

## Stochastic Optimization of a Vendor-Managed Inventory Problem in a Two-Echelon Supply Chain

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**Abstract :** The purpose of this paper is to develop a multi-product economic production quantity model under vendor management inventory policy and restrictions including limited warehouse space, budget, and number of orders, average shortage time and maximum permissible shortage. Since the "costs" cannot be predicted with certainty, it is assumed that data behave under uncertain environment. The problem is first formulated into the framework of a bi-objective of multi-product economic production quantity model. Then, the problem is solved with three multi-objective decision-making (MODM) methods. Then following this, three methods had been compared on information on the optimal value of the two objective functions and the central processing unit (CPU) time with the statistical analysis method and the multi-attribute decision-making (MADM). The results are compared with statistical analysis method and the MADM. The results of the study demonstrate that augmented-constraint in terms of optimal value of the two objective functions and the CPU time perform better than global criteria, and goal programming. Sensitivity analysis is done to illustrate the effect of parameter variations on the optimal solution. The contribution of this research is the use of random costs data in developing a multi-product economic production quantity model under vendor management inventory policy with several constraints.

**Keywords :** economic production quantity, random cost, supply chain management, vendor-managed inventory

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