Sale Forecasting for a Global Industrial Supplier

Business problem
Our client receives 5% manufacture rebate for big orders made by the distribution center instead of individual orders from the client's branch store but pays a 2.5% carry on cost for the products not sold by the end of a month. An accurate sale forecast is needed to maximize the profit by making the most out of the rebate while keeping the carry on cost low.

Challenge
Our client has more than 2000 national branch stores, a dozen distribution centers and an average of 30000+ purchases orders per manufacturer and supplies 2600+ different inventories from cheap daily items to expensive equipment. Such high volumes of data and variety of parts makes accuracy a great challenge.

Our solution
Kwantum developed a sale forecasting model using time series which was originally developed for stock prediction. The model applies auto-regression with decayed weights for historical data to capture the trends and confidence interval. The seasonal purchase is solved using Fourier analysis, a popular technic in signal filtering. We then adopted idea in machine learning to automate the model for big scale data. In addition, our model makes predictions at two levels. Forecasting at branch store level saves the transportation cost while forecasting at distribution center yields better accuracy with bigger data. The algorithm automatically balances both directions through simulation.

Impact
The forecasting model improved our client's current prediction by 10% in profit. The model makes more aggressive purchase plan and keep the carry on cost at a reasonable level. The accuracy can be improved if more time is spent on tuning the parameters. Forecasting is a daily used technic for most companies. Creating a customized model using math/statistics and data science often yields a better accuracy with a much lower cost than purchasing big commercial software. In addition, the model can be easily modified to make prediction on demand, phone call, service request, and many other particular targets.