

The Implementation of Expiration Date Visibility at a Dutch retailer

Master Thesis – Operations Management & Logistics

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Supervisors

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Introduction

Food retailers like Jumbo have to face endless challenges to be successful. The needs of customers continuously increase while a reduction in food waste is expected. A potential improvement in operations is the availability of expiration dates (ED's) in the replenishment system (Broekmeulen & Van Donselaar, 2009; Haijema & Minner, 2019). However, Jumbo misses expiration date information on items in their stores. Multiple levels of expiration date visibility are possible to implement, but the exact consequences of these methods are unclear. Therefore, the research question is in short defined as:

How should Jumbo register and control the expiration dates of items in the stores?

Design

Generally, two levels of ED visibility are defined. The aim of this thesis is to determine which visibility level is most suited to implement at Jumbo. The first level is to use extended bar codes to keep track of expiration dates on item level. Secondly, the expiration dates could only be registered when a batch of items arrives at the store. This latter needs to estimate the expiration date of items sold to customers to monitor which expiration dates remain in stock. The fraction of customers who are taking the item with the oldest expiration date (FIFO-demand) can be estimated based on the daily sales, amount of waste, and inventory levels (Broekmeulen and Van Donselaar, 2019).



Batch ED visibility = register ED at store arrival and estimate FIFO% of demand



Item ED visibility = use bar codes with expiration date to monitor inventory

The first part of this study focuses on the estimation of the customer withdrawal fraction. The second part tests the potential performance of both ED visibility levels in a simulation experiment.

References

Broekmeulen, R. A. C. M., & Van Donselaar, K.H. (2019). The added value of expiration date visibility, capping order quantities and estimating withdrawal behaviour for perishable items with fixed case pack sizes. Eindhoven University of Technology

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Results

Customer withdrawal behavior:

The main finding in this part is that the FIFO fraction of customer demand can be estimated with reasonable accuracy with only 20 daily observations. Figure 1 presents an example of the accuracy curve of one replication for one parameter setting (representing a Jumbo product).

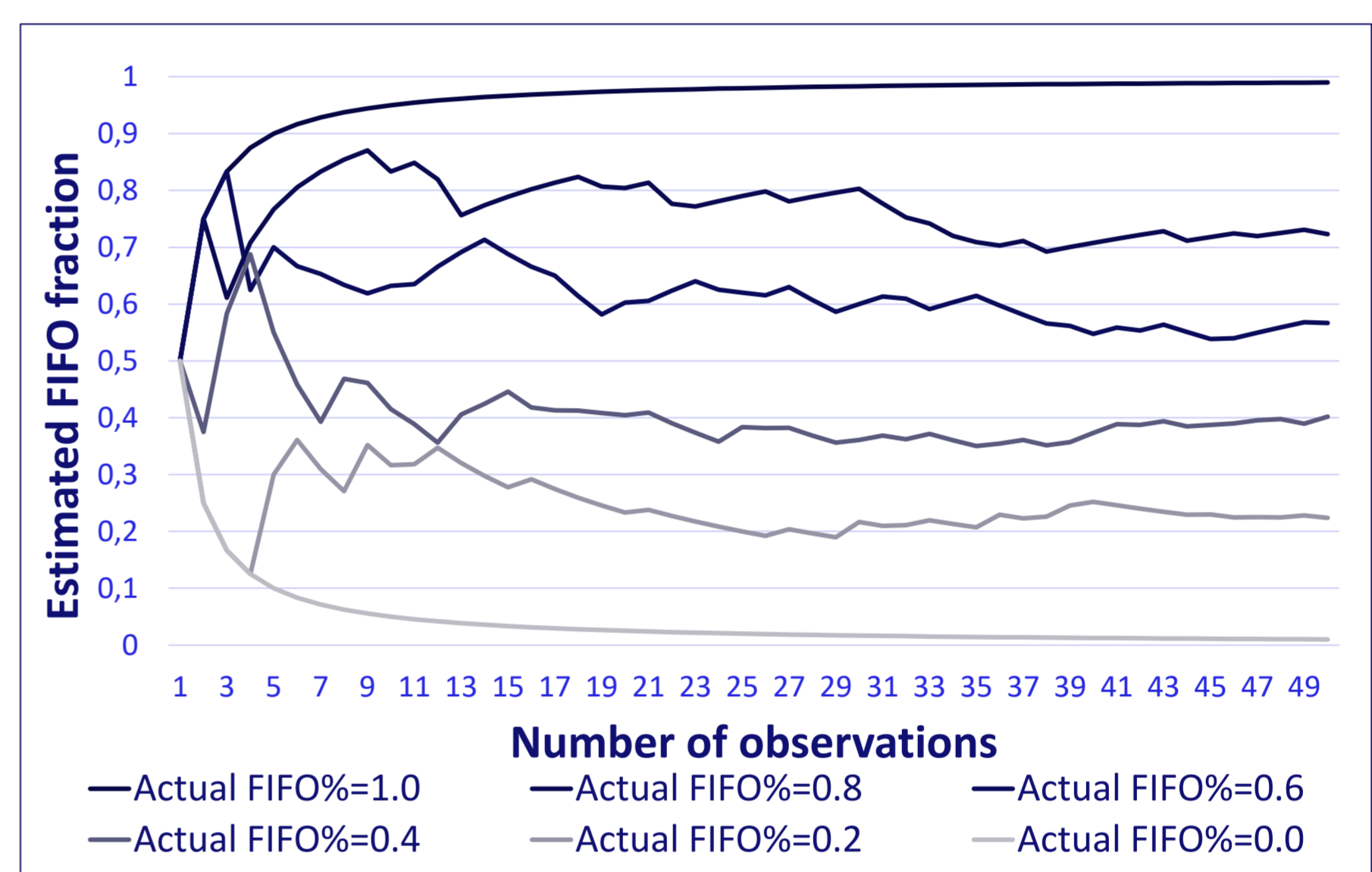


Figure 1; Estimated FIFO fraction for one product over the number of observations.

Another finding is that the estimated FIFO fractions of Jumbo products have a significant relation with its general product characteristics (i.e. demand).

Performance of expiration date visibility levels:

A simulation experiment confirmed that Item ED visibility only slightly outperforms Batch ED visibility. Both ED visibility levels significantly increased performance related to availability and waste for several product departments at Jumbo. Table 1 shows the potential waste reduction for the large Potato/Vegetable/Fruit department.

Table 1; Potential waste reduction compared to scenario without ED visibility.

Product department	Waste reduction with Batch ED visibility	Waste reduction with Item ED visibility
P.V.F. (Potato/Vegetable/Fruit)	8.8%	9.3%

Recommendations

The implementation of ED visibility is dependent on the product department. Expiration date visibility is beneficial for departments with highly perishable items. It is recommended that retailers implement Batch ED visibility for these departments because the operational requirements to implement Item ED visibility are considerably more difficult.