International Journal of
Information
and
Management
Sciences

International Journal of Information and Management Sciences
26 (2015), 13-28. DOI:10.6186/IJIMS.2015.26.1.2

Installed Base Forecast for Final Ordering of Automobile Service Parts

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Abstract

Service part inventory models can be distinguished by their intended application on single part/machine/facility, or on servicing an installed base of equipment. Besides typical uncertainties in part failure, the install base problem is compounded with the heterogeneity of the part age in equipment life cycle and scarcity of data toward the end of life phase. This paper presents an empirical study of the final order problem after the sale of a product is discontinued but there is an installed base to be serviced. Two fundamental issues are addressed: (1) to build forecast models on sales data directly or on failure probability indirectly, and (2) to use few but recent data or many but dated data. This paper first shows that regression on derived failure probabilities yields more accurate forecasts than regression on part sales data. The effect of data age and quantity on forecast is next investigated. The recency of historical data is shown to be more informative than the quantity of input data in demand forecast. Finally, an installed-base forecast model is constructed which show an improvement of 16.0% in absolute forecast errors than an existing method used in practice by a case study firm.

Keywords: Installed base forecast, service parts inventory, after-sales services, automobile maintenance, final order.

1. Introduction

Complex engineered products, such as automobiles, machines and computers, have long life time. After the sale of a product is discontinued, service parts must be provided over an extended period of time to satisfy warranty requirements and to facilitate other customer services. The sale of an automobile model might last for 5 years, but its service parts must be provided for at least 15 more years. The sale of a computer model might last for six months, but its service parts typically are provided for 3 more years. The availability of service parts is crucial in upholding after-sales service quality. In addition, the sales of service parts generate a steady stream of revenue at high margins which is less immune to economic cycle than new product sales. Service part inventory management is a core operation in product firms that cherish customer relationships.