

INVENTORY MANAGEMENT: DEMAND FORECASTING

CASE STUDY: PREDICTIVE MODELING

Retail Business

Objective

Build a Forecasting model to predict the monthly demand levels for each of the sales channels across all geographies.

Background and Challenges

A multinational retailer has more than two hundred products in offer to cater the many consumer segments in three continents. The product line consists of innovative dressing wears which are targeted as the ultimate brands for partying and celebrations. These style icons, popular mostly amongst the kids and the young, have seen a phenomenal rise in the global demand giving rise to a meteoric growth in the company's revenues since past five years of inception.

Positioned as mid-luxury items with affordable prices, the company adds new products and features to the product line and capitalizes on the seasonal demand created for a limited time while proactively filling up the demand whenever out-of-shelf cases are reported in the myriad of retail outlets present worldwide. As the products are procured from China, all of these immediate gaps are filled by freight cargos via shipments or aircrafts. This leads to:

- Splurging of capital on the high-cost carrier charges due to refills, and
- Inaccurate estimations of gaps leading to wastage of Inventory stocks, particularly products that have become out fashioned.

"We have been doing this with intuition & you gave us the missing pie - the mathematics that completes our demand forecasting efforts"

*- Director
Online Retail Operations, UK*



Insights into Demand Forecasting

- Grasp Seasonality Factors in business
- Identify Confounds
- Identify Phantom Inventories

Our Approach

Method: Multiplicative Regression Model

Analyses Performed: Historical Data Analysis & Product Segmentation

Studying the Data and creating the product segments for analyses: We request our client to provide granular level data for each of the distribution channels. Before beginning on the analysis, our team works to make sure that the data is available with a good hygiene factor and that all the external events that have happened in the past years are available in the records. We further cluster the many products (more than 250) data into segments that make most of the business sense (e.g. studying all new launches together to identify trends and factors that may be critical in products sales). The segmentation is built above the product variants available with the company (target age group, location specific, base vs. accessories, bundle packages, etc.). The segments are then extensively studied per-se to factor out trends & patterns that can be built into the model development at a later stage.

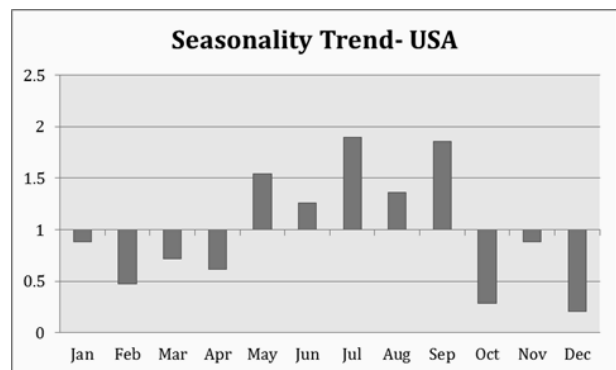
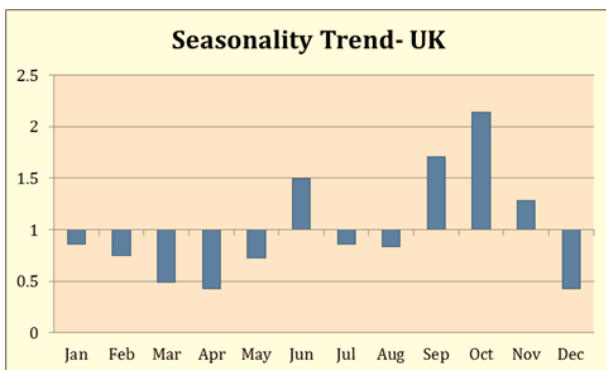


Illustration 1: Understanding seasonal trends across the geographies for various customer segments

The distribution centers (DCs) are found to be exhibiting unique trends for each of the three geographies - UK, USA, and AUS. UK had the first distribution centre to be operationalized and hence possessed the maximum amount of data followed by USA and AUS centres. To compare trends, the data for each of the three geographies is standardized at the aggregate level for the ease of comparison.

