



Computer-based support for marketing strategy development

Computer-based support

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Abstract *Reports on an investigation of computer-based support for developing marketing strategy. First, on the basis of a literature study, the nature of marketing strategy development is clarified. The needs for computer-based support are identified. The status and underlying problems of existing computer-based information systems for developing marketing strategy are then examined. Finally, a mail questionnaire survey on computer-based support for developing marketing strategy is discussed. The major issues addressed in the survey were: managers' needs for computer-based support in developing marketing strategy; the current provision of computer-based information systems; and the gaps between the identified needs and current provision. It is believed that this was the first study to use a large-scale questionnaire survey to explore these issues. The findings provide important evidence and implications for both researchers and designers of computer-based support for marketing strategy development.*

Introduction

Sound and robust marketing strategy is essential to the survival and success of any business in the increasingly complex, hostile and competitive environment in which companies operate (McDonald, 1996; Creveling, 1994). Nevertheless, developing a sound and timely marketing strategy is not an easy task. Many companies are experiencing difficulties with strategic marketing planning. There are a number of barriers to effective marketing strategy development (McDonald, 1992b). In order to help managers formulate good marketing strategy, computer-based information systems have been applied to support the process of marketing strategy development and strategic marketing planning in different ways. However, such efforts as have been made still exhibit a disappointing degree of success. Current information systems developed for this purpose are still in the embryonic phase.

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This paper deals with computer-based support for developing marketing strategy. The opening section of the paper examines the nature of marketing strategy development, and this leads to a consideration of the needs for computer-based support in developing marketing strategy. The next section outlines the status and underlying problems of existing computer-based information systems for developing marketing strategy according to the literature. There follows an account of a questionnaire survey on managers' perceived needs for computer support, current provision of computer-based information systems, and the gaps between the needs and current provision. The final section presents the conclusions of the paper and an outline of related work.

The nature of marketing strategy development

Marketing strategy has been a major focus of academic research since the 1980s (Schnaars, 1991). There are many definitions of marketing strategy in the marketing literature, reflecting differing points of view. However, most of the definitions agree that marketing strategy provides the means of utilising the company's skills and resources to achieve marketing objectives. Generally, marketing strategy is concerned with the four major elements of the marketing mix: product, price, place and promotion (Morris and Pitt, 1993; Kotler, 1991; Wind and Robertson, 1983; Day, 1984; McDonald, 1996; Fifield, 1992; Hooley *et al.*, 1992; Varadarajan and Clark, 1994). Essentially, marketing strategy evolves as a consequence of an interplay of four major strategic inputs and the processes which act on them. The inputs are related to the company's customers, its competition, its resources and environmental forces. The task of marketing strategy formulation involves determining the strength, direction and interaction of these strategic forces in a given situation (Jain and Punj, 1987). The purpose of marketing strategy development is to establish, build, defend and maintain competitive advantage (McDonald, 1992a).

Many academic researchers conceive the formulation of strategy as a formalised, analytical process. Porter (1979, 1987, 1980a, 1980b) suggests a set of analytical techniques for developing strategy with strong emphasis on strategic thinking. Day (1984), Aaker (1984), Brownlie (1985), McDonald (1989b, 1992a, 1996) and Brooksbank (1990) individually emphasise step-by-step systematic processes for strategic marketing planning. Cravens (1988) states that if a manager follows a logical sequence of analyses and decisions, corporate and marketing management will be better able to select winning strategy. However, arguments have been presented that the strategy making process must emphasise line managers' intuition and judgement, for it is line managers who are responsible for implementing strategy, and it is they who are closest to the markets concerned (Mintzberg, 1994a, 1994c). Managerial judgement is essential in dealing with ambiguity and uncertainty in strategic marketing (Brownlie and Spender, 1995). While researchers cannot seem to agree on a single, best approach, managers have to get on with planning as best as they can, using a combination of experience, intuition and hope (McDonald,

1992a). Mintzberg (1976, 1994b, 1994c) points out that the value of both intuition and analysis should be respected in the process of strategy making. The final choice is often the result of strategic analysis and management's intuitive sense of the strategic fit of the various strategies under consideration (Cravens, 1988). Generally speaking, marketing strategy development has the following characteristics (Li, 1998):

- It is particularly concerned with devising the means by which the company can effectively differentiate itself from its competition, by capitalising on its strengths to provide better value to its customers over time (Jain and Punj, 1987).
- It is a complex process that usually involves complex decision-making activities by managers, and requires both comprehensive analysis of changing environments and a synthesis of useful information (Mintzberg, 1994a, 1994c).
- It requires a wide range of relevant strategic information (Mintzberg, 1994c; Taylor *et al.*, 1992).
- It is domain knowledge intensive (McDonald and Wilson, 1990; Dubelaar *et al.*, 1991).
- It involves a high degree of uncertainty and ambiguity (Brownlie and Spender, 1995).
- It involves managers' experience, intuition and judgement (Little, 1970; Mintzberg, 1976, 1994a, 1994c; Brownlie and Spender, 1995; McIntyre, 1982; Alpar, 1991).

The needs for computer support in developing marketing strategy

Arriving at a sound and timely marketing strategy is not a easy task. Because of bitter competition, uncertainty, high stakes, and the complexity and fast pace of change in the environment, strategic marketing planning presents a real challenge to managers. There are many barriers preventing managers from developing an effective strategic marketing plan (McDonald, 1992b). Many external and internal factors interact in a bafflingly complex way to affect the manager's ability to achieve successful marketing (McDonald, 1989b, 1996). The question must be asked, therefore: "what are managers' needs for computer-based support?" As strategy makers, managers possess many unique strengths (Mintzberg, 1994c). First, they have the authority to make strategy. Secondly, they hold, and have the connections needed to acquire, critical "soft" information (Mintzberg, 1994a, 1994b). Thirdly, they have the flexibility to respond to strategic issues directly, and in a dynamic way. Finally, and perhaps most importantly, managers have experience, intuition and judgement about markets. As strategy makers, managers may, of course, have some weaknesses (Mintzberg, 1994a, 1994b, 1994c): their information processing abilities are constrained by cognitive capacity; their domain knowledge is limited by experience and background; many will lack the analytical skills to

undertake systematic strategic analysis; it is well recognised that busy managers usually lack time to focus intensively and at length upon strategic issues. Further, the assumption that judgement is a manager's greatest asset must be considered. Intuition and judgement require intimate knowledge of the domain, and this may take many years to develop; it can be limited by narrow experience and constrained by culture and tradition. Not all managers will have good intuition and judgement (Li, 1998).

