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IIE Transactions >

Volume 36, 2004 - Issue 6

1,840 | 135 | 0 | Altmetric

Original Articles

Make-to-order, make-to-stock, or delay product differentiation? A common framework for modeling and analysis

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Pages 529-546 | Received 01 Jun 2002, Accepted 01 Oct 2003, Published online: 17 Aug 2010













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Abstract

Delaying product differentiation is a hybrid strategy that strives to reconcile the dual needs of high variety and quick response time. A common product platform is built to stock in the first stage of production (called the Make-To-Stock (MTS) stage) which is then differentiated into different products after demand is known in the second stage (known as the Make-To-Order (MTO) stage). In this article, we develop models to compute the costs and benefits of delaying differentiation in series production systems when the order lead times are load dependent. The models are then used to gain insights through analytical and numerical comparisons. For example, we observe the following patterns in a large number of numerical experiments. The effect of congestion in the MTS and MTO stages is asymmetric with tighter capacity at the MTO stage having a greater detrimental effect on the desirability of delaying differentiation. If

there is flexibility in choosing the point of differentiation, higher loading is observed to
favor later differentiation. Also, if the sequence in which work is performed can be
affected, then placing workstations that have a tighter capacity in the MTS stage lowers
costs.

Acknowledgements

The authors are grateful to two anonymous referees for their help in improving an earlier version of this manuscript. This material is based in part upon work supported by the National Science Foundation under grant no. DMII 9988721. Additional funding was provided by the Graduate School of the University of Minnesota through a grant to DG and by the Honeywell Coroporation through a grant to SB.



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