Preparing Data for Model Building: 25% of the popular product categories are discovered to exhibit a sudden drop in the sales volume at selective periods of the year. Suspecting that it may not be representing natural sales trend, and may be due to possibilities of stock outs, we discuss the situation with our client to get the on-field inputs on these irregularities. A thorough scrutiny of inventory levels is conducted at store levels and, indeed, the stock out options are found to play a critical role in the sales drop phenomenon. Our team

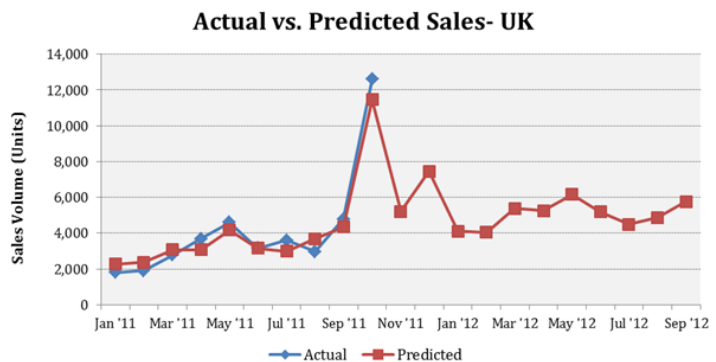


Illustration 2: Comparison of Actuals vs. Predicted Sales

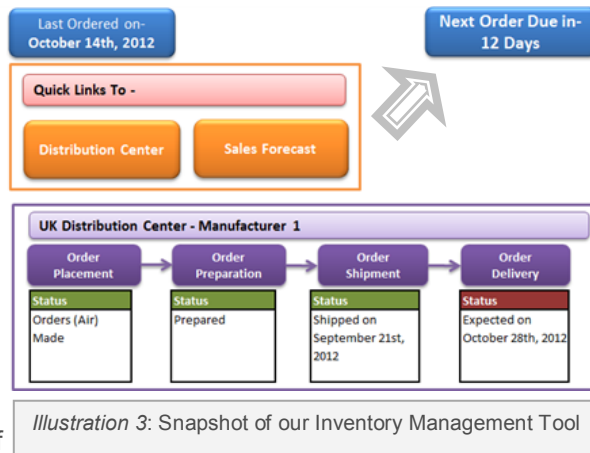
calibrates the data in these situations and prepares data for the demand forecasting analysis.

Demand Forecasting Model: Considering the many statistical algorithms available in building a forecasting model, six various techniques are hand-picked to test the efficacy of these models which included EWS– Holt and Winter, Additive Decomposition, Multiplicative Decomposition, Auto Regressive Moving Average, and more. For autoregressive models we consider different lag combinations using correlation coefficients to arrive at the most effective set. A comparative study is done to compare the models performances using the concepts of mean absolute percentage errors (MAPE).

Once the analysis is complete, we identify the best model with least MAPE and re-test performance on the top selling segments of products. Once results are confirmed, the aggregate level model is customized for each of the products to ensure better and more accurate results.

Results and Implementation

Using the predictive forecasting models, accuracy of 82% is achieved in demand prediction within the first two months of its usage. Our 'Inventory Management tool', built to manage inventories, administers the orders and shipments statuses to a very fine level of



success which further increases the service levels by 41%. Our team regularly updates the models based on upcoming events, and these Demand Forecasting Models are now a critical part of the strategy team and helps liaising with the operations units across the globe.

Contact Us

- Demand Forecasting
- Inventory Management
- Marketing Analytics
- Customer Profiling
- MIS & Dashboards

Feel free to give us a call for more information on our services:

White Capers

Level 6,
JMD Regent Square,
Mehrauli Gurgaon Road,
Gurgaon, 122002,
India

(+91) 11-41619309

info@whitecapers.com

Visit us on the web at
www.whitecapers.com