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Inventory control, replenishment and lot-sizing under demand, yield or lead time uncertainties

Proposed by:

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Aim & scope: Managing uncertainty and risks is becoming one of the most important challenges in SC optimization. In fact, uncertainty causes several difficulties in supply and production planning, and inventory control. The sources of uncertainty are various and can take place at several levels of the SC: transport delays, demand variability, machines breakdowns, price variability, variations of assembly and manufacturing capacities, etc. In these last years, decision-makers and academics have seen growing vulnerability of SCs. They recommend that appropriate decisions and actions have to be taken in order to cope with these uncertainties. Moreover, the great competition and the perpetual drop in prices push companies to deal with suppliers from distant countries and be delivered through various transportation mean such as plane, train and container shipment over sea with various associated costs. However, this may further increase uncertainties and reduce the responsiveness of the global SC. To decrease the influence of these uncertainties, the companies use *safety stocks*, but stocks are expensive. So, the problem is to control stocks and to avoid stockout while keeping a high service level.

The objective of this Invited Session is performing a review on this topic, more particularly on advanced replenishment planning and inventory control models under demand, yield or lead time uncertainties. A particular aspect of this session concerns models *for assembly systems*. Indeed, several types of components are needed to produce one finished product in case of assembly lines, then, the inventories of the different types of components become dependent. A delay and stockout of only one component automatically leads to a shortage due to the impossibility to assemble the finished product. In addition, appends an overstocking of the others types of components (delivered but not used). Thus, the models, for this case, are more sophisticated.

Keywords: Replenishment, Inventory, Uncertainties, Assembly Systems, Newsboy model, MRP parametrization, Safety stocks, Safety lead-time, Lot-sizing, Stochastic models, Optimization.

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