Build-pack planning for hard disk drive assembly with approved vendor matrices and stochastic demands

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Abstract: Offering customers product flexibility is one strategy deployed by companies to build competitive advantage and defend profit margins. This strategy is particularly well-suited for products with a high degree of component modularity. The hard-disk drive is one such product. However, such strategies often complicate downstream activities such as production planning. In this presentation, we discuss about a production planning problem based on hard-disk drive assembly, where customers choose their preferred suppliers for pairs of inter-dependent components through the approved vendor matrix. The problem is to develop production plans that minimize the expected total shortage and holding costs while observing the matrix restrictions and limited components supplies. We provide a mixed-integer formulation of the problem, whose linear approximation and relaxation is solved using the column generation method. This is then embedded in a branch-and-price framework to solve the mixed-integer problem. Special branching rules are devised to preserve the structure of the pricing sub-problem at each branch-and-bound node. We also present some computational results of our implementation.

Biography: Ng Tsan Sheng Adam received the B.Eng degree in electrical engineering from the National University of Singapore (NUS) in 2000. He then received his Ph.D. degree in industrial and systems engineering (ISE) from the NUS in 2005. He has been a research engineer with the Design Technology Institute (DTI) in 2004-2005, with a focus in quality and reliability engineering for product design. Subsequently he was also with the Defence Science Organization (DSO) as a research engineer in the human factors laboratory in 2005. He is currently a research fellow with the ISE Department, NUS. His research interests include applications of operations research and statistical modeling techniques in various domains such as advanced planning systems for manufacturing, logistics, services supply chains.

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