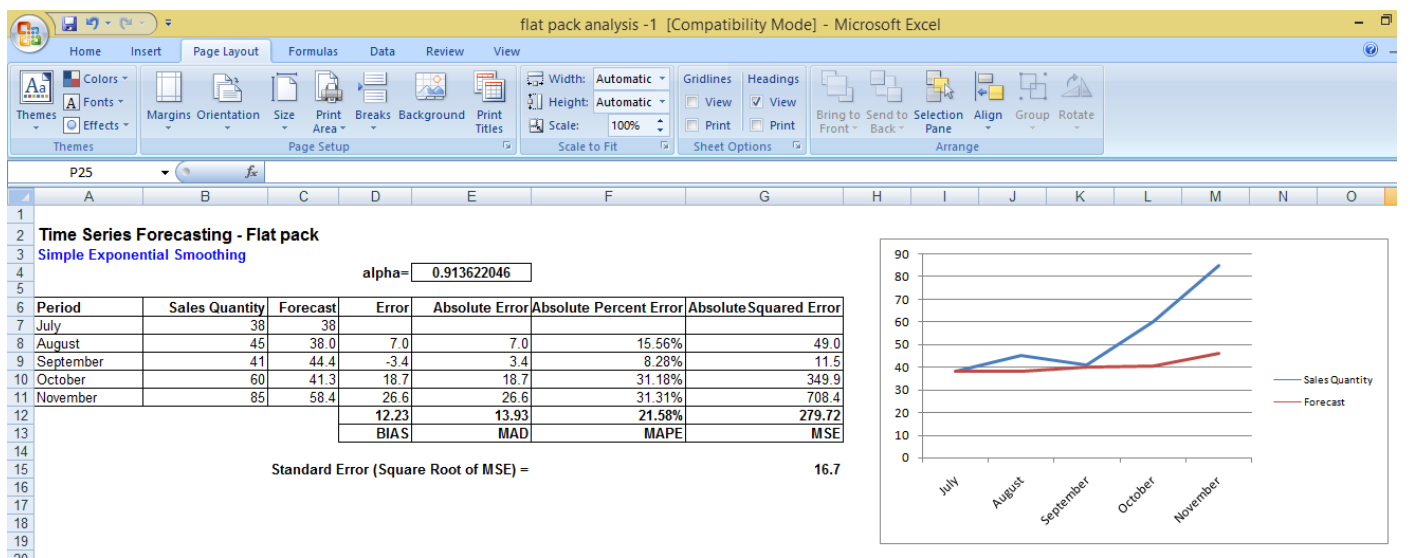**Fig. 2: Simple exponential forecasting for Flat pack (α value is calculated using solver)**

**Absolute mean deviation at different α values**
MAD(at α=0.1) = 18.58
MAD(at α=0.2) = 17.53
MAD(at α=0.3) = 16.57
MAD(at α=0.9136) = 13.93(α value that is obtained through solver)

As the absolute mean deviation is minimum at α=0.9136, hence we calculate the forecast value with reference to this α value.

**5.2 Strategies for obtaining the objective of the study**
1. When the stock is lesser than the demand, then the reorder point for every month is lesser than the sum of safety stock (MAD is taken as safety stock) , forecast (demand) and first 6 days stock of next month.
2. Excess stock = end of month stock. When EOM is greater than half safety stock less than 3/4th safety stock then, Reorder point quantity is equal to the sum of EOM, forecast, 6 days stock, half MAD.
3. When EOM is greater than 3/4th MAD (safety stock). Then, reorder point is equal to the sum of EOM, forecast and 6 days stock.

## 5.3 Integration of quantitative and qualitative methods

We introduce a combination of both quantitative and qualitative methods for obtaining the best results. Both quantitative and qualitative methods have advantages and disadvantages. By undergoing only a qualitative method that is purely based on the judgmental decision can sometimes produce inconsistent results. By undertaking only quantitative that is purely statistical approach can sometimes lead to inaccurate results [8]. And it is impossible to pinpoint a particular forecasting technique that gives the best results [6]. So many authors discussed integrating both, hence we have combined both methods together in this paper.

