

Supplier selection and supply quantity allocation of common and non-common parts with multiple criteria under multiple products

Z.H. Che ^{*}, H.S. Wang

Department of Industrial Engineering & Management, National Taipei University of Technology, 1, Section 3, Chung-Hsiao E. Road, Taipei, Taiwan 106, ROC

Received 19 November 2007; accepted 5 December 2007

Available online 14 December 2007

Abstract

With limited capacity of suppliers, how to reduce the total operating cost of the enterprise by determining the most suitable production capacity allocation has become the major issue faced by various enterprises in producing multiple types of products. In addition, when manufacturing multiple types of products, due to the high demand of common and non-common parts, which is applicable to various products, enterprises will place special emphasis on the procurement of common and non-common parts, to select most suitable suppliers of parts with the highest quality and minimum time and costs, in order to cut down on operating costs of enterprises. This research first lists parts of various products through bill of material (BOM), and constructs an optimal mathematical model suitable for multi-phase products' parts, in order to assess the assembling relationship of various parts; it makes use of the linkage among those to select the supplier of common and non-common parts when assessing multiple products. Then considering the limited production capacity of suppliers, it selects the best combination of suppliers of special common and non-common parts. To solve the optimal mathematical model, a genetic algorithm (GA) is proposed to find the acceptable results of the supply selection and quantity allocation problem. It then provides a benchmark for enterprise in current diversified market to purchase and assess common and non-common parts, and makes such benchmark a normal standard for selection of suppliers in the future. © 2007 Elsevier Ltd. All rights reserved.

Keywords: Supplier selection; Quantity allocation; Common parts; Genetic algorithm

1. Introduction

With the change of the market, current enterprises constantly focus on industries. For obtaining opportunities of continuous operation in the meager profit environment, enterprises all solve the operation-related issues with complex structure or non-linear combination in industries and markets through information

^{*} Corresponding author. Tel.: +886 2 2771 2171x2346; fax: +886 2 7317168.
E-mail address: zhche@ntut.edu.tw (Z.H. Che).

equipments. In addition, while resource is limited, how can enterprises come up with most efficient and productive resource allocation with optimal method, is the key issue discussed in this research.

To meet the different needs of each customer, enterprises have become customer-oriented to produce varieties of products. Moreover, under current competitive environment, if enterprises want to remain in operation continuously and acquire long-term profit, fighting alone is not a good idea. Supplier selection management has to be put in good use to integrate suppliers and enterprise and make the supply-demand become best and maintain a long-term cooperative relationship.

Especially for enterprises of multiple products, types of orders are becoming complicated, taking the most popular PDA, for example, with the appearance of nano-tech, many PDA products are being updated. Wang and Che (2004) suggested that currently many companies endeavor to change and improve current products; and in order to maintain or increase the occupancy of mature products, enhancement of quality and reduction of cost are two major tasks. We thought that once products are updated, their common and non-common parts should also be appraised, as shown in Fig. 1 and then the selection of parts and parts suppliers becomes an even more complicated process. Each product is normally composed of many parts, when the number of parts becomes plentiful, there may be more suppliers to choose from, thus increasing the chance of selecting better parts suppliers and even diverting the risks of enterprises.

How to determine parts supply quota among different supplier groups with limited supply capacity, under the conduction of multiple products and parts and based on different selection criteria, is becoming important for enterprises. Especially in the environment that sees numerous changes taking place concurrently, there are still many factors interlinked. How to assist enterprise in determining the selection of particular part and suppliers to acquire maximum profit, under the condition of rapidly changing market and multiple products, will be an important topic at present time. Heuristic algorithm that features fast calculation function becomes the tool for our assessment.

Among various algorithms, GA, as thought by Wang, Yung, and Ip (2001), is most suitable for selecting best supplier combination. And Hokey, Gengui, Mitsuo, and Zhenyu (2005) suggested that GA is the best population-based heuristic algorithm, capable of generating a group of best solutions at once. Therefore, considering the variety of current products, both the selection of suppliers and operation and production of suppliers themselves should be taken into account, so algorithm featuring fast calculation should be employed to solve such problems. In this research, we plan to introduce case studies based on GA to deal with the selection suppliers of common parts and non-common parts of multiple products, allocation of supply, thus cutting off the unnecessary costs of enterprises.

Vonderembse and Tracey (1999) mentioned in their research that to face the huge change in the market, enterprise should explore wider supply system, clearly define criteria for selecting and assessing suppliers, in order to improve production performance of the enterprise. Their research results also showed that selection criteria of suppliers and two interfaces adopted by suppliers can all influence performance, and the application

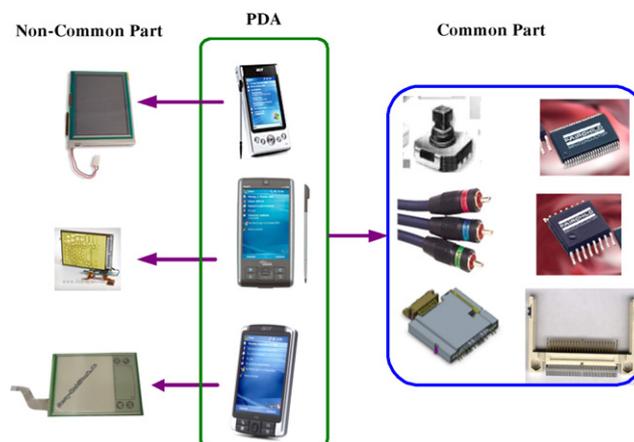


Fig. 1. Schema of multi-product with common and non-common parts.

متن کامل مقاله

دریافت فوری ←

ISIArticles

مرجع مقالات تخصصی ایران

- ✓ امکان دانلود نسخه تمام متن مقالات انگلیسی
- ✓ امکان دانلود نسخه ترجمه شده مقالات
- ✓ پذیرش سفارش ترجمه تخصصی
- ✓ امکان جستجو در آرشیو جامعی از صدها موضوع و هزاران مقاله
- ✓ امکان دانلود رایگان ۲ صفحه اول هر مقاله
- ✓ امکان پرداخت اینترنتی با کلیه کارت های عضو شتاب
- ✓ دانلود فوری مقاله پس از پرداخت آنلاین
- ✓ پشتیبانی کامل خرید با بهره مندی از سیستم هوشمند رهگیری سفارشات