



ELSEVIER

Available online at [www.sciencedirect.com](http://www.sciencedirect.com)

SCIENCE @ DIRECT®

Mathematical and Computer Modelling 43 (2006) 158–169

MATHEMATICAL  
AND  
COMPUTER  
MODELLING

[www.elsevier.com/locate/mcm](http://www.elsevier.com/locate/mcm)

# Application of a quantification SWOT analytical method

Hsu-Hsi Chang\*, Wen-Chih Huang

*Department of Harbor and River Engineering, National Taiwan Ocean University, Keelung, Taiwan, ROC*

Received 6 May 2005; received in revised form 5 August 2005; accepted 9 August 2005

---

## Abstract

In this paper we present a Quantified SWOT (Strengths, Weaknesses, Opportunities and Threats) analytical method which provides more detailed and quantified data for SWOT analysis. The Quantified SWOT analytical method adopts the concept of Multiple-Attribute Decision Making (MADM), which uses a multi-layer scheme to simplify complicated problems, and thus is able to perform SWOT analysis on several enterprises simultaneously. Container ports in East Asia are taken as a case study in this paper. Quantified SWOT analysis is used to assess the competing strength of each port and then suggest an adoptable competing strategy for each.

© 2005 Elsevier Ltd. All rights reserved.

*Keywords:* Quantified SWOT (Strengths, Weaknesses, Opportunities and Threats); Multiple-Attribute Decision Making (MADM); Container ports; East Asia; Competing strategy

---

## 1. Introduction

Strategic management has been widely used by all enterprises to withstand fierce market competition. The strategic management process consists of three stages: strategy formulation, strategy implementation, and strategy evaluation [1]. SWOT analysis of external opportunities and threats as well as the internal strengths and weaknesses of the enterprises is important for strategy formulation and development.

The purpose of the analysis of external opportunities and threats is to evaluate whether an enterprise can seize opportunities and avoid threats when facing an uncontrollable external environment, such as fluctuating prices, political destabilization, social transition, change in the rule of law, etc. The purpose of the analysis of internal strengths and weaknesses is to evaluate how an enterprise carries out its internal work, such as management, work efficiency, research and development, etc.

If used correctly, SWOT can provide a good basis for successful strategy formulation. A review of past documents on SWOT analysis reveals that most presented a literal description of the analysis and few conducted quantified analysis. As planning processes are often complicated by numerous criteria and interdependencies, it may be that utilization of SWOT is insufficient. A study by Hill and Westbrook [2] found that none of the 20 case companies prioritized individual SWOT factors, one grouped factors further into subcategories, and only three companies used

---

\* Corresponding address: China Engineering Consultants, Inc., Department of Harbor and Coastal Engineering, 26FL, 185 Hsinhai Road, Sec. 2, 10637 Taipei, Taiwan, ROC.

*E-mail address:* [sschang@ceci.org.tw](mailto:sschang@ceci.org.tw) (H.-H. Chang).

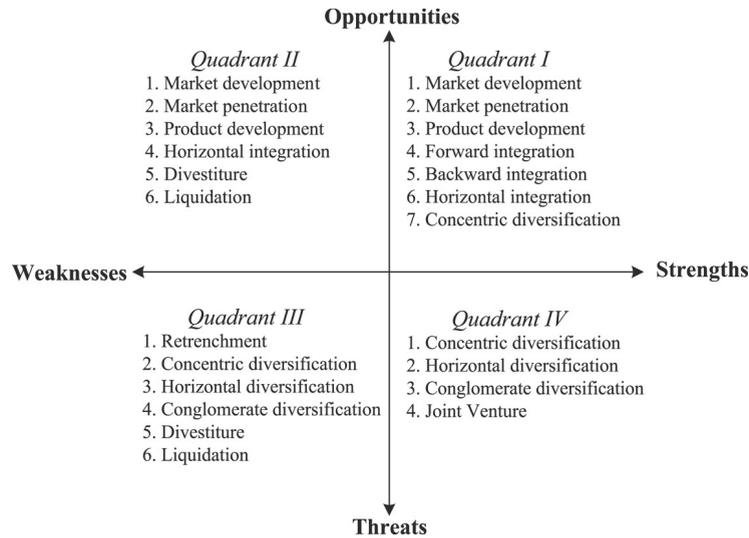


Fig. 1. Quantified SWOT analysis and the strategic matrix. (Source: adapted from Christensen et al. [5].)

SWOT analysis as an input for a new mission statement. In addition, the expression of individual factors was of a very general nature and brief. Thus, it can be concluded that the result of SWOT analysis is too often only a superficial and imprecise listing or an incomplete qualitative examination of internal and external factors [3].

Some related documents have put forward methods of quantified analysis, such as the following methods generalized by David [1]: the External Factor Evaluation Matrix (EFE), Internal Factor Evaluation Matrix (IFE) and Competitive Profile Matrix (CPM) methods. However, the following shortcomings are inevitable: (1) all the key factors' scores are measured subjectively (e.g., 1–4 points), so objective and quantified data (such as business volume) is lacking; (2) non-uniformity may occur when answering the same question because the key factors' weights are scored subjectively by the evaluation group without a consistency test. Thus, Kurttila et al. [3] and Stewart et al. [4] combined the Analytic Hierarchy Process (AHP) with SWOT to provide a new hybrid method for improving the usability of SWOT analysis. Although a consistency test is used to ensure the weights are scored objectively by the evaluation group, carrying out SWOT analysis comparison on several enterprises simultaneously is difficult.

Quantified SWOT in this study not only improves the above methods, but also develops them on the basis of the Grand Strategy Matrix (GSM) [5]. Just as in the GSM, the enterprises are parked in the four quadrants of the coordinate according to their categories (as shown in Fig. 1). However, there is a reversal in that the ordinate stands for the external environment (opportunities, threats) while the abscissa stands for the internal environment (strengths, weaknesses). The meaning of the four quadrants is as follows:

The first quadrant stands for the enterprises' strengths and market opportunities. Enterprises in this quadrant can use their strengths to adopt strategies, such as market penetration, market development, and product development to form competitive strength. If the enterprise in the first quadrant has extra resources, forward, backward and horizontal integration may be efficient strategies.

Enterprises in the second quadrant are those with market developing opportunities but on the weak side of competition. The most urgent issue is to improve their weakness to intensify competitive strength. If they lack unique competence, they may consider intensifying their competitive strength through joint venture or horizontal merger strategies.

Enterprises in the third quadrant are of low competitive strength and facing threats from other competitors. Defensive strategies, such as focusing on the most favored markets, can be adopted to avoid threats. Divestiture or liquidation should be adopted if these strategies fail.

Enterprises in the fourth quadrant are those possessing competition strength but facing greater threats than opportunities. Diversification or joint venture strategies should be adopted to reduce threats.

By Quantified SWOT analysis and revealing of the coordinates, enterprises can not only realize their position in the competition but also have a reference for developing strategies. But only by the quantified comparison method

متن کامل مقاله

دریافت فوری ←

**ISI**Articles

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