## 5.4 Mechanical Integration – procedure [8]

The procedure for mechanical integration includes combining, bootstrapping, correction for bias and correcting and combining. Combining forecasting is done by taking an average of both judgmental forecast and statistical forecast. More importance is given to the method which has more weight to produce a more accurate forecast but this may be problematic sometimes. The main factor that influences the result of the combined forecast is the interrelationship between the forecast errors that are in combination. It becomes less effective if the combined forecast error is high as there is more variation in forecasts (that includes some new information) [8]. Certainly, less interrelationship between the forecast errors will give effective results but it is often doesn't seem to have negative forecast errors [3]. This is forms a hybrid buying plan, especially for generation Z customers.

## 6. CONCLUSION

Therefore the required strategies to improve the service level has been identified and evaluated. Traditional buying plan is replaced by a new technique with effective strategies. Gen Z customer demand is satisfied through analyzing the various perception of their taste and attributes and according to that the demand has been forecasted to meet the generation characteristics requirements. For further research, one may focus on generation specific buying for all the generations and meet the various customer demand through more accurate forecasting techniques.

## 7. REFERENCES

[1] Alp Ustundag,(2009), A Hybrid Model for Forecasting Sales in Turkish Paint Industry. International Journal of Computational Intelligence Systems, Vol.2, No. 3 (October 2009), 277-287.

[2] Anna Dolot, The characteristic of Generation Z, "e-mentor" 2018, s. 44–50, http://dx.doi. org/10.15219/em74.1351

[3] Astrid Suryapranata(2003), Forecasting Framework for Inventory and Sales of Short Life Span Products. Master thesis.

[4] Barton A Weitz, Michael Levy, (2011), Retail management book, The McGraw-Hill Companies. Edition 8, chapter 12.

[5] Chiplunkar R M(2010), 'Product Category Management' ch. 6, pp. 126 – 135, Tata McGraw Hill Education Pvt. Ltd., New Delhi, 2010

[6] Diamantopoulos, Adamantios; Heidi Winklhofer (2002), Export Sales Forecasting by UK Firms Technique Utilization and Impact on Forecast Accuracy, Journal of Business Research, Elsevier.

[7] Eliot simangunsong(2018). Generation-z buying behaviour in Indonesia: opportunities for retail businesses. mix: journal ilmiah management, volume 8, no. 2, June 2018

[8] Goodwin, Paul (2001), Integrating management judgment and statistical methods to improve short-term forecasts, Omega, the International Journal of Management Science, volume 30, Elsevier Science.

[9] http://www.vanguardsw.com/business-forecasting-101/exponential-smoothing/(28.2.2019)

[10] Maria Elena Nenni1,*, Luca Giustiniano[2] and Luca Pirolo[2]. Demand Forecasting in the Fashion Industry: A Review International Journal of Engineering Business Management Special Issue on Innovations in Fashion Industry July 2013

[11] Norman Gaither and Greg Frazier(2013). Operations management book. Edition 9.2013

[12] Raffaele Iannone, Angela Ingenito[*4](2013) Merchandise and Replenishment Planning Optimisation for Fashion Retail. International Journal of Engineering Business Management Special Issue on Innovations in the Fashion Industry. volume 5

[13] Rajaram K. (2008), Merchandise Planning Models for Fashion Retailing. In: Tang C.S., Teo CP., Wei KK. (eds) Supply Chain Analysis. International Series In Operations Research & Mana, vol 119. Springer, Boston, MA

[14] Samir K. Safi, Issam A. Dawoud(2013), Comparative Study on Forecasting Accuracy among Moving Average Models with Simulation and PALTEL Stock Market Data in Palestine. International Journal of Theoretical and Applied Statistics. Vol. 2, No. 6, 2013, pp. 202-209. doi: 10.11648/j.ajtas.20130206.17

[15] Scott Nadler, John F. Kros(2007), Forecasting with Excel: Suggestions for Managers. Research gate - Spreadsheets in Education (eJSiE). Volume 2, Issue 2, Article 5.

[16] Serkan aras1, Ipek device kocakoç[2], Cigdem polat[3](2017). comparative study on retail sales forecasting between single and combination methods. journal of business economics and management. ISSN 1611-1699 / eissn 2029-4433. volume 18(5): 803–832.

[17] Swapna prabhan(2010). Retail merchandising book. Tata McGraw Hill Education Private Limited.