

# The development of a hybrid intelligent system for developing marketing strategy

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## Abstract

In this paper, the development of a hybrid intelligent system for developing marketing strategy is described. The hybrid system has been developed to: provide a logical process for strategic analysis; support group assessment of strategic marketing factors; help the coupling of strategic analysis with managerial intuition and judgement; help managers deal with uncertainty and fuzziness; and produce intelligent advice on setting marketing strategy. In this system, the strengths of expert systems, fuzzy logic and artificial neural networks (ANNs) are combined to support the process of marketing strategy development. Moreover, the advantages of Porter's five forces model and the directional policy matrices (DPM) are also integrated to assist strategic analysis. In the paper, the software architecture of the hybrid system is discussed in details. Particularly, the group assessment support module, the fuzzification of strategic factors, and the fuzzy reasoning for setting marketing strategy are addressed. In addition, the empirical field work on evaluating the hybrid system is also summarised. The empirical evidence indicates that the hybrid intelligent system is helpful and useful in supporting the development of marketing strategy. © 2000 Elsevier Science B.V. All rights reserved.

*Keywords:* Marketing strategy development; Hybrid intelligent systems; Decision support systems; Expert systems; Fuzzy logic; Artificial neural networks

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## 1. Introduction

Marketing strategy is the means by which the marketing objectives will be achieved [40]. In recent years, the use of computer-based information systems in the field of strategic marketing has been increasingly highlighted. Researchers have attempted

at developing effective information systems in support of marketing strategy development. Decision support systems (DSSs) have been developed to support strategic marketing decisions (e.g., [6,35,37,64,66,67]). Pioneering research has been conducted to apply expert systems in strategic marketing planning [3,7,12–14,34,38,41,42,44,62–64]. Fuzzy logic has been used to model market entry decisions [27]. Pioneering work has also been undertaken by Carlsson [11] to combine fuzzy logic and hyperknowledge in support of effective strategy formation. A support system for strategic management,

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called *Woodstrat* [14], has been implemented successfully in Finnish forest and wood industries. Carlsson's work [11,14] on developing the hyperknowledge system was based upon the idea and theory of creating hyperknowledge environments coined by Chang et al. [68,69]. Recently, artificial neural networks (ANNs) have also been harnessed to aid the process of strategic marketing decisions [22,26,52,58]. More recently, efforts have been made to build hybrid systems to assist marketing strategy formulation [11,18,70]. Researchers have also developed a hybrid artificial intelligence approach to the implementation of trading strategy [60].

A framework for a hybrid intelligent system in support of marketing strategy development has been proposed by Li [29] and Li et al. [31], with five objectives: to help strategic analysis; to couple strategic analysis with managers' judgement; to integrate the strengths of diverse support techniques and technologies; to combine the benefits of different strategic analysis models; and to help strategic thinking. The proposed framework provides a pragmatic conceptual framework for the development of computer-based support for marketing strategy formulation and strategic marketing planning. This paper describes the development of a hybrid intelligent system for developing marketing strategy. In the following sections, the background for building a hybrid intelligent system for marketing strategy development is briefly discussed. The software architecture of the hybrid intelligent system is presented in detail. Particularly, the group assessment support, the fuzzification of marketing strategy factors and the fuzzy reasoning for setting marketing strategy are addressed. Moreover, other associated technical details are also examined. In addition, the findings of the field work on evaluating the system are also summarised. Conclusions are drawn and intended future research is outlined in Section 14.

## 2. Current provision of computer-based support for developing marketing strategy

Even with the pioneering efforts in the past, most computer applications in the marketing domain are routine and operational rather than strategic [64].

Existing information systems are still rather limited in their support abilities [5]. Most reported systems for strategic marketing planning are either prototype or experimental [18]. Current information systems, in most instances, are still at early stages of development [47], exhibiting a lack of success and a disappointing degree of satisfaction in support of marketing strategy development [29,32].

A mail questionnaire survey was undertaken by Li [29] and Li et al. [32] in autumn 1997, in 900 large companies in the UK, to explore managerial requirements for computer-based support and current status of information systems in support of marketing strategy development. According to the responses from the 104 marketing directors and managing directors of these companies, 86 companies reported currently using computer-based systems to support the development of marketing strategy. Of the 86 companies, the most common computer-based support is provided by database systems (91.7%) and spreadsheets (90.5%). Nearly half (48.8%) of the 86 companies reported currently using marketing information systems. Moreover, executive information systems (25%) and DSSs (15.5%) have also been reasonably used. But only 6% of the 86 companies reported currently using expert systems in support of marketing strategy development.

Moreover, according to the 86 British companies, most systems fail to provide even *moderate* help for the following five types of requirements: help couple strategic analysis with managerial judgement; provide strategic analysis assistance; help strategic thinking; cope with uncertainty and fuzziness; and help understand the factors that affect marketing strategy development. This lack of success has led to the fact that the greater number (55%) of the responding managers in the 86 companies are dissatisfied or very dissatisfied with the computer-based systems currently used in developing marketing strategy. Thirty-six percent of the respondents moderately satisfied. Only 9% of the respondents are satisfied, and nobody is very satisfied. It is also found that the four principal factors leading to managers' dissatisfaction include: the individual system used is limited in support capabilities (54.3%); the systems cannot couple strategic analysis with managerial judgement (53.6%); the particular strategy analysis models employed are limited in function

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