Although effective managers can think intuitively about various strategic dimensions, managers' ability to understand the relationships is ultimately limited without support tools that can help them examine these relationships interactively (Fredericks and Venkatraman, 1988). It is evident that managers need a wide range of relevant strategic information, domain knowledge, and assistance with systematic strategic analysis to overcome their inherent limitations in the process of developing strategy. It is also believed that these needs can be met, to a great extent, by suitable uses of effective computer-based systems (Wilson and McDonald, 1994; Frolick *et al.*, 1997). Information systems have demonstrated the ability to gather, filter, and analyse data and subsequently communicate information (Frolick *et al.*, 1997). Appropriate computer-based systems can help managers learn about strategic concepts, facilitate strategic thinking, and, in some instances, can be used to validate their strategies (Belardo *et al.*, 1994; Li, 1998).

Existing computer-based information systems for developing marketing strategy

For the purpose of this study, a computer-based information system is defined as a system for the gathering, storage, processing and communication of information (Molloy and Schwenk, 1995) in direct support of marketing strategy development or strategic marketing planning. The relevant computer-based information systems concerned in the study include database systems, spreadsheets, marketing information systems, executive information systems, decision support systems, artificial neural networks, fuzzy logic and other computer-based information systems. In addition, in this study, computer-based support is defined as the use or application of computer-based information systems in direct support of marketing strategy development or strategic marketing planning (Li, 1998).

The importance of computers in marketing was first highlighted by Kotler (1966). In recent years, effort has been devoted to the introduction of computer-based information systems to improve the effectiveness and efficiency of marketing decision making. Surveys (Higgins and Opdebeek, 1984; Morris *et al.*, 1989; Hirst, 1991a, 1991b; Higby and Farah, 1991) reveal that the computer-based systems most widely used in marketing functions are general IT tools such as spreadsheets, graphics packages, word processing, electronic mail, database systems and statistics packages. Existing computer-based support

for strategic marketing planning and strategy formulation is in the main restricted to the provision of relevant information from operational systems (Wilson and McDonald, 1994).

A marketing information system (MkIS) is an essential tool for translating raw data to useful information (O'Brien *et al.*, 1995). The first definition of marketing information systems was presented by Cox and Good (1967). Conventionally, a MkIS was seen as a set of procedures and methods for the regular planned analysis and presentation of information for use in making marketing decisions. During the past decades, many authors have presented models for MkIS (e.g. Kotler, 1991; Proctor, 1991; Li *et al.*, 1993). According to a study conducted by McLeod and Rogers (1985), over three-quarters of the *Fortune* 1,000 firms utilise marketing information systems for decision making. However, these systems do little more than process information mechanically and presumably at considerable expense (Bessen, 1993). The large volumes of information presented by such systems do not serve management needs well (Amaravadi *et al.*, 1995).

Decision support systems (DSSs) are interactive computer-based information systems designed to help decision making by utilising data and models to solve unstructured problems (Sprague and Carlson, 1982; Turban, 1995). A marketing DSS is a co-ordinated collection of data, systems, tools, and techniques with supporting software and hardware by which an organisation gathers and interprets relevant information from business and environments and turns it into a basis for marketing action (Little, 1979). Marketing DSSs have been developed to assist with strategic marketing decision making (Arinze, 1990; Wilson and McDonald, 1994; Choffray and Lilien, 1986; Green *et al.*, 1983; Moormann and Lochte-Holtgreven, 1993). In addition to DSSs, executive information systems (EISs) have also been introduced to support the decision making of senior management (Watson *et al.*, 1991; Cottrell and Rapley, 1991). An executive information system is a data retrieval and information handling system developed specifically for the executive (Molloy and Schwenk, 1995; Watson *et al.*, 1991; Turban, 1995). Occasionally there are business models in the system, which enable executives to explore "What if?" decision making options (Cottrell and Rapley, 1991). In general, however, these systems are as yet little used successfully to support strategic planning (Wilson and McDonald, 1994). Although DSSs have been shown to be valuable in the achievement of competitive advantage, many companies have been disappointed. The systems so far developed in support of marketing decision making are limited in their managerial support capabilities (Amaravadi *et al.*, 1995). Further, even with the significant technological advances of the past decade, research has found that many current systems are still in rudimentary stages of development (O'Brien *et al.*, 1995). A major limitation of conventional DSSs is that they rely on limited quantitative models and cannot handle situations where complete information is not available (Amaravadi *et al.*, 1995). Neither EISs or conventional DSSs are very applicable to the many cases where

managers make decisions based largely upon their own beliefs, experience and expertise, rather than using complete data, information and quantitative models.

