The Optimal Number of Rental Items to Own and to Borrow: A Bayesian Approach

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Abstract

Inventory models for rental items may be used to plan service operations as diverse as rental of tools, access to telephone lines, or repair stations.
The talk models the situation where the service provider owns a number of items that he rents-out, but these items may be insufficient to meet uncertain demand. When the inventory is insufficient, the provider may borrow, at a cost, additional items from another source.
The purpose of the model is to determine the optimal number of service provider should own.

We consider the situation where the number of users or clients is finite and takes advantage of information on client-specific rental history. Users may exhibit heterogeneous patterns of use that the approach incorporates explicitly.

The Bayesian approach provides more appropriate measures of uncertainty for the Expected Present Value of the project than the standard approaches. Furthermore, it incorporates uncertainty form different sources: heterogeneity among subject-specific rental durations and times between consecutive requests for items.