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Product and supply chain design using a taboo search

Radwan EL HADJ KHALAF^a, Bruno AGARD^b, Bernard PENZ^a

^a*G-SCOP*
Grenoble INP – CNRS – UJF
46 avenue Félix-Viallet, 38031 Grenoble Cedex 1, France

^b*Département de Mathématiques et Génie Industriel*
École Polytechnique de Montréal
C.P. 6079, succ. Centre-Ville, Montréal (Québec), H3C 3A7, Canada

Abstract

An assemble to order policy considers a tradeoff between the size of product portfolio and assembly lead time. The concept of modular design is often used to implement the assemble to order policy. Modular design impacts assembly of products and the supply chain. In particular storage, transportation and production are affected by the selected modular structure.

For a determined assembly lead time, a module composition that minimizes assembly and production costs is difficult to establish. This problem is highly combinatorial, it is not achievable to look for an optimal solution. This article proposes a challenging modeling approach that consists in selecting a set of modules to be manufactured in distant facilities and shipped in a nearby location plant for a final assembly operation under time limits. A taboo search resolution approach is then investigated. Computational results showed that this method is promising.

Key words: product family, design, supply chain, optimization, taboo search.

1 Introduction

When commercial competition is strong, the customers have opportunities to choose between different products. Each customer may select the product that is the closest to his individual needs. For a company, it necessitates to design and manufacture diversified products. This enlarges the possibilities to be closer to the customer requirements. At the same time, this involves an increasing number of product variants and options. It follows a complex product diversity that must be well managed in order to guaranty competitive costs. [13].

In order to give an efficient answer to this problem without an expansive product proliferation, companies may focus on “mass customization” [19]. Mass customization deals with large products portfolio, flexible manufacturing systems and extended supply chain.

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Email addresses: radwan.el-hadj-khalaf@g-scop.inpg.fr (Radwan EL HADJ KHALAF),
bruno.agard@polymtl.ca (Bruno AGARD), bernard.penz@g-scop.inpg.fr (Bernard PENZ).