Strategy development needs much expert judgement and extensive domain knowledge (McDonald and Wilson, 1990; Dubelaar *et al.*, 1991). Since expert systems (ESs) can embody organised domain knowledge and can perform as skilful and cost-effective experts to generate reasoned advice or instructions (Moutinho *et al.*, 1993; McDonald, 1989a), they may have a role to play in developing strategy. For some years, ESs have been developed to support managers in conducting strategic marketing (Alpar, 1991; McIvor *et al.*, 1992; Moutinho *et al.*, 1993; Curry *et al.*, 1992; Borch and Hartvigsen, 1991; McDonald and Wilson, 1990; Carlsson and Walden, 1996). However, almost all of the reported expert systems in the domain of strategic marketing are either prototype or experimental (Duan and Burrell, 1995; Dubelaar *et al.*, 1991). Progress towards applying expert systems to this field has been slow (McDonald and Wilson, 1990), and it seems probable that such systems are likely always to be severely limited in capability and application (Duan and Burrell, 1995). An ES is restricted to a structured and narrow domain, and only well-defined situations can be modelled. In addition, a conventional ES cannot learn from or adapt to environmental changes (Goonatilake, 1995; Goonatilake and Khebbal, 1995; Medsker, 1994; Osyk and Vijayaraman, 1995).

More recently, with the emergence of artificial neural networks (ANNs), some research has been carried out to try to apply ANNs to the analysis of market share using the PIMS database (Poh, 1994). ANNs are distributed information-processing systems typically composed of computational elements interacting across weighted connections (Hinton, 1992; Venugopal and Baets, 1994). ANNs have salient features that are important in modelling and forecasting non-linear systems; they are seen to have advantages over current statistical methods. They have proven to be particularly successful in forecasting, and learning patterns from noisy or incomplete data where experts are unavailable or where clear rules cannot be easily formulated. A main limitation of ANNs, however, is that they lack explanation capabilities. They are thus not suitable for applications where explanation of reasoning is critical (Goonatilake, 1995; Goonatilake and Khebbal, 1995; Medsker, 1994; Osyk and Vijayaraman, 1995).

Fuzzy logic (Zadeh, 1988) is another technique which is designed to deal with imprecise "linguistic" concepts or fuzzy terms. It aims at modelling the imprecise modes of reasoning that play an essential role in the remarkable human ability to make rational decisions in an environment of uncertainty and imprecision (Zadeh, 1988). Systems based on fuzzy logic allow users to provide input in imprecise terms and receive either fuzzy or precise advice. In recent years, fuzzy logic has been applied to address semi-structural and fuzzy issues in developing customer-oriented decision support systems (Levin *et al.*, 1995). Researchers have also utilised fuzzy logic to handle imprecision, such as ambiguous facts, subjective analyses, and imperfect decision rules in modelling

the market entry decision (Levy and Yoon, 1995). Potential limitations of fuzzy logic are that the membership functions and rules have to be specified manually. Further, fuzzy systems cannot adapt automatically to changes in the environment (Goonatilake, 1995; Goonatilake and Khebbal, 1995; Medsker, 1994).

The strengths and weaknesses of different types of computer-based systems for developing marketing strategy are summarised in Table I.

In recognition that each of the range of techniques has its own strengths and limitations, efforts have been made to build a hybrid system that integrates the advantages of a DSS and an ES, in order to enhance the ability to aid strategic marketing planning (Duan and Burrell, 1995). The research is, however, limited to the integration of an ES and the Analytic Hierarchy Process approach (Saaty, 1980) and the development of a prototype demonstration system. A more detailed literature review on existing computer-based information systems for developing marketing strategy can be found in Li (1998).

In general, attempts to apply computers to aid decision-making in strategic marketing have not met with much success so far. The focus has been more upon information systems that provide routine and operational functions to

| Type of system | Function | Strength(s) | Weakness(es) |
|-------------------------------------|---|---|--|
| Marketing Information System (MkIS) | Regular planned analysis and presentation of information | Widespread, therefore familiar; information mainly about the past | "Mechanical"; expensive; can result in information overload |
| Decision Support System (DSS) | Providing data and models to support unstructured problem solving | Can explore many options quickly; calculates quantitative decisions | Mainly quantitative; cannot handle missing data or situations requiring expertise and experience |
| Executive Information System (EIS) | Data retrieval, information handling, and business models for senior executives | Information handling and presentation; specifically aimed at senior management; easy to use | As for DSS, but these weaknesses are more severe for executive decisions |
| Expert System (ES) | Making/advising on decisions in a specific domain | Can share expertise of others; enables consistent decision-making | Only works within very narrow, well structured domain; human expert(s) needed for system to be built |
| Artificial Neural Network (ANN) | Forecasting; recognising patterns in data | Can cope with noisy or incomplete data | No explanation facilities |
| Fuzzy Logic | Making/advising on decisions in a specific domain | Can use imprecise input; output may be either fuzzy or precise | Membership functions and rules specified manually, therefore slow; still experimental |

Table I.
Different types of computer-based systems for developing marketing strategy

support marketing activities (Wilson and McDonald, 1994). The support abilities of current information systems are still rather limited (Amaravadi *et al.*, 1995). O'Brien *et al.* (1995) suggest that such systems as do exist are in an early stage of development.

Li (1998) argues that a primary reason for the lack of success in developing computer-based decision support is the complexity of marketing strategy development problems. The process of decision making is not fully understood. It commonly involves much uncertainty, and relies heavily upon the experience, knowledge and judgement of the decision maker. Further, strategic marketing decisions usually have to be made quickly because of rapid change in the external environment, and often on the basis of limited and incomplete data (McDonald, 1996).

There is also a suggestion (Li, 1998; Li *et al.*, 1998) that a preponderance of researchers from systems backgrounds (rather than with a deep knowledge of marketing) has resulted in a tendency to emphasise the technology and its capabilities at the expense of a good match with the real needs of decision-making managers. The critical importance of capturing managerial judgement in making strategic decisions has not always been recognised. Nor have the systems allowed capitalisation upon the strengths of individual decision makers and the minimisation of their weaknesses (Hoch and Schkade, 1996; Mintzberg, 1994a, 1994c).

