Forecasting Centre
Success Stories

Forecast Model Selection in FMCG Supply Chains

Executive summary
This project successfully developed statistical routines for selecting optimal forecasting models for FMCG manufacturer Beiersdorf worldwide. Forecasting accuracy has been increased leading to substantial inventory savings.

Challenge overview
Beiersdorf (BDF) is a global fast moving consumer goods manufacturer of skin and beauty care brands, selling 100s of products across 150 affiliates worldwide. Planning and coordinating the supply chain is vital to ensure availability of the products to consumers. Here, forecasting plays a key role as its accuracy drives inventory, and hence supply chain efficiency and return on assets. Forecasting thousands of product/country combinations with different forms of seasonality and trends requires automation of model selection, which conventional approaches could not provide.

Implementation of the initiative
The Lancaster Centre for Forecasting, based at the Lancaster University Management School, has as its objective, developing new methods and approaches to forecasting focused on improved organisational practices. It has been particularly concerned with evaluating and improving company forecasting systems, funded by the EPSRC and a large number of companies. It has long standing relations to support Beiersdorf HQ in Germany and its UK division through a mentoring scheme. The project was conducted by a team of researchers, Lancaster PhD students and Masters students in operational research, who carried out a 14 week internship onsite.

The problem
The objective was to select the best forecasting algorithm for each product/country to forecast future demand as accurately and robust as possible. The project involved a large scale empirical evaluation of statistical forecasting algorithms and statistical model selection routines available in the in-house software SAP APO-DP, and recent state-of-the-art developments in maths & stats research. The team ran a large scale empirical evaluation on thousands of real-life time series of sales across product categories (lipcare, sun, deo, shower, etc.) and country clusters (Europe, LATAM, etc.) to identify optimal model parameters for unique, product- and country-specific consumption patterns. The analysis explored different algorithms of exponential smoothing, regression and artificial neural networks, and various routines for optimisation, e.g. with constrained parameter search spaces, all within a comprehensive rolling-origin design to mimic the performance of real planners over the last year. To limit complexity for the demand planners, similar products were assigned to 13 forecasting profiles, leading to a reduced model set within brand groups, within countries and globally, using sophisticated techniques of parameter clustering and time series clustering. The project estimated an optimal, reduced set of statistical forecasting profiles that (a) increases forecasting accuracy & reduces inventory costs, and (b) limits complexity to demand planners to enhance their understanding and acceptance.

Results and achievements
Results were presented to the HQ in Germany and are currently being implemented for worldwide roll out. Key impacts include:
- Estimated improvements in forecasting accuracy of 2.4% - 5.1% (compared to using a single model)
- Estimated decrease in safety stocks of 5.8% - 12.5%, a significant reduction of excess stocks (at a constant service level)
- Time savings from enhanced automation of forecasting processes for 100s of demand planners globally

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