Applying (1, T) Ordering Policy in a Multi-Vendor-Single-Buyer Inventory System with Lost Sales and Poisson Demand

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Abstract : This paper considers a two-echelon inventory system with a number of warehouses and a single retailer. The retailer replenishes its required items from warehouses, and assembles them into a single final product. We assume that each warehouse supplies only one kind of the raw material for the retailer. The demand process of the final product is assumed to be Poissson, and unsatisfied demand of the final product will be lost. The retailer applies one-for-one-period ordering policy which is also known as (1, T) ordering policy. In this policy the retailer orders to each warehouse a fixed quantity of each item at fixed time intervals, which the fixed quantity is equal to the utilization of the item in the final product. Since, this policy eliminates all demand uncertainties at the upstream echelon, the standard lot sizing model can be applied at all warehouses. In this paper, we calculate the total cost function of the inventory system. Then, based on this function, we present a procedure to obtain the optimal time interval between two consecutive order placements from retailer to the warehouses, and the optimal order quantities of warehouses (assuming that there are positive ordering costs at warehouses). Finally, we present some numerical examples, and conduct numerical sensitivity analysis for cost parameters.