In much of the previous reported work in this domain, attempts have been made to apply a specific technique or technology (such as MkISs, DSSs, ESs, ANNs or fuzzy logic) to the problems of marketing strategy formulation. It is unlikely to be the case, however, that a single technique or technology will be suitable for each of the wide range of complex problems inherent in strategy formulation, or appropriate to each of the many different organisations engaged in the process. The strengths and weaknesses of individual support techniques and technologies render them effective in some circumstances, less so in others. A single support technique often fails precisely to fit the decision-making parameters, and to meet the wide range of information, modelling and conceptual needs of marketing strategy development (Li, 1998; Goonatilake and Khebbal, 1995).

It is suggested that it would also be meaningful to embody a variety of marketing strategic analysis models (such as Porter's five forces model and the directional policy matrix) in one support system. Each model has its peculiarities and may not readily adapt to specific circumstances; it has advantages and disadvantages that vary depending upon context (McDonald, 1992a; Li, 1998). Computer support has the potential benefit of aiding the decision maker to combine the range of strategic analysis models, or choose the most appropriate one for his or her purpose.

Finally, previous support systems seem to have done very little in helping managers deal with uncertainty and ambiguity in developing marketing strategy. If the problem of handling fuzziness and uncertainty in strategy formulation can be overcome, there is likely to be considerable benefit (Li, 1998).

The mail questionnaire survey

The mail questionnaire is an impersonal survey method. It has such advantages as low cost of data collection, less interviewer bias, a high degree of anonymity, and wide access to geographically dispersed samples. In order to strengthen and extend the findings gained from the literature study, a large-scale mail questionnaire survey was conducted by Li (1998) to explore the following key issues:

- Managers' needs for computer-based support in developing marketing strategy.
- Current provision of computer-based information systems for developing marketing strategy.
- The gaps between managers' needs and current provision of computer-based systems.

It is believed that this was the first study to use a large-scale questionnaire survey to explore the above issues in large manufacturing companies in the United Kingdom. The manufacturing industry was selected because of its importance to the national economy, and its direct concern with products and markets. The questionnaire used consisted of three major parts, with 31 questions in all. The first set of 14 questions asked about managers' potential needs for computer-based support in the process of developing marketing strategy. In this part, the nature of marketing strategy development, managers' difficulties in developing marketing strategy, and managers' perceived needs for computer-based support were investigated. The second section comprised 13 questions. These were used to explore the gaps between managers' perceived needs and the current provision of computer-based systems. In particular, some factors contributing to managers' dissatisfaction and the factors holding companies back from using (or making further use of) computer-based systems were explored. The third component of the questionnaire was designed to establish which companies would be interested in evaluating a prototype of a hybrid intelligent support system.

Methodology and responses

The questionnaire sample consisted of manufacturing companies geographically located in the United Kingdom. These manufacturing companies are principally involved in the manufacture and sale of industrial goods. Only companies with more than 500 employees were included. Companies not providing employee numbers or turnover are excluded. A total of 900 companies were randomly selected from the FAME (Financial Analysis Made Easy) CD-ROM database. The characteristics of the population of British manufacturing companies with more than 500 employees are shown in Table II. The stratified sample composition of the 900 selected sample companies is given in Table III.

Table II.
Characteristics of the
population of UK
manufacturing
companies with more
than 500 employees

| Number of employees Range | Number of companies | Percentage |
|------------------------------|---------------------|------------|
| 500 to 1000 | 739 | 48.0 |
| 1001 to 2000 | 410 | 26.6 |
| 2001 to 3000 | 143 | 9.3 |
| 3001 to 5000 | 119 | 7.7 |
| Over 5000 | 129 | 8.4 |
| Total sample | 1540 | 100 |
| <i>Turnover</i> | | |
| <i>Range (£m)</i> | | |
| Under 10 | 11 | 0.7 |
| 10.001 to 20 | 32 | 2.1 |
| 20.001 to 20 | 338 | 22.0 |
| 50.001 to 100 | 427 | 27.7 |
| Over 100 | 732 | 47.5 |
| Total sample | 1540 | 100 |

Note: Companies not providing employee number or turnover are excluded

Table III.
Sample composition of
the 900 randomly
selected companies

| Number of employees Range | Number of companies | Percentage |
|------------------------------|---------------------|------------|
| 500 to 1000 | 297 | 33 |
| 1001 to 2000 | 297 | 33 |
| 2001 to 3000 | 108 | 12 |
| 3001 to 5000 | 99 | 11 |
| Over 5000 | 99 | 11 |
| Total sample | 900 | 100 |
| <i>Turnover</i> | | |
| <i>Range (£m)</i> | | |
| Under 10 | 9 | 1.0 |
| 10.001 to 20 | 12 | 1.3 |
| 20.001 to 50 | 140 | 15.6 |
| 50.001 to 100 | 235 | 26.1 |
| Over 100 | 504 | 56.0 |
| Total sample | 900 | 100 |

During the Autumn of 1997, a questionnaire survey package was mailed to the marketing director of each company (or managing director if the name of marketing director was not available). The package consisted of a covering letter, the questionnaire and a prepaid envelope for return mailing. A follow-up procedure was employed after a four week period. A total of 104 usable responses were received, which gave a usable response rate of 11.5 per cent. The characteristics of the 104 respondent companies are shown in Table IV. The low response rate can probably be ascribed to two main reasons. First,

| Number of employees Range | Number of companies | Percentage |
|------------------------------|---------------------|------------|
| 500 to 1000 | 49 | 47.0 |
| 1001 to 2000 | 28 | 27.0 |
| 2001 to 3000 | 12 | 11.6 |
| 3001 to 5000 | 8 | 7.7 |
| Over 5000 | 7 | 6.7 |
| Total sample | 104 | 100 |
| <i>Turnover</i> | | |
| <i>Range (£m)</i> | | |
| Under 10 | 2 | 1.9 |
| 10.001 to 20 | 2 | 1.9 |
| 20.001 to 50 | 16 | 15.4 |
| 50.001 to 100 | 30 | 28.9 |
| Over 100 | 54 | 51.9 |
| Total sample | 104 | 100 |

Table IV.
Characteristics of the
104 respondent
companies

many companies now have a policy of not taking part in any surveys; 24 companies replied to that effect here. Secondly, the questionnaire was long (31 questions) and needed to be answered by a senior member of the organisation. However, as the survey was conducted to strengthen and extend the authors' literature review findings, the total of 104 usable responses was felt to be sufficient.

