

Economic Order Quantity (EOQ)



Applies to:

SAP Forecasting and Replenishment

Summary

Economic order quantity is that level of inventory that minimizes the total of inventory holding cost and ordering cost.

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Daniela Khalaf is part of Industry Solution Management, Trading Industries. She joined SAP in 1996 and held various positions all within the retail sector. In 2003 she founded the SAP Forecasting and Replenishment Competence Center in order to support the product definition, go-to-market and delivery of SAP F&R application.

Table of Contents

Economic Order Quantity (EOQ).....	3
Definition	3
Solution	3
Copyright.....	6

Economic Order Quantity (EOQ)

Definition

Economic order quantity is that level of inventory that minimizes the total of inventory holding cost (capital lock-up and storage costs) and ordering cost.

Solution

The calculation of the economic order quantity is an integral part of replenishment optimization. The replenishment optimization processes three steps to come up with the final proposal of an order quantity:

1. rounding
2. EOQ
3. supplier restriction

In the optimizing step EOQ, the decision is made which quantity is most cost-efficient. Based on the costing structure of a retail company for their products it might make more sense to order a quantity that exceeds the pure demand for a certain period.

To determine the final order quantity, capital lock-up costs, storage costs (storage costs av. In 5.1) and the basic costs for ordering need to be compared. In SAP F&R this is done in a profile (EOQ profile) provided in customizing:

SPRO F&R → Replenishment optimization → EOQ

The assignment of profiles is at level location/product that ensures each combination can take on an individual EOQ profile. The EOQ calculation, of course, takes the rules of rounding into consideration as well.

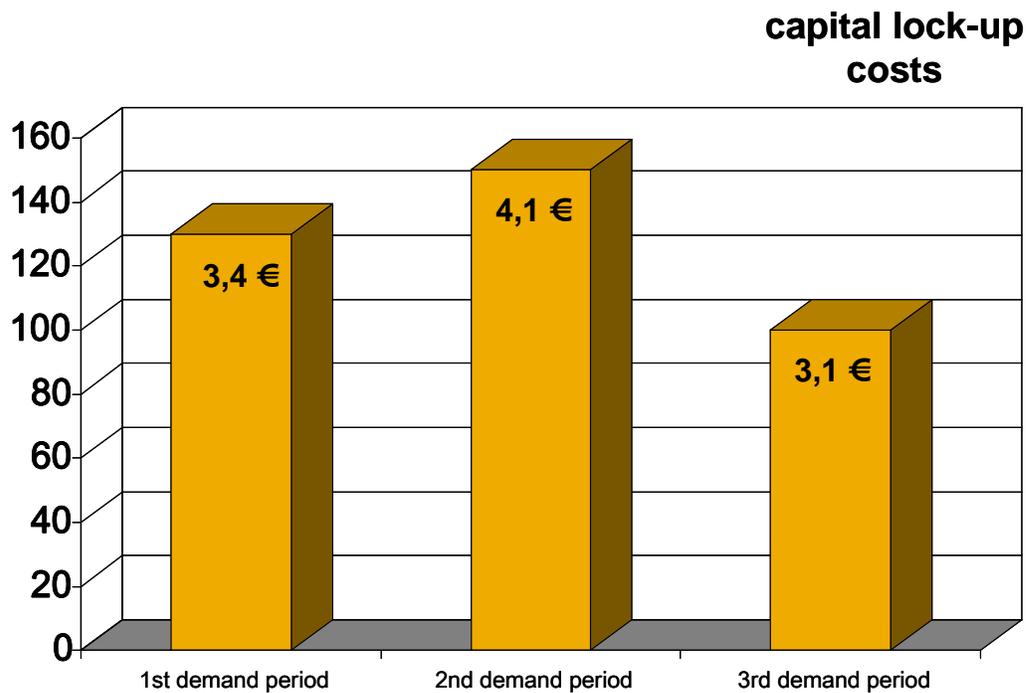
The challenge of EOQ is determining and defining the variable cost drivers that come on top of the typically fixed and constant ordering costs:

- Handling costs (goods receipt processing, invoice verification, personnel)
- Supplier fees
- EDI costs
- Freight costs
- Customs

