

A decision model for a newsvendor inventory problem with an extraordinary order[†]

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SUMMARY

This work presents a newsvendor inventory model with two ordering opportunities: the regular order and an extraordinary order. We suppose that the size of the emergency order depends on the behavior of the customers and it is automatically determined as a variable fraction of the extent of shortage in the inventory. More concretely, the backlogged demand rate is described by a non-increasing cosinusoidal-type function with respect to the amount of shortage. In the model studied here, the objective is to maximize the expected total profit for the period, when the demand follows an exponential distribution. The uniqueness and existence of optimal policies are proved and, by using closed-form expressions, we determine the optimal lot size and the maximum expected profit. This work extends several newsvendor inventory models proposed in the literature.

Keywords: newsvendor model, backlogged demand rate, maximum expected profit

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