Statistical comparisons have been made to test the differences in some characteristics between the 900 sample companies and the population of manufacturing companies with more than 500 employees. T-tests have also been conducted to compare the characteristics of the 104 respondent companies with the population. The t-test results are given in Tables V, VI, VII and VIII. It can be seen from Table V that there is a significant difference in the average number of employees between the 900 selected sample companies and the population of manufacturing companies with more than 500 employees. Table VI shows that there is also a difference in the average turnover between the 900 chosen companies and the population. These differences may be mainly due to

| | <i>n</i> | Mean | <i>t</i> | df | Sig. (2-tailed) | Mean difference | 95% confidence interval of the difference | |
|---------------------|----------|---------|----------|-----|--------------------|--------------------|--|---------|
| | | | | | | | Lower | Upper |
| No. of employees | 900 | 3704.17 | 3.264 | 899 | 0.001 | 944.47 | 376.65 | 1512.30 |

Notes: Alpha = 0.05. Test value = 2759 (The average number of employees of the population of manufacturing companies with more than 500 employees)

Table V.
Comparison of the
average number of
employees of the 900
sample companies with
that of the whole
population

the fact that more larger companies were sampled in the survey. Some differences will also be noticed in Tables II and III. However, it can be seen from Table VII that the average number of employees of the 104 respondent companies is *not* significantly different from that of the population. Moreover, Table VIII indicates that the average turnover of the 104 respondent companies is also *not* significantly different from the mean of the population. Therefore, according to these t-test results, it is evident that the 104 respondent companies are representative of large manufacturing companies in the UK. Nevertheless, because of the low response rate, care is still needed in generalising the survey findings to the population of large British manufacturing companies. The results reported here are exploratory and tentative.

Table VI.
Comparison of the average turnover of the 900 sample companies with that of the population

| | <i>n</i> | Mean | <i>t</i> | df | Sig. (2-tailed) | Mean difference | 95% confidence interval of the difference | |
|----------|----------|--------|----------|-----|--------------------|--------------------|--|----------|
| | | | | | | | Lower | Upper |
| Turnover | 900 | 404418 | 3.210 | 899 | 0.001 | 103516.8 | 40218.2 | 166815.0 |

Notes: Alpha = 0.05. Figures are expressed in thousands of £s. Test value = 300901.01 (The average turnover of the population of manufacturing companies with more than 500 employees)

Table VII.
Comparison of the average number of employees of the 104 respondent companies with that of the population

| | <i>n</i> | Mean | <i>t</i> | df | Sig. (2-tailed) | Mean difference | 95% confidence interval of the difference | |
|------------------|----------|---------|----------|-----|--------------------|--------------------|--|--------|
| | | | | | | | Lower | Upper |
| No. of employees | 104 | 2422.76 | -0.592 | 103 | 0.555 | -336.93 | -1465.75 | 791.88 |

Notes: Alpha = 0.05. Test value = 2759 (The average number of employees of the population of the manufacturing companies with more than 500 employees)

Table VIII.
Comparison of the average turnover of the 104 respondent companies with that of the population

| | <i>n</i> | Mean | <i>t</i> | df | Sig. (2-tailed) | Mean difference | 95% Confidence interval of the difference | |
|----------|----------|--------|----------|-----|--------------------|--------------------|--|-----------|
| | | | | | | | Lower | Upper |
| Turnover | 104 | 363454 | 0.661 | 103 | 0.510 | 62552.61 | -125176.00 | 250282.00 |

Notes: Alpha = 0.05. Figures are expressed in thousands of £s. Test value = 300901.01 (The average turnover of the population of the manufacturing companies with more than 500 employees)

The content and reliability of the questionnaire survey were validated according to guidelines given by Straub (1989) and Yoon *et al.* (1995). Most of the questionnaire measurement items were derived from the relevant literature and have been previously used. Before the first mailing, the questionnaire was reviewed and validated by several experienced researchers. Based on the 104 usable replies, the internal consistency reliability coefficients were also computed. The calculated Cronbach's Alpha values for the constructs (and alphas if individual items are deleted) are given in Tables X, XI and XV, respectively, in the following section. As shown in these Tables, the internal consistency reliability coefficients (alpha) are all well above the level acceptable for exploratory studies (Nunally, 1978). In addition, in order to check for late response bias, the means of the major measurement items from the 63 responses to the first mailing were compared with those for the 41 follow-up responses by means of t-tests. No significant differences between the means of these two different sets of samples were found.

Findings

The mail questionnaire survey results were analysed using the SPSS statistical package and Microsoft Excel.

Managers' needs for support in developing marketing strategy. First of all, a question was asked to identify which individuals have primary responsibility for developing marketing strategy. This question was adapted from Fletcher and Hart (1990). It was designed to clarify who needs computer-based support in developing marketing strategy. Respondents were invited to choose from listed management functional specialisms.

Marketing directors were most frequently cited as having principal responsibility for developing marketing strategy, often jointly with managing directors, sales directors and other relevant business managers (see Table IX).

In order to explore the nature of marketing strategy development and managers' difficulties in developing strategy, respondents were asked to judge whether or not each of the listed statements describes the situation in their own companies, using a modified five point scale derived from O'Keefe (1989). The statements were derived from the relevant research (Moutinho *et al.*, 1993; Curry *et al.*, 1992; McIvor *et al.*, 1992; Wilson and McDonald, 1994; McDonald,

| Position | Percentage |
|--------------------|------------|
| Marketing director | 71 |
| Managing director | 41 |
| Sales director | 25 |
| Other | 21 |

Notes: Respondents were invited to choose from listed managers. Some respondents gave more than one response. The sample size $n = 102$.

