HIERARCHY FORECASTING AND SEASONALITY

McBride Ltd is Europe’s leading producer of private label Household and Personal care products. It operates in the FMCG sector with more than 500 customers and approximately 5000 products. Its Demand Plan Team currently is not satisfied with their initial two-tier forecasting model built in SAP Advanced Planning and Optimizer (SAP-APO), as it cannot capture the underlying seasonality in their data, while the team’s experience has identified potential seasonal elements. McBride is looking for ways to improve the current forecasting hierarchical structure with the aim of investigating whether there is seasonality and how this can be captured best.

This project, based on the baseline sales of laundry products provided by the company, aims to improve on the benchmark prototype model that is currently used at McBride.

Challenge Overview

Currently, McBride operates a 2-level hierarchy model to forecast baseline sales, generated from a middle level that includes brand and Forecasting Code (FC). Subsequently, those parameters become disaggregated into two lower hierarchies. These consist of the High Level Code (HLC) and the Customer Group (CG). The model accuracy is measured on the combination of HLC and CG, which is more important and sensitive to the company.

Although, it is possible to capture low level information, some high level information is currently left out during the forecasting process, in particular for combinations with seasonal products. Thus the challenge is to fully explore and test how the forecast accuracy can be efficiently improved by modifying the hierarchical setup.

Solving the Problem

The project first focuses on different data segmentation. For this a data split into normal and intermittent time series was considered as a first step. Subsequently, several combinations for both high level and low level forecasts have been applied, which thereafter their performance was fully compared. In a second step, two widely used forecasting methods have been applied, namely ETS and ARIMA. The experiments were carried out using R and Microsoft Excel.

Results and Achievements

The results indicate that a new hierarchical structure of a high level code (HLC) in Level 1 and customer group (CG) in Level 2 is more accurate and simpler than the benchmark prototype.

McBride is advised to use different forecasting model types in order to achieve more accurate forecasts. It has been found that Simple Exponential Smoothing (SES) forecasting method performs well for normal demand, while for intermittent demand forecasting, the Intermittent Demand Multiple Aggregation Prediction Algorithm (IMAPA) is suggested. Thus, it would be beneficial for McBride to incorporate the IMAPA model at a later stage into their SAP-APO environment.

In terms of the hierarchical alternatives, the middle-out approach performs best. But for normal demand, disaggregating forecasts based on historical proportions results in greater benefits, while for intermittent demand the use of historical averages is preferred. Lastly, if the seasonal pattern from the market level is applied to lower levels the forecasting accuracy improves demonstrating that considering more complete hierarchies is beneficial.