

Forecasting Car Demand with Different Methods

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The purpose of this study is to propose a sales forecast model for car dealers. The scope of the research is a case study on a Hyundai dealer in Yalova city, Turkey. Actual time series data of 48 months on Onurlu Hyundai car dealer's aggregate sales figures between January 2007 and December 2010 were used as fit-set data. The same data between January 2011 and December 2012 were used as ex-ante data to calculate the accuracy of the methods. In order to increase the accuracy of measurement models, the company's history data was examined 24 times. In the study, MS Office Excel and Statgraphics Centurion softwares were used to forecast demand and calculate the forecast errors with different quantitative methods. Four different time series forecasting methods were applied to the data the result of each one was considered separately for the same period lengths. These were Random Walk, Simple Exponential Smoothing Method, Holt's Exponential Smoothing Method, and ARIMA Method. Comparison of the models' predictions to actual sales data suggested reasonable results to compare the accuracy of all four methods. Also, the forecasting accuracy was tested separately for each forecast horizon length from 1 to 12 months to select the best method. For each particular forecast horizon, the specific figures by different error methods were calculated. On the other hand, 5 types of error measurement scales were used to compare the forecasting accuracy of the methods. These error metrics were Percentage of Errors, MAPE, wMAPE, wMSE, and Theil's U2 which are explained in details within the paper. Ultimately, the best results came from Exponential Smoothing methods, namely from Holt's Method. For the company, each period is a different issue and the results of 1-period ahead forecasts cannot be averaged with 2 and 3 period ahead forecasts. So, in 1 period ahead forecasts, from the five error measurement method, 2 offered Simple Exponential Smoothing, 2 offered Holt's Exponential Smoothing and 1 offered ARIMA as the best forecasting method. In 2, 4, 5, 6 period ahead forecasts, the 3 of 5 error calculation methods offered Holt's Exponential Smoothing Method. In 3, 7, 12 period ahead forecasts, Holt's Exponential Smoothing Method gave the smallest error figures in four error measurement methods. In 11 period ahead forecasts, all error measurement methods gave their minimum by Holt's Exponential Smoothing Method. In 8, 9, 10 period ahead forecasts, the 4 of 5 error measurement methods had the least scores by ARIMA model.

Keywords: Forecasting Methods, Sales Forecast, Car Dealership, Turkey.