Table IX.
Principal responsibility
for developing
marketing strategy

1989a, 1992a; Brownlie and Spender, 1995; Mintzberg, 1994a, 1994b; Porter, 1980b,1987). In particular, the nature of marketing strategy development was measured by using five component items (see Table X). Managers' difficulties in developing marketing strategy were measured by using seven items (see Table XI). The responses and calculated Cronbach's alpha values are given in Tables X and XI, respectively.

As may be seen in Table X, in regard to the nature of marketing strategy development, the majority of respondents strongly agreed or somewhat agreed with the following statements:

- Strategic thinking is essential to developing good marketing strategy.
- Managers need a wide range of relevant information to develop marketing strategy.
- Managers' intuition and judgement are important in developing marketing strategy.
- Systematic analytical approaches are helpful for developing marketing strategy.
- Marketing strategy development involves a high degree of uncertainty and ambiguity.

Moreover, as shown in Table XI, a majority also agreed that: managers lack time to focus intensively and at length on strategic marketing issues.

| Item | Strongly agree (%) | Somewhat agree (%) | Neither agree nor disagree (%) | Somewhat disagree (%) | Strongly disagree (%) | Alpha if item deleted |
|---|--------------------|--------------------|--------------------------------|-----------------------|-----------------------|-----------------------|
| Strategic thinking is essential to developing good marketing strategy (<i>n</i> = 103) | 65.3 | 28.7 | 2.0 | 2.0 | 2.0 | 0.7260 |
| We need a wide range of information to develop marketing strategy (<i>n</i> = 104) | 61.8 | 28.4 | 3.9 | 4.9 | 1.0 | 0.8281 |
| Our intuition and judgement are important in developing marketing strategy (<i>n</i> = 104) | 31.4 | 51.0 | 8.8 | 6.9 | 2.0 | 0.7390 |
| Systematic analytical approaches are helpful for developing marketing strategy (<i>n</i> = 104) | 29.4 | 51.0 | 14.7 | 4.9 | 0 | 0.7681 |
| Marketing strategy development requires managers to deal with issues that involve a high degree of uncertainty and ambiguity (<i>n</i> = 41) | 23.1 | 38.5 | 20.5 | 15.4 | 2.6 | 0.7786 |

Note: Cronbach's alpha for the overall measure is 0.8088. *n* denotes the sample size

Table X.
The nature of
marketing strategy
development

| Item | Strongly agree (%) | Somewhat agree (%) | Neither agree nor disagree (%) | Somewhat disagree (%) | Strongly disagree (%) | Alpha if item deleted |
|--|--------------------|--------------------|--------------------------------|-----------------------|-----------------------|-----------------------|
| We lack time to focus intensively and at length on strategic issues (<i>n</i> =104) | 23.5 | 42.2 | 12.7 | 13.7 | 7.8 | 0.8559 |
| We have difficulties in analysing relevant strategic information (<i>n</i> =104) | 7.8 | 38.2 | 15.7 | 26.5 | 11.8 | 0.8303 |
| We have difficulties in gaining proper insights into our company's competitive position (<i>n</i> =104) | 6.9 | 31.4 | 13.7 | 27.5 | 20.6 | 0.8503 |
| We have insufficient knowledge and skills in developing marketing strategy (<i>n</i> =104) | 3.9 | 30.4 | 13.7 | 24.5 | 27.5 | 0.8428 |
| We have difficulties in gaining a proper perspective of the alternative strategies (<i>n</i> =104) | 6.9 | 25.5 | 22.5 | 32.4 | 12.7 | 0.8335 |
| We have difficulties in understanding various factors affecting the development of marketing strategy (<i>n</i> =103) | 1.0 | 34.7 | 19.8 | 28.7 | 15.8 | 0.8294 |
| We have difficulties in understanding various competitive forces (<i>n</i> =104) | 1.0 | 18.6 | 21.6 | 43.1 | 15.7 | 0.8343 |

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Table XI.
Managers' difficulties in developing marketing strategy

Note: The overall measure has a Cronbach coefficient alpha of 0.8593. *n* denotes the sample size.

A substantial minority of the respondents also agreed that they have difficulties in:

- analysing relevant strategic information;
- gaining proper insights into their own competitive position;
- acquiring knowledge and skills in developing marketing strategy;
- gaining a proper perspective of the alternative strategies;
- understanding various factors affecting the development of marketing strategy.

A rather smaller minority (19.6 per cent) felt that they have difficulty in understanding various competitive forces.

It does appear from Table XI that many respondents claim they do not have difficulties with some aspects of strategy development. This might not necessarily imply that managers do not have these difficulties. It could be that some managers may not realise the difficulties or may be reluctant to admit their problems.

When the respondents were asked, in open-ended question format, what key information they needed in developing marketing strategy, 75 managers answered the question. Content analysis was used to analyse these responses. There were 280 occasions (phrases). These were classified into seven different content categories as shown in Table XII. Two observers coded the answers independently. The inter-observer agreement was measured according to the guidelines in Robson (1993). First, a two-dimensional matrix ("confusion" matrix) was used to identify the pattern of agreements and disagreements between the two observers. Secondly, the proportion of agreement was calculated, and found to be 0.867. Thirdly, the proportion expected by chance was computed. The total chance proportion for all seven codes was found to be 0.289. Finally, Cohen's Kappa was obtained, which in this case was 0.813. According to Fliess (1981), a Kappa value of above 0.75 indicates excellent reliability. The findings are presented in Table XII.

When the respondents were asked, in an open-ended question, what computer-based support they needed most in developing marketing strategy, 67 managers replied. Similarly, these responses were analysed by content analysis. Managers' answers were allocated into four different content headings. There were 145 occasions (phrases) in the answers. The phrases were coded independently by two observers. The proportion of agreement was found to be 0.917. The proportion expected by chance was 0.334. The value of Cohen's Kappa was found to be 0.875. The findings are listed in Table XIII.

