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Flexible kanbans to enhance volume flexibility in a JIT environment: a simulation based comparison via ANNs

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Abstract

Kanbans play an important role in the information and material flows in a JIT production system. The traditional kanban system with a fixed number of cards does not work satisfactorily in an unstable environment. In the flexible kanban-type pull control mechanism the number of kanbans is allowed to change with respect to the inventory and backorder level. Based on the need for the flexible kanban, a method was proposed by (Husseini, S.M.M., O'Brien, C., and Hosseini, S.T., 2006. A method to enhance volume flexibility in JIT production control. International Journal of Production Economics, 104 (2), 653–665), using an integer linear programming technique, to flexibly determine the number of kanbans for each stage of a JIT production system, minimising total inventory cost for a given planning horizon. Here, the effectiveness of the method proposed by Husseini et al. is examined by a case study and compared with the results for the conventional method of fixed kanban determination. This is also confirmed by a

simulation study using artificial neural networks (ANNs). The main aim of this paper is to show the cost advantage for Husseini et al.'s method over the conventional method in fluctuating demand situations, and especially to prove that simulation via ANNs ensures a simplified representation for this method and is time saving.

Keywords:

just-in-time | kanban | flexibility | volume flexibility | artificial neural networks