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**Demand forecasting and inventory control: a simulation study on automotive spare parts**

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## Abstract

This paper presents results of a large-scale simulation study on spare parts demand forecasting and inventory control to select best policies within each SKU category. Simulations were conducted over 10,032 SKUs of an automaker that operates in Brazil, considering six years of demand data. Literature review drove the selection of different models simulated. The study included three alternatives to record demand data (individual orders data, weekly and monthly time buckets), three demand forecasting models (SMA – Simple Moving Average, SBA – Syntetos-Boylan Approximation and Bootstrapping) and six models for demand distribution during lead-time (Normal, Gamma, NBD-Negative Binomial Distribution, compound Poisson-Normal, compound Poisson-Gamma and Bootstrapping) resulting in seventeen "combined" policies. These policies were applied under (s, nQ) inventory control (reorder point, multiples of fixed order quantity), considering two alternative frequencies for model parameters revision (monthly and semi-annually) and four Target-Fill-Rates (TFR = 80%, 90%, 95% and 99%), totalizing 136 simulation runs over each SKU. Parameter values (s, Q) were calculated towards TFR using methods from literature. Performance of each combined policy was measured by total costs and RFR - Realized-Fill-Rate. Major contributions of the research are the policy recommendations within each SKU category, a new



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