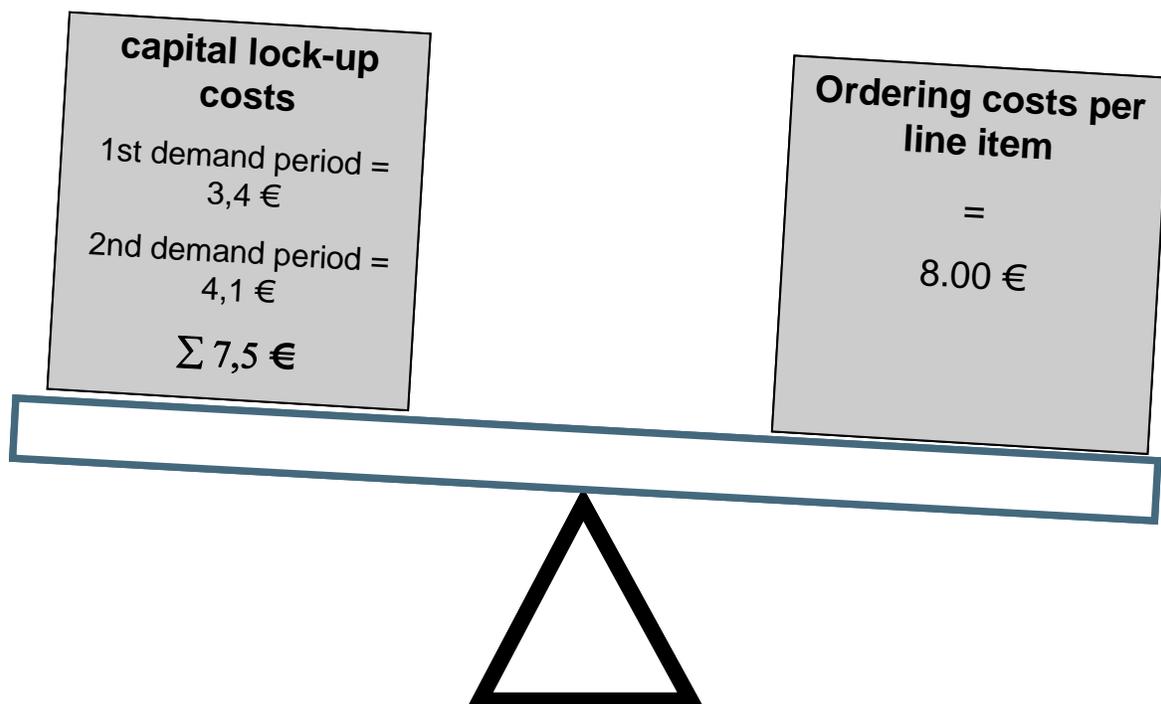
Variable costs related to capital investments and holding costs are often not 100% known so companies also rely on approximate figures. But even approximate figures can have an impact on the determination of order quantities.

Below you can find an example to highlight the idea of EOQ and how this is realized in SAP F&R:

Situation: Demand of the upcoming first demand period is 130 each, 150 for the following demand period, and 100 for the third demand period. Based on the cost information in the EOQ profile the capital lock-up costs are 3.40 Euro for the first demand period, 4.10 Euro for the second, and 3.10 Euro for the third.



Ordering costs per order are 8,00 Euro. Comparing the ordering costs against the capital lock-up costs, the system will look beyond the upcoming demand period and add as many demand periods as required until the capital lock-up costs exceed the ordering costs. In our current example, the capital lock-up costs of demand period 1 and 2 are still lower than the ordering costs (see figure).



If the system only considers the first demand period the cost would have added up as follows: Ordering costs (1. order) + variable costs for demand period 1, ordering costs (2. order) + variable costs sum up to 23.50 Euro. In our EOQ calculation the total costs are only 15.50 Euro

In an implementation project, it is wise to perform a proof-of-concept based on a selected product category. For this category, fixed costs and variable costs need to be determined upfront as correct as possible. Results respectively the quality of the order proposal needs to be investigated thoroughly.

This will give sufficient decision support for an advanced usage of F&R. Typically the first phase of running F&R is dedicated to cover demand with appropriate stock. With EOQ you can achieve not only optimization of stock levels but also optimization of costs.

As EOQ calculation is part of our standard F&R offering, efforts need to be estimated mainly for the determination of the cost variables and structure.

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