Planning for a "Sudden-Death" Inventory Loss

Triggered by International Tax Competition

by

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Abstract

This study addresses a medical device company's need to relicense its products for export after declaring a new legal manufacturer. New license applications are approved at an unknown date with increasing probability within a finite time horizon. Approval results in the instantaneous obsolescence, or "sudden-death," of inventory bound for export. As a result, the company needs to re-align its supply chain strategy to avoid stock-outs or inventory obsolescence. This thesis develops a model that aids the organization in assessing the decisions and necessary information that can help navigate the transition. Potential responses include pushing inventory out of the system before obsolescence, or ramping down production in advance of the sudden-death event. Improved estimates of alternative distribution costs, lead-time, event-probability, and production capacities will greatly aid the organization's ability to respond to the event scenario. Changing these factors suggest different optimal inventory policies. To illustrate this relationship, a dynamic programming model is derived based on probability distributions for likely license approval times. The resulting model allows the organization to assess optimal inventory policies derived from various system assumptions. In the thesis, different product aggregations are used to assess inventory strategies for bulk-license application submission. Patterns are identified in the analysis of simulation runs, including the time period for starting alternative inventory ramp-up as well as ramp-down speed. The intent of the study is to provide an iterative method for experimenting with assumptions within the organization in order to drive a coordinated response to the sudden-death event. The method is intended to be useful to other organizations planning to transition in preparation for events occurring with increasing likelihood within finite time horizons.

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