Current provision of computer-based information systems. To investigate the current provision of computer-based systems, respondents were asked whether or not their companies currently use computer-based systems to support the development of marketing strategy. Of the 104 responding companies, 86 companies (85 per cent) answered "yes" to this question. In order to investigate

| Content category | Frequency of observed agreement | Percentage agreement |
|---|---------------------------------|----------------------|
| Market size, structure, segments, channels, growth rate, trends and profit potential | 86 | 30.7 |
| Competitors' market share, strategies and activities | 51 | 18.2 |
| Customers' requirements for products, prices and services | 34 | 12.1 |
| Political, economic, social and technological environment and trends | 17 | 6.0 |
| The company's competitive strengths and weaknesses including image, product, price, market share, resources, etc. | 42 | 15.0 |
| External opportunities and threats | 7 | 2.5 |
| Corporate plan, objectives and strategies | 6 | 2.1 |

Table XII.
Key information
managers most need

Note: The number of respondents is 75. There are 280 occasions (phrases). Cohen's Kappa is 0.813

what types of computer-based systems are currently used in their companies for developing marketing strategy, the respondents were also asked to select from listed computer-based systems. The replies are summarised in Table XIV.

As Table XIV shows, the most common support is provided by general IT tools; spreadsheets and database systems are used by the vast majority of respondents. Nearly half of the respondents reported currently using marketing information systems, which is a greater proportion than might have been anticipated from the literature. Executive information systems (25 per cent) and decision support systems (15.5 per cent) have a reasonable presence, but only 6 per cent of the respondents reported currently using expert systems in support of marketing strategy development.

When the respondents were asked about the provision of the systems currently used, the information in Table XV was obtained. As shown in the table, seven items were used to measure the current provision of computer-based systems. The items for measuring system provision were designed on the basis of previous relevant work (Molloy and Schwenk, 1995; Wilson and McDonald, 1994; Mintzberg, 1994a, 1994b, 1994c; Brownlie and Spender, 1995). The responses all took the form of a five-point scale adapted from Molloy and Schwenk (1995), where 1 = no help at all, 3 = moderately helpful, and 5 = completely helpful. It appears that current systems fail to provide even

| Content category | Frequency of observed agreement | Percentage agreement |
|---|---------------------------------|----------------------|
| Appropriate computer-based systems for marketing strategy development | 70 | 48.3 |
| Strategic analysis tools and models | 15 | 10.3 |
| Provision of relevant strategic information | 23 | 15.8 |
| Strategic analysis knowledge and skills support | 25 | 17.2 |

Note: The number of respondents is 67. There are 145 occasions (phrases). Cohen's Kappa is 0.875

Table XIII.
Computer-based support managers most need

| Systems | Percentage |
|-----------------------|------------|
| Database | 91.7 |
| Spreadsheets | 90.5 |
| Marketing information | 48.8 |
| Executive information | 25.0 |
| Decision support | 15.5 |
| Expert | 6.0 |
| Other computer-based | 6.0 |

Note: Respondents were asked to select from listed systems. Many respondents gave more than one response. The sample size $n = 86$

Table XIV.
Computer-based systems used in developing marketing strategy

Table XV.
Current provision of
computer-based
systems

| Item | Mean score | Standard deviation | Alpha if item deleted |
|---|------------|--------------------|-----------------------|
| Meet information needs ($n = 84$) | 3.06 | 0.83 | 0.8616 |
| Help couple analysis with judgement ($n = 83$) | 2.60 | 1.01 | 0.8197 |
| Provide strategic analysis assistance ($n = 84$) | 2.55 | 0.98 | 0.8242 |
| Help strategic thinking ($n = 84$) | 2.54 | 0.95 | 0.8301 |
| Help understand marketing strategy factors ($n = 82$) | 2.13 | 0.90 | 0.8418 |
| Cope with uncertainty ($n = 40$) | 2.18 | 1.07 | 0.8319 |
| Improve strategy formulation practice ($n = 84$) | 2.51 | 0.93 | 0.8257 |

Note: Measuring scale: 1 – no help at all, 2 – somewhat helpful, 3 – moderately helpful, 4 – very helpful, 5 – completely helpful. Cronbach’s alpha for the overall measure is 0.8544. n denotes the sample size

moderate help for most requirements, except perhaps for “meeting information needs”. The calculated Cronbach’s alpha for the construct (and the alphas if individual items are deleted) are given in Table XV.

The gaps between managers’ needs and current provision of computer-based systems When the respondents were asked how satisfied they are with the computer-based systems currently used in developing marketing strategy, the results in Table XVI were obtained. All the questions took the form of a modified five-point scale adopted from Molloy and Schwenk (1995), where 1 = very dissatisfied, 2 = dissatisfied, 3 = moderately satisfied, 4 = satisfied, and 5 = very satisfied.

Table XVI shows that the majority (55 per cent) of the responding managers are dissatisfied or very dissatisfied with the computer-based systems currently used in developing marketing strategy. Only 9 per cent of the managers are satisfied by the current provision, and no one is very satisfied. This is consistent with the results in Table XV. It does appear that there are gaps between managers’ needs and the current provision of computer-based systems.

To explore what factors might lead to this dissatisfaction, respondents were invited to select from listed factors. These factors were developed based upon

| | |
|----------------------|-------|
| Very dissatisfied | 8.2% |
| Dissatisfied | 47.1% |
| Moderately satisfied | 35.3% |
| Satisfied | 9.4% |
| Very satisfied | 0 |
| Mean score | 2.46 |
| Standard deviation | 0.78 |

Table XVI.
The extent of
managers’ satisfaction

Note: Measuring scale: 1-very dissatisfied, 2-dissatisfied, 3-moderately satisfied, 4-satisfied, 5-very satisfied. The sample size $n = 86$.

the work of McDonald (1992a), Mintzberg (1994a, 1994b, 1994c), Belardo *et al.* (1994) and Brownlie and Spender (1995). The principal factors contributing to dissatisfaction are shown in Table XVII. Limited support capabilities and the inability to couple analysis with managers' intuition and judgement were mentioned most frequently.

