FORECASTING DEMAND FOR SLOW-MOVING SPARE PARTS: A COMPARATIVE STUDY AT THREE COMPANIES

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Traditional forecasting methods such as moving average, single exponential smoothing, and double exponential smoothing, are known to be inapproriate for forecasting demand of slowmoving spare parts, because they do not incorporate explicitly the potentially high number of periods in which no demands occur. Several methods have been proposed that can cope with such periods, of which we mention Croston's method (Croston, 1972), the Syntetos-Boylan Approximation (SBA, by Syntetos and Boylan, 2001), and the empirical method by Porras and Dekker (2008).

In the latter method, if L is the average lead time in periods, then samples are taken from the historical demand of size L periods. Taking many of such samples, an empirical distribution arises. We propose an additional empirical method in which we sample from the historical lead times and use this historical lead time instead of L. Since huge variations in lead times can be observed for certain parts, such a change may result in better forecasts.

We compare the performance of the seven above-mentioned methods on a data set that consists of five-year historical data from three different companies. Whereas most comparative studies focus on performance measures like the mean squared error, we focus on the resulting inventory control.

We look at various characteristics of the parts and find that the two characteristics that inuence the performance of the forecasting methods are the average inter-demand-interval and the squared coefficient of variation of demand size. This is in line with

observations of Boylan et al. (2008), but our classification is different from theirs: they do not consider empirical methods, whereas we find that that the empirical methods are the best performing methods for parts with a high average inter-demand-interval (> 4) and a low squared coefficient of variation of demand size (< 0:3). In this category of parts, our method is slightly better than that of Porras and Dekker (2008). On all other parts, SBA performs best.

Our work is very useful for companies that need to forecast spare parts demand. To the best of our knowledge, it is the most extensive comparative study in terms of number of forecasting methods considered and size of the data set. Our new forecasting method and the classification scheme have practical relevance as well.

Keywords: spare parts, inventory control, demand forecasting

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