2011

[Introduction to] Service Parts Management: Demand Forecasting and Inventory Control

Nezih Altay

Lewis A. Litteral
University of Richmond, llittera@richmond.edu

Nezih Altay · Lewis A. Litteral
Editors

Service Parts Management

Demand Forecasting and Inventory Control

Springer

Preface

There are 14 distinct contributions to this volume from authors who hail from more than ten countries representing universities from six countries around the world. Although their approaches to the management of spare parts are widely divergent, everyone involved in the project agrees on two things: first, the management of spare parts is important because of its prevailing nature and magnitude and second, the problems associated with the management of spare parts are complex and really very hard. The first point is the motivation for the volume and we think that the second point is moderated somewhat by the talent, experience, and hard work of the authors whose work is presented.

Many industries rely on the management of spare parts including military weapon systems in naval and aircraft applications, commercial aviation, information technology, telecom, automotive, and white goods such as fabrics and large household appliances. Some of these applications involve providing service parts to end users while others involve the maintenance of manufacturing facilities for products like textiles and automobiles.

According to an article in the *McKinsey Quarterly* authored by Thomas Knecht, Ralf Leszinski, and Felix A. Weber, the after-sales business accounts for 10–20% of revenues and a much larger portion of total contribution margin in most industrial companies.Equally important, during a given product's life cycle, after-sales can generate atleast three times the turnover of the original purchase, especially for industrial equipment. A well-run after-sales business can also provide strategic benefits. Customers are usually less concerned about spare part prices than about speed of delivery and availability of service know how, whether on-site or via telephone. The reason is simple: down-time costs typically run at anywhere from 100 to 10,000 times the price of spare parts or service. And that means good performance can boost customer satisfaction, and thus, build repurchase loyalty in the original equipment business.

With specific regard to spare parts management policies used by the armed services of the United States, the General Accounting Office reported in 1997 that the inventory of service parts at non-major locations was valued at over $8.3 billion and that the need for many of the items stored at non-major locations is

questionable. Of the $8.3 billion of inventory at the non-major locations, $2.7 billion of it was not needed to meet the services' current operating and war reserve requirements. Maintaining inventory that is not needed is expensive and does not contribute to an effective, efficient, and responsive supply system. Based on GAO's analysis, GAO estimates the services that could save about $382 million annually in inventory holding costs by eliminating inventory at non-major locations that is not needed to meet current operating and war reserve requirements.

Academics and practitioners will find this volume valuable, as a starting point for spare parts research or to augment their current knowledge, for the results presented here as well as the foundation upon which those results are built as indicated in the extensive literature reviews and reference sections of each paper.

There are a number of papers in this volume that provide some level of summary and thus are particularly suited to readers looking for an initial understanding of the field of managing spare parts. One of these is the work by Andrew Huber where he provides a framework for evaluating the application of alternative techniques noting that this is a place where practice often lags theory. Macchi et al. discuss a structured framework of five steps whereby decisions can be made regarding the maintenance of spare parts in the avionic sector. The work of Bucher and Meissner provides a summary of ways that intermittent demand can be categorized, allowing the researcher or practitioner to quickly determine which spare parts management methods to consider given the nature of their particular data. Bartezzaghi and Kalchschmidt present findings on the choice of how the data aggregated can affect the performance of managing inventory. A distinctive contribution to volume is made by Smith and Babai: they present a comprehensive review of bootstrapping methods for spare parts forecasting, a promising area of study that has been developed as a parallel track to parametric methods.

Other papers in this volume present and evaluate various techniques (tabu search, Bayesian analysis, decision trees, and prediction intervals) tested on real and simulated data. Some techniques are theoretical developments while others are heuristics. Even with the computing power available in 2010, some aspects of the spare parts inventory management problem remain so complex that it is impossible to apply traditional techniques to forecasting and inventory management in this context. Various criteria are used to evaluate techniques, and some of which are traditional.