To investigate which factors hold companies back from using (or making further use of) computer-based systems to support the development of marketing strategy, respondents were asked to choose from listed factors. The listed factors were derived from the literature (Wilson and McDonald, 1994; Cottrell and Rapley, 1991; Mintzberg, 1994a, 1994c). The findings are given in Table XVIII.

As Table XVIII indicates, the main factors which hold companies back are a lack of appropriate computer-based systems, a lack of necessary data and information, and a lack of knowledge and skills in developing or using computer-based systems.

Many managers of large companies who replied to the questionnaire survey would like to be further involved in this study. When the respondents were asked whether or not they would be willing to evaluate a prototype system for developing marketing strategy, 41 responded positively.

| Factor | Percentage |
|--|------------|
| The individual computer-based system used is limited in support capabilities for developing strategy ($n = 70$) | 54.3 |
| The computer-based systems used cannot couple strategic analysis with managers' judgement and intuition ($n = 70$) | 53.6 |
| The particular strategy analysis models employed are limited in function and scope ($n = 70$) | 38.6 |
| The computer-based systems we have used do not match managers' real needs ($n = 70$) | 32.9 |
| The computer-based systems cannot deal with uncertainty and ambiguity ($n = 41$) | 22.9 |
| The computer-based systems are difficult to use ($n = 70$) | 10.0 |

Note: Respondents were asked to select from listed factors. Most respondents gave more than one response. n denotes the sample size

Table XVII.
Principal factors contributing to managers' dissatisfaction

| Factor | Percentage |
|--|------------|
| Lack of appropriate computer-based systems | 61.6 |
| Lack of required data and information | 55.8 |
| Lack of knowledge and skills in computer-based systems | 34.9 |

Note: Respondents were invited to choose from listed factors. Most respondents gave more than one response. The sample size $n = 86$

Table XVIII.
Main factors holding companies back from using computer-based systems

Conclusion and further work

This research sought to explore computer-based support for developing marketing strategy. In this paper, the needs for computer-based support in developing marketing strategy have been clarified. The current state of computer-based support for marketing strategy formulation has also been examined. In particular, the strengths, weaknesses and underlying problems of relevant support systems have been identified. It is evident that most current computer-based systems for developing marketing strategy exhibit a disappointing degree of success.

The mail questionnaire survey found that, in most instances, marketing directors and managing directors have primary responsibility for developing marketing strategy, and thus are the persons for whom support should be provided. It is also clear that, from the point of view of the surveyed managers: strategic thinking is essential to developing good marketing strategy; managers' judgement is important in developing marketing strategy; systematic analytical approaches are helpful for developing marketing strategy; marketing strategy development involves a high degree of uncertainty and ambiguity. Moreover, the computer-based support managers need most includes: appropriate computer-based information systems; the provision of relevant strategic information; marketing strategy analysis models and tools; and strategic analysis knowledge and skills assistance.

The mail questionnaire survey also revealed that many companies currently use computer-based systems to support the development of marketing strategy. Database systems and spreadsheets are almost universal; marketing information systems are used by approximately half of the respondents' companies. Some companies currently use executive information systems and decision support systems to support marketing strategy development, but few use expert systems. It is also evident that most current systems fail to provide even a moderate level of help in most aspects of the process of developing marketing strategy.

Not surprisingly, therefore, the survey results also show that most responding managers are dissatisfied or very dissatisfied with the computer-based systems currently used in developing marketing strategy. It appears that the five principal factors contributing to managers' dissatisfaction are: the individual system used is limited in support capabilities; the system used cannot couple strategic analysis with managers' judgement; the particular strategy analysis models employed are limited in function and scope; the systems used do not match managers' real needs; and the systems used cannot deal with uncertainty. In addition, three main factors holding companies back from using or making further use of computer-based systems seem to be a lack of appropriate computer-based systems, a lack of required data and information to drive the systems, and a lack of knowledge and skills in the use of computer-based systems.

A major limitation of this study is the low response rate. However, according to the t-test results, there are not significant differences in the size and turnover

between the 104 respondent companies and the population of UK manufacturing companies with more than 500 employees. Even so, care is still needed in generalising the survey results to the whole population of UK large manufacturing companies. Even more caution needs to be exercised in any attempt to generalise more widely beyond manufacturing, although the issues explored are not specific to the manufacturing sector. The evidence presented here, therefore, is exploratory and tentative.

Despite the limitations, this study represents a first attempt to explore managers' information and computer-based support requirements for marketing strategy development; the provision of current computer-based systems; the gaps between the identified needs and current provision; and causes of managerial dissatisfaction. The results of the study provide important evidence for both researchers and designers of computer-based support for developing marketing strategy. The findings reported here provide useful guidance and suggest implications for further research in this field.

Having recognised managers' needs for computer-based support in developing marketing strategy and the gaps between those needs and the current provision of computer-based systems, it should be possible to develop effective computer-based systems to better meet manager's identified needs for support, and to fill the existing gaps. To progress this study, a framework for a hybrid intelligent system in support of marketing strategy development has been established (Li, 1998; Li *et al.*, 1998). Furthermore, a hybrid intelligent system for developing marketing strategy, which integrates the strengths of different support techniques and technologies, has been developed by the first named author to assist strategic analysis; to support the coupling of strategic analysis with managers' judgement; to help strategic thinking; to help managers cope with uncertainty; and to support the assessment of strategic marketing factors based on the opinions of a board of directors. Field work has also been undertaken by the first named author to test and evaluate the hybrid intelligent system in five large companies in